Genetic Epidemiological Perspectives on Alcohol Use and Dependence

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Kenneth S Kendler MD
Virginia Institute for Psychiatric and Behavioral Genetics
Outline of Talk

1. Examine the specificity of genetic risk factors for alcohol abuse/dependence.
2. Explore the changing role of shared environment and genes in influencing alcohol intake over development.
3. Examine the sources of individual differences over development in self-ratings of alcohol availability.
Outline of Talk

4. Determine the role of genetic factors in determining the social environment.
5. Use genetic epidemiological methods to disentangle the causal inter-relationships between person and peer group deviance.
Specifity of Genetic Risk Factors for Alcohol Abuse/Dependence

• Sample -- over 4,500 members of male and female twin pairs from the Virginia Twin Registry, all personally interviewed.

• First analysis -- 7 common psychiatric and substance use disorders assessed at personal interview.

• Second analysis – Abuse/dependence of 5 psychoactive substances
  – 3 licit: caffeine, nicotine and alcohol
  – 2 illicit substances: cannabis and cocaine.
Genetic Sources of Comorbidity in Common Psychiatric And Drug Use Disorders

- Major Depression
- GAD
- Phobia
- Alcohol Depend
- Drug Abuse or Dep
- Adult Antisocial Behavior
- Conduct Disorder

DEP = dependence
GAD = generalized anxiety disorder
Individual Differences in Psychoactive Substance Use Across the LifeSpan

- Use of calendar data from this same sample.
- Useful data on nicotine, caffeine, alcohol and cannabis. Will only look at alcohol use here.
- Look at univariate results across years of age
Sources of Individual Differences in Self-Report Alcohol Availability

- Measures of average alcohol intake retrospectively reported by the life history method for each year up to their present age.
- ~750 male-male twin pairs.
- From the third interview wave with male-male twins, completed in 1998-2004 by 1796 male twins (75%) who had participated in the second interview. Subjects were 24-62 years old (mean age = 40.3 years, SD = 9.0).
Individual Person Trajectories of Alcohol Consumption

Alcoholic Drinks per Month vs. Person Year Ages
Additive genetic

Shared environment

Non-shared environment

Unstandardized variance

Standardized variance

8-11yrs
12-14yrs
15-17yrs
18-21yrs
Models of Development

• How to begin to understand the developmental pathways through which genetic and environmental risk factors contribute to externalizing disorders.

• Do we need to move away from the static model of genetic effects that are often assumed in cross-sectional twin studies and in linkage and association studies?
Examples of Items for PGD

• How many of your friends would have
  – Smoked cigarettes
  – Had problems with alcohol
  – Been in trouble with the law
  – Cheated on school tests
  – Sold or gave drugs to other kids
Modeling Time and the Environment Together – Dynamic Changes in our Social Environment

- Measures of peer group deviance retrospectively reported by the life history method.
- ~750 male-male twin pairs.
- Five ages assessed.
- The third interview wave, restricted to male-male twins, was completed in 1998-2004 by 1796 male twins (75%) who had participated in the second interview. Subjects were 24-62 years old (mean age = 40.3 years, SD = 9.0).
Peer Group Deviance

Ages

8-11 12-14 15-17 18-21 22-25

A C E
Joint Developmental Models for PGD and CD

- Same Sample
- Focus on 3 waves – the relationship between personal deviance (CD) and Peer group deviance (PGD)
- Major prior theories
  - Role of social selection CD to PD
  - Versus social causation PD to CD
Models of Development

• Conclusions
  – Variance in peer group deviance grows dramatically with age – most of this is driven by increasing genetic effects. Genes influence how we shape our social world.
Models of Development

• Conclusions
  – Analyses of CD and PD were very illuminating about causal processes. Seems that genetic epidemiologic methods are here able to cleanly divide causal processes – social selection and social causation -- in ways that would be hard to see doing with other methods.
Summary of Talk

1. Genetic risk factors for alcohol abuse/dependence are partly specific and partly non-specific.

2. In early adolescence, shared environmental factors play an important role in individual differences in alcohol intake. With increasing age, genetic factors become more important.
Summary of Talk

3. Examine the sources of individual differences over development in self-ratings of alcohol availability.

4. Through development, genetic factors become increasingly important in influencing our choice of social environment.

5. Genes appear to drive processes of social selection (from individual to peer deviance) while shared environmental factors drive social causation (from peer to individual deviance).
Summary of Talk

6. Implications of these findings for molecular genetic studies of alcohol dependence.
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