



Genetic Theories of Substance Abuse

Psychology 470

Introduction to Chemical Addictions

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Background

- Genetic models are the major part of Nature – Nurture debate
- Early debates focused on alcoholism
- Which causes alcoholism
 - Nature – Biology, Genetics, etc
 - Nurture – Environment
- Many proponents on both sides

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Early Discussions of a Genetic Role in Alcoholism

- Aristotle
 - Drunken women bring forth children like unto themselves
- Hippocrates
- Also observed some diseases run in families.
- Theorists contended that alcoholism was the same.
- Continued until the 20th century

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Genetic Models to Explain Addiction

- Pure Genetics Models
- Recessive Gene Models
- Multiple Combination Models
- Diathesis-Stress Models
- Other

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Concordance Rates

- Defined as the number of people who develop a disease when comparing two groups
- E.g. Families with an alcoholic member have a higher number of offspring who develop alcoholism than families that do not have an alcoholic member
 - Also occurs with other mental disorders as well

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Pure Genetics Models

- Have primarily focused on alcoholism
- Have been around for a long time. Contend that some particular gene causes alcoholism
- Early theories used markers (hair color or eye color)
- Looked at concordance rates
- Problem, no real evidence to support the model

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Evidence before Jellinek

- Lots of discussion
- Was tied to the disease model
- No solid evidence to support the genetics model

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Jellinek

- In his analysis, found alcoholics went through different stages, also had different types.
- Contended alcoholics had "something" that made them different from individuals who drank alcohol
 - Called the variable the "X" factor

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Consequences

- Jellinek did not identify the "X" factor.
 - Did not have enough evidence to say what it was
 - That did not stop others "Primarily in AA" to say the "X" factor was a genetic difference.
 - Result - Became Dogma
 - You either buy into the model or suffer the consequences.
- Problem, still no real evidence to support the model.

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Twin Studies (Goodwin)

- Had been observed for centuries that offspring of alcoholics had a higher rate of developing alcoholics.
- Goodwin began to examine rates of alcoholism among twins

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Fraternal Twin Studies

- Compared concordance rates of alcoholism between fraternal twins and offspring who were not twins
- Found that fraternal twins had higher concordance rates of alcoholism than offspring that were not twins
- Conclusion, this was evidence to support the contention that alcoholism was genetic

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Problem

- Were correlational designs
- The rates while statistically significant were not that large practically
 - Face validity issue
- Fraternal twins also interact differently than non-twins
 - Also raised in the same environment
 - Is a nurture issue

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Monozygotic Twin Studies

- Are twins who share the same genetic information at birth
- Monozygotic twins had a higher concordance rate for alcoholism than fraternal twins and non-twin offspring
- That is, when one twin developed alcoholism, the other twin had a higher probability of developing alcoholism

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Problems

- Monozygotic twins are not like other twins. They do similar things.
 - E.g. same clothes
 - They share the same environment
 - Same problems
- Also is a correlational design

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Adoption Studies

- To resolve the problems with previous twin studies, Goodwin looked for monozygotic twins that were separated shortly after birth (usually due to parental fatalities).
- Found some European countries kept records of these twin groups.
- So, compared monozygotic, fraternal, and non-twin groups

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Result

- Found that when one monozygotic twin was an alcoholic, 60% of the time the other twin was an alcoholic.
- This was held as “the” definitive study that genetics caused alcoholism
- Used by all of the proponents for the model

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Problem

- If 60% of the time the person became an alcoholic, what about the other 40 percent that did not become an alcoholic?
- Again, despite the controls, it is still a correlational design.
- Only applies to alcoholism
- If there is a gene for alcoholism, is cocaine or heroin addiction genetic as well? If so, what gene causes them?
- Alternative explanation, if one gene does not cause the problem, what gene does?

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Alternative 1: Multiple Gene Models

- It must be that there are multiple genes that cause alcoholism.
- You must have ALL of the genes
- Problem, Monozygotic twins by definition have the same genetics. So, when one person is alcoholic, their twin should become alcoholic
- Does not occur
- Also, what about other drugs?

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Alternative 2: Recessive Gene Models

- If not all monozygotic twins develop alcoholism, there must be recessive gene that is expressed in some of the monozygotic twins (results in alcoholism) and is not expressed in the other monozygotic twin (results in no alcoholism).
- Problem
 - Which are the gene's
 - How does it explain other types of substance abuse?

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Alternative 3: Diathesis – Stress Models

- Contends you have a genetic predisposition to alcoholism but you must have the right environment before you become an alcoholic.
- Explains the Goodwin twin studies

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Problem

- Which is the right environment?
 - Some people live with alcoholics but do not develop alcoholism
 - Others do not live with alcoholics but become alcoholics.
- What about other substances?
 - Why do some people never become heroin addicts but are around the substance?
- Also, which is the right gene

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Alternative 4: Biochemical changes

- One gene does not cause one substance abuse disorder, what it does is change the brain biochemistry, levels of some neurotransmitter, or reward pathway.
- Problems
 - All of the research is correlational [despite the techniques used (PET)]
 - Data is inconsistent

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Human Genome Study

- Looked at identifying genes that might cause alcoholism
 - Some have been identified that might have a role
 - None have been identified that specifically cause alcoholism

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Conclusions

- There are a lot of genetic models
- Each has major problems
- So, is alcoholism genetic?
- Answer: As of this time, the evidence does not support that alcoholism is genetic.
- Definitely does not support that other substance abuse disorders are genetic.
- Do we have genes for cocaineism, methamphetamineism, heroinism, etc?

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Implications

- So, if alcoholism or substance abuse is not genetic, what does that mean to clients?
- Answer, nothing
 - The person still has the problem
 - The therapeutic techniques are the same

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What does it mean to academics?

- Answer, A lot
 - Directly goes at the heart of why a person becomes an alcoholic
 - If alcoholism is a learned behavior, with appropriate training, it could be unlearned – Can become social drinkers
 - Some evidence to support this contention
 - Sobell studies, Miller studies, Shuckett studies
- Problem,
 - While some individuals become social drinkers with or without treatment, others revert to out of control drinking.
 - How do you determine which treatment to use
 - Currently cannot do with high reliability

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Other Explanations

- Alcoholism and all substance abuse is a learned behavior
- Results in brain biochemical changes
- This results in behavioral changes, out of control drinking, etc.
- Changes take a long time to change or recover

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As discussed earlier

- May have lots of different types of alcoholics
- May need different types of treatment
 - Education
 - Retraining a person to drink
 - Abstinence
- This model does not work for other drugs
 - Due to high tolerance and addiction potential

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If Genetic What are the Political Implications?

- General population does not believe it is genetic.
- If it is genetic, allows the person to not take responsibility for their behavior
- Court/legal issues as well
 - Can you get off because you are alcoholic or a substance user
 - Court can monitor your behavior
- Mental illness issues
 - Could be institutionalized for a mental condition
- Insurance issues

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Point to Note

- It does not matter where one stands academically, if the client is in out of control drinking or has health issues, abstinence is probably the best approach
- However, if one has tried multiple abstinence models and has not controlled the problem, then other solutions may be needed
 - Medications
 - Controlled drinking
 - Harm reduction

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Depends on the client's condition.

- Many clients need abstinence
- Some do not
 - A teen caught drinking at a party probably does not need inpatient treatment unless they are experiencing tolerance and withdrawal symptoms
- Thus, a thorough assessment of the client's condition is needed

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Conclusion

- Lots of issues
- Has a lot of issues
- Causes a lot of controversy
- Needs significantly more EXPERIMENTAL research
- Does not really need more CORRELATIONAL research

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