



Etiology and Natural History of Alcoholism

NIAAA Social Work Education
Module 2

(revised 3/04)



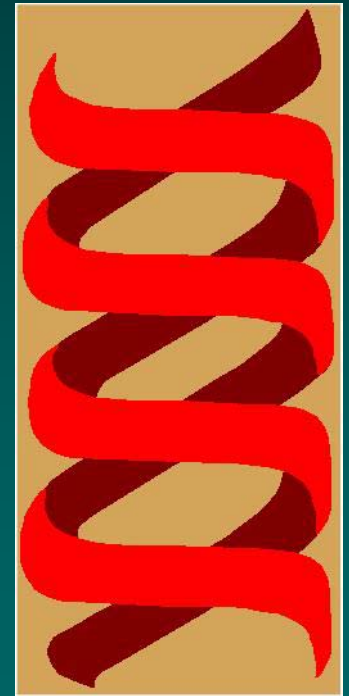
Outline

- A. Genetic and Biological Basis of Alcoholism
- B. Cognitive Factors
- C. Childhood Problems, Temperament
- D. Psychological Models of Etiology
- E. Sociocultural Models and Causality
- F. Clinical Heterogeneity
- G. Conclusions



Genetic Basis of Alcoholism

- Alcohol dependence is a complex disorder
- Many pathways lead to the development of alcohol dependence
- Many genes are likely involved in the development of alcohol dependence



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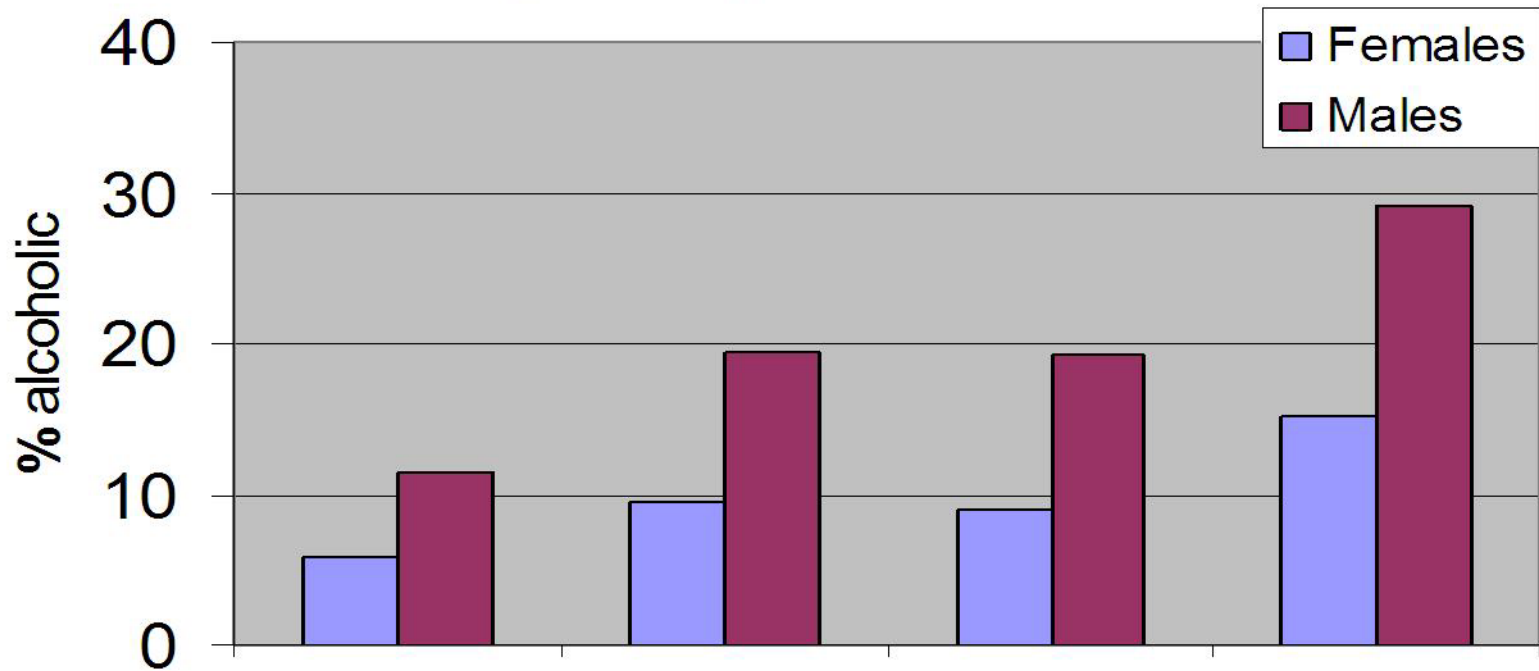


Genetic Basis of Alcoholism (cont'd)

The evidence of a genetic basis for alcohol dependence comes from a variety of sources:

- Pedigree studies of large, multigenerational families
- Studies of adoptees
- Studies of identical (MZ) and fraternal (DZ) twins

Rate of Alcoholism as a Function of Family History Among Current Drinkers



FHN = no
fam hx of
alcoholism

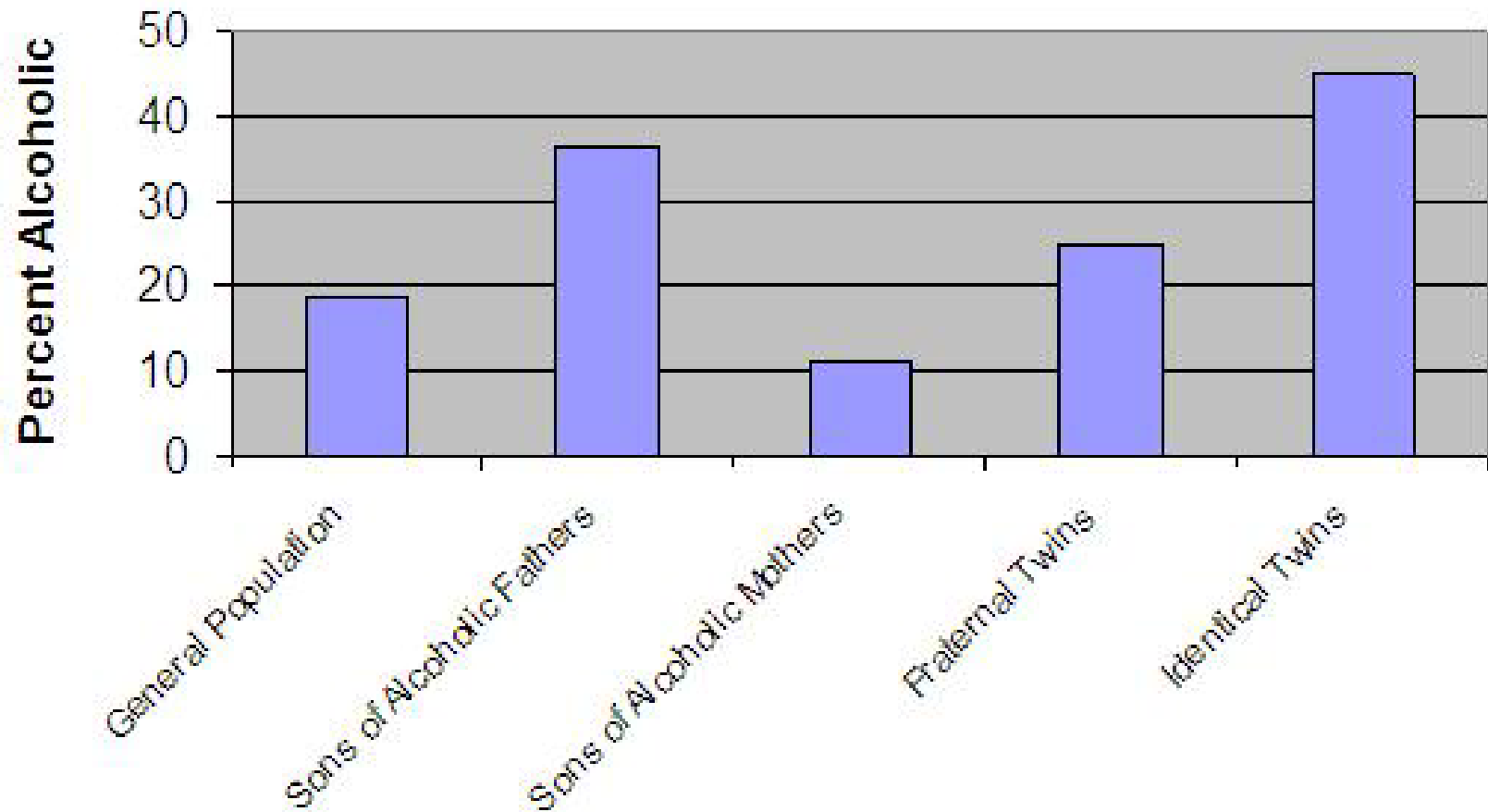
FHP1 = hx
alcoholism
2nd or 3rd
degree
relatives
only

FHP2 = hx
alcoholism
1st degree
relatives
only.

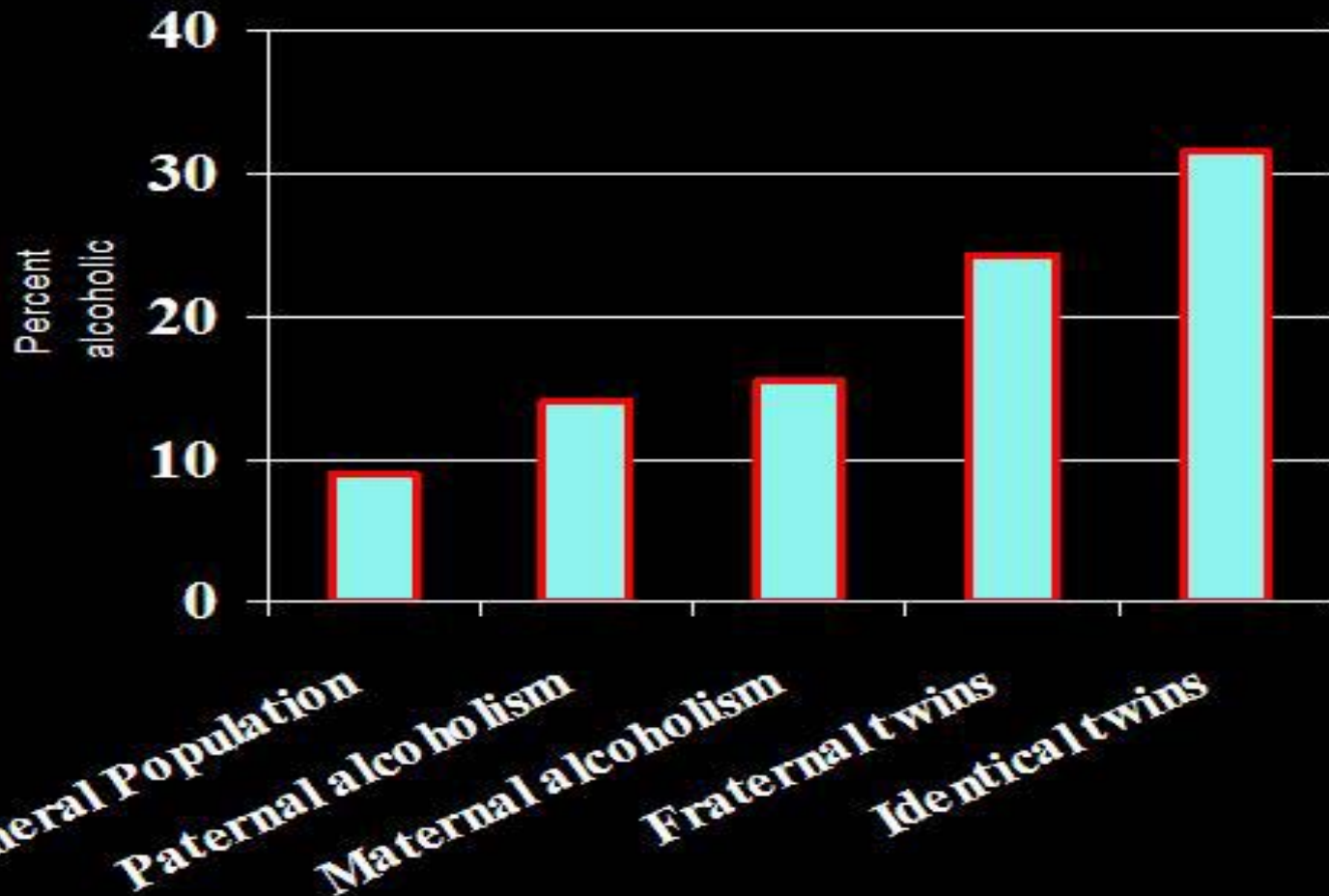
FHP3 = hx
alcoholism
1st degree
relatives +
either 2nd/3rd
degree
relatives

Source: Dawson
et al., 1992

Estimated Rate of Alcoholism in Men Among Relatives of an Alcoholic



Alcoholism among Female Relatives of an Alcoholic



Same-Sex Twin Concordance for Alcoholism in MALE Samples

Study	Diagnosis	Concordance MZ	DZ	Relative Risk
Kaij (1960)		0.71 (n=14)	0.32 (n=31)	2.2*
Hrubec and Omenn (1981)		0.26 (n=271)	0.12 (n=444)	2.2*
Gurling, et al (1984)		0.33 (N=15)	0.30 (N=20)	1.1
Pickens, et al (1991)				
Alcohol dependence		0.59 (n=39)	0.36 (n=47)	1.6*
Alcohol abuse and/or dependence		0.76 (n=50)	0.61 (n=64)	1.3*
McGue, et al (1991)				
Alcohol abuse and/or dependence		0.77 (n=85)	0.54 (n=96)	1.4*
Caldwell and Gottesman (1991)				
Alcohol dependence		0.40 (n=20)	0.13 (n=15)	3.1*
Alcohol abuse and/or dependence		0.68 (n=28)	0.46 (n=26)	1.5*
Allgulander, et al (1991)		0.40 (n=2293)	0.36 (n=3691)	1.1

*mz-dz difference in concordance significant at $p < 0.05$.

Same-Sex Twin Concordance for Alcoholism in FEMALE Samples

Study	Diagnosis	Concordance MZ	DZ	Relative Risk
Gurling, et al (1984)		0.08 (N=13)	0.13 (N=8)	0.6
Pickens, et al (1991)				
Alcohol dependence		0.25 (n=24)	0.05 (n=20)	5.0*
Alcohol abuse and/or dependence		0.36 (n=31)	0.25 (n=24)	1.4
McGue, et al (1991)				
Alcohol abuse and/or dependence		0.39 (n=44)	0.42 (n=43)	0.9
Caldwell and Gottesman (1991)				
Alcohol dependence		0.29 (n=7)	0.25 (n=12)	1.2
Alcohol abuse and/or dependence		0.47 (n=17)	0.42 (n=24)	1.1
Allgulander, et al (1991)		0.62 (n=2736)	0.51 (n=4164)	1.2
Kendler, et al (1992)		0.32 (N=81)	0.24 (N=79)	1.3*

*MZ-DZ difference in concordance significant at $p < 0.05$.

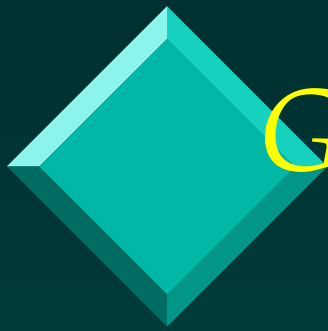
Adoptee Risk of Alcoholism by Alcoholism in Biological Parents

Study	Positive	Negative	Relative Risk
M A L E S			
Roe (1945)	0.0 % (n = 21)	0.0 % (n = 11)	(1.0)
Goodwin et al. (1973)	18.0 % (n = 55)	5.0 % (n = 78)	3.6 *
Cloninger et al. (1981)	23.3 % (n = 291)	14.7 % (n = 571)	1.6 *
Cadoret et al. (1985)	61.1 % (n = 18)	23.9 % (n = 109)	2.6 *
Cadoret et al. (1987)	62.5 % (n = 8)	20.4 % (n = 152)	3.1 *
F E M A L E S			
Roe (1945)	0.0 % (n = 11)	0.0 % (n = 14)	(1.0)
Goodwin et al. (1977)	2.0 % (n = 49)	4.0 % (n = 47)	0.5
Bohman et al. (1981)	4.5 % (n = 336)	2.8 % (n = 577)	1.6 *
Cadoret et al. (1985)	33.3 % (n = 12)	5.3 % (n = 75)	6.3 *

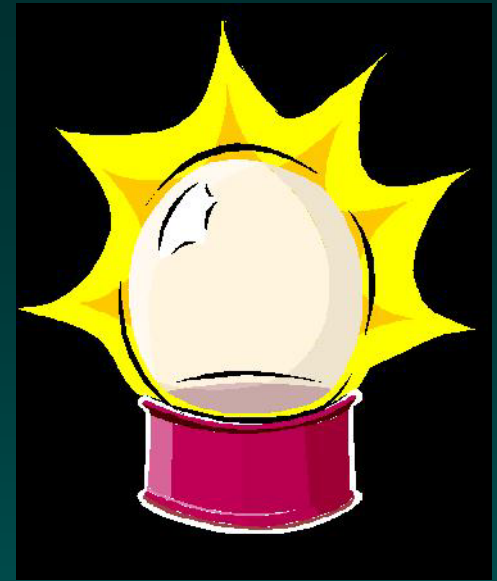
Risk of Alcoholism by Alcoholism in Adoptive Parents

Study	Positive	Negative	Relative Risk
MALES			
Goodwin et al. (1973)	12.5% (n = 24)	10.1% (n = 109)	1.2
Cloninger et al. (1981)	13.0% (n = 31)	18.0% (n = 831)	0.7
Cadore et al. (1985)	48.0% (n = 25)	24.5% (n = 102)	2.0*
Cadore et al. (1987)	38.5% (n = 26)	19.4% (n = 134)	2.0*
FEMALES			
Bohman et al. (1981)	3.7% (n = 27)	3.4% (n = 886)	1.1
Cadore et al. (1985)	17.4% (n = 23)	6.3% (n = 64)	2.8*

*Rate in positive adoptive family history group significantly greater than rate in negative adoptive family history group at $p < 0.05$.



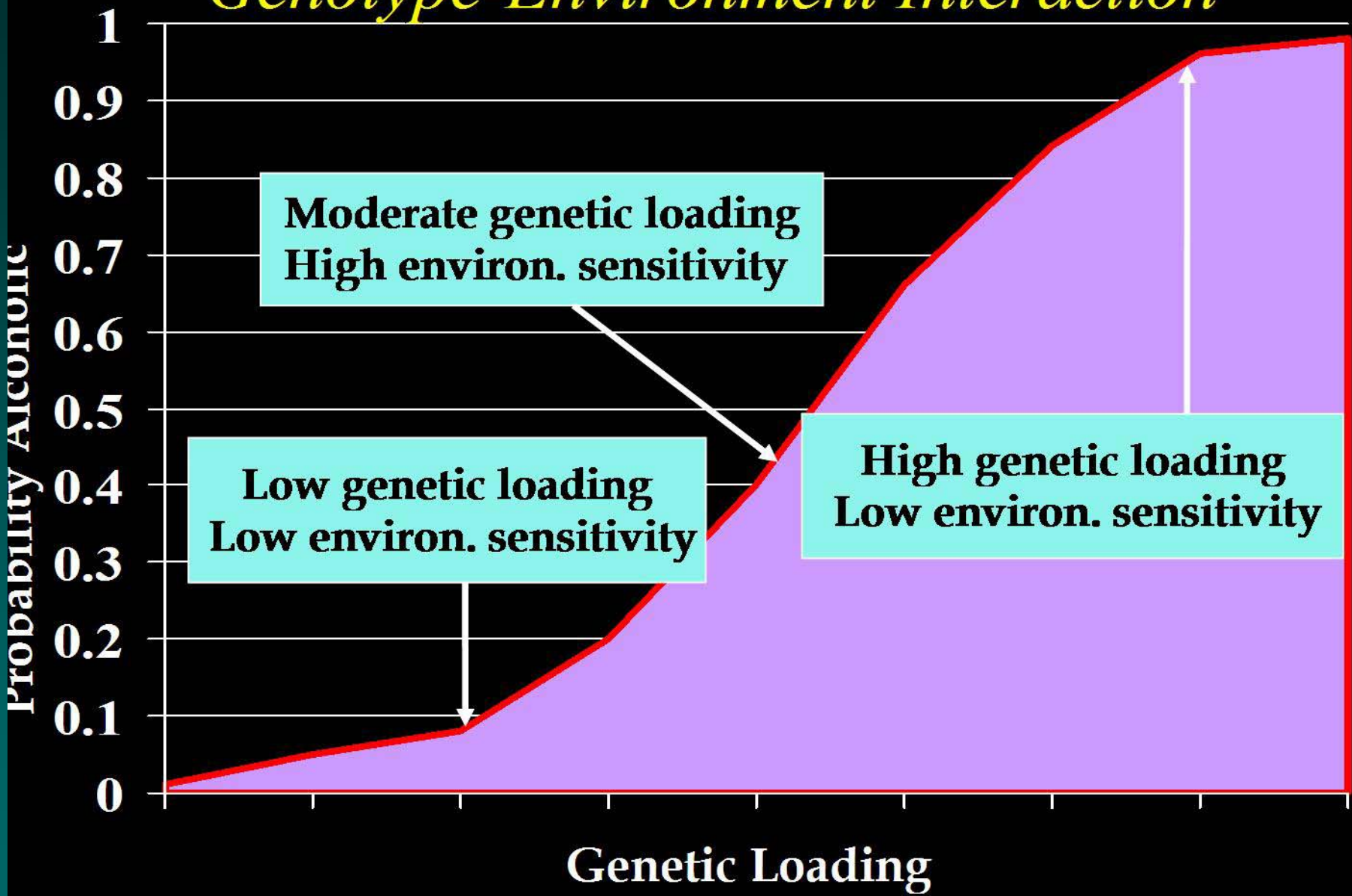
Genetic Factors



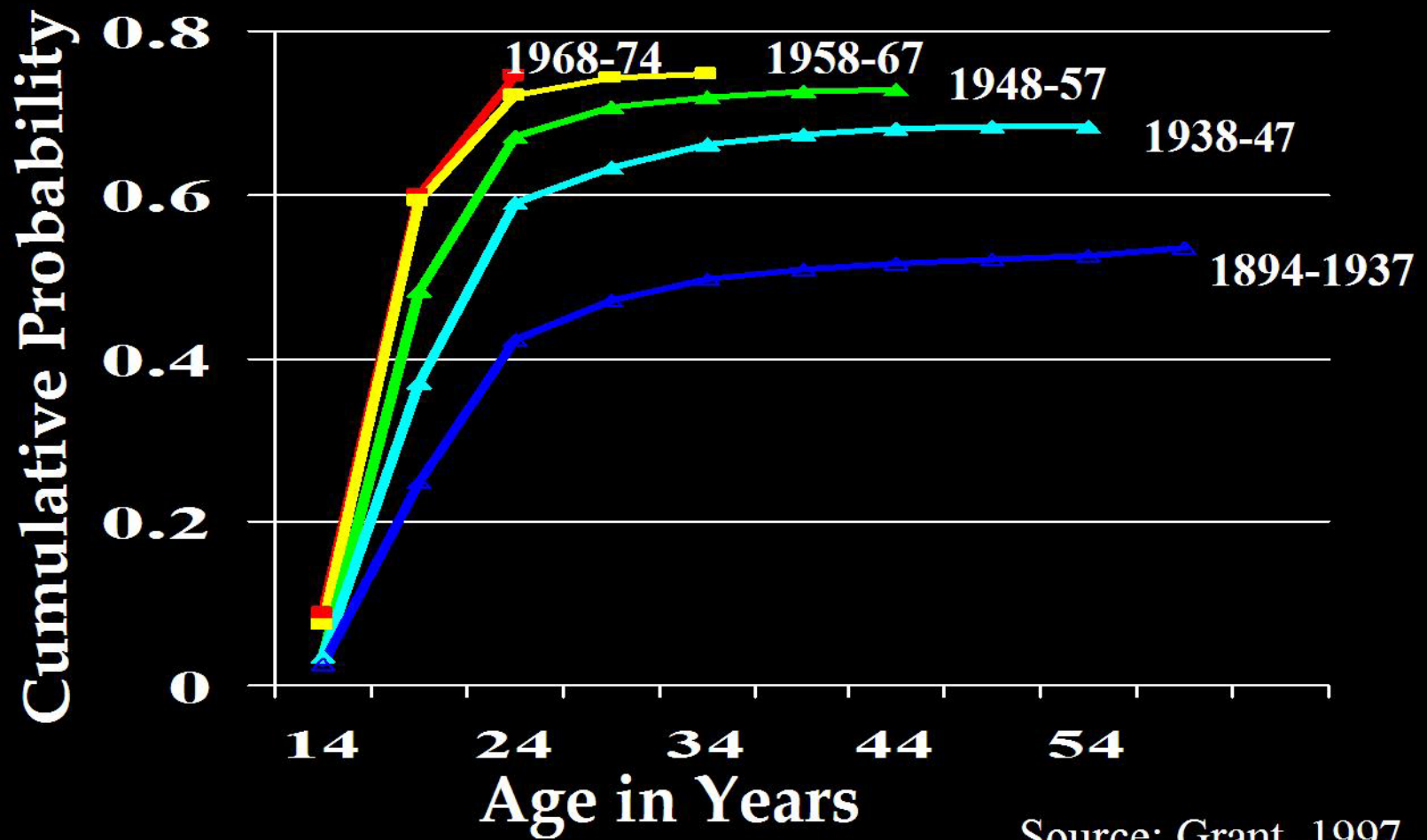
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- Genetics \neq Predestiny
- Genetic factors are related to:
 - an increased vulnerability for alcohol dependence
 - an increased invulnerability for alcohol dependence

Genotype-Environment Interaction

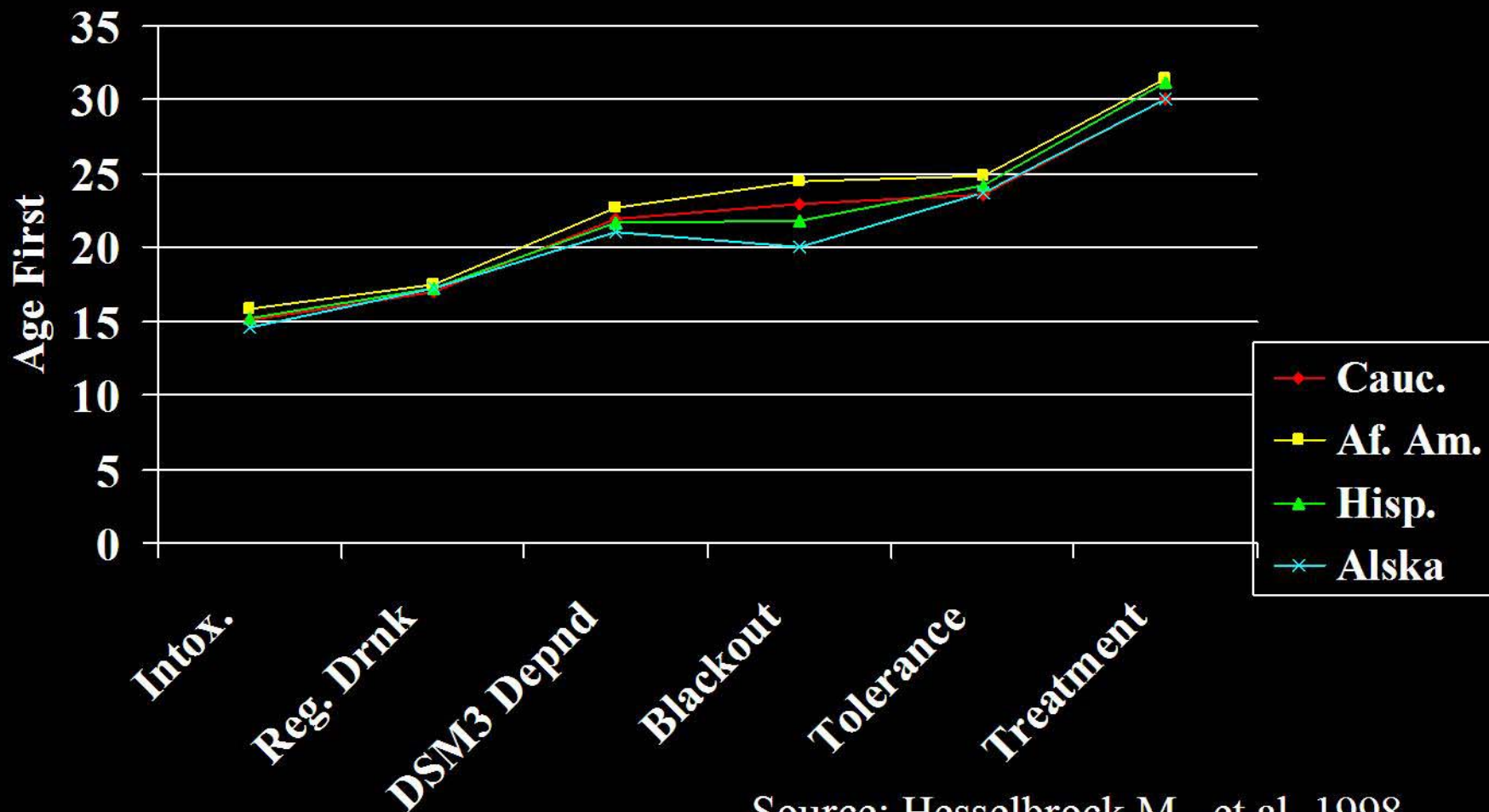


Cumulative Probability of Alcohol Dependence by Birth Cohort



Source: Grant, 1997

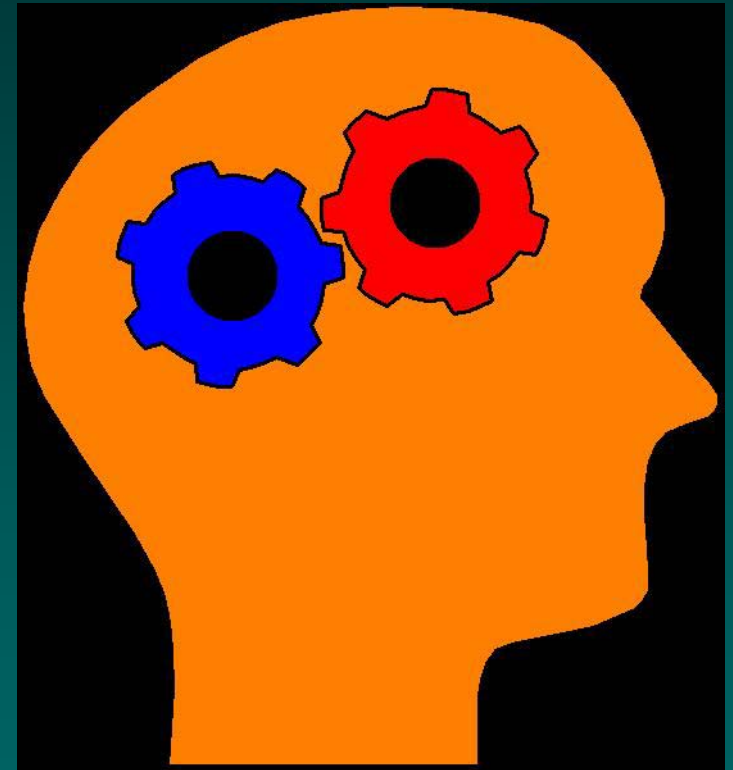
Course of Alcoholism and Ethnicity



Source: Hesselbrock M., et al, 1998

Cognitive Factors and Risk for Alcoholism

- Neuropsychology
 - Memory
 - Attention span
 - Abstract thinking
 - Verbal reasoning
 - Visual-spatial skills
- Electrophysiology
 - EEG/ERP



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Childhood Problem Behavior And Risk for Alcoholism

- Conduct problems
- Attention deficit problems
- Hyperactivity
- Oppositional behavior

*Alcohol-Related
Violence, ASPD, and
Alcoholism by Gender:
COGA Family Study*

		None	ASP	Alc.	Both ¹⁹
	<u>N</u>	<u>5,308</u>	<u>86</u>	<u>3,161</u>	<u>601</u>
<u>Get into Arguments</u>	<u>M</u>	23.3	45.2	76.0	91.2
	<u>F</u>	23.5	41.2	77.7	87.4
<u>Hit/Threw Things</u>	<u>M</u>	9.6	29.0	54.2	77.7
	<u>F</u>	6.7	29.4	48.0	69.9
<u>Hit Family Members</u>	<u>M</u>	1.6	9.7	23.3	43.2
	<u>F</u>	3.3	0	25.4	42.7
<u>Hit Other People</u>	<u>M</u>	2.4	16.1	17.5	43.8
	<u>F</u>	2.1	0	18.2	40.8
<u>Physical Fights</u>	<u>M</u>	16.3	53.2	56.1	82.5
	<u>F</u>	4.5	17.6	34.8	66.0

Source: Hesselbrock, V., et al., 2000



Temperament Traits and Increased Risk for Alcoholism

- Novelty seeking
- Reward dependence
- Harm avoidance
- “Difficult” temperament
- Internalizing / externalizing



Psychological Models of Etiology

- Psychoanalytic models
 - Oral fixation
 - Ego malfunction
- Behavioral
 - Substance use is learned
 - Maintained through conditioning response
- Cognitive
 - Cognition, feelings, direct behavior
 - Alcohol use perceived as positive / negative reinforcement



Psychological Models of Etiology (cont'd)

- Social Learning
 - Focus on cognitive constructs
 - Expectancies
 - Self efficacy
 - Attributions
- Alcohol Expectancies
 - Positive expectancies of effects of alcohol
 - Social facilitation
 - Enhanced sexual performance
 - Increased personal power
 - Social assertiveness / relaxation



Correlations & Causality Cautions

- Possible explanations for an association between variables A & B:

$$A \Rightarrow B$$

$$B \Rightarrow A$$

$$A \Leftrightarrow B$$

$$A \leftarrow C \Rightarrow B$$

*Childhood
Aggression, ASPD,
and Alcoholism by
Gender*

None **ASP** **Alc.** **Both** ¹⁸

N **5,308** **86** **3,161** **601**

Vandalism

M **15.7** **69.7** **30.3** **68.9**

F **4.6** **55.0** **17.2** **57.3**

Physical Fights

M **8.1** **57.6** **22.8** **58.6**

F **3.5** **40.0** **15.6** **55.3**

Used a Weapon

M **2.5** **36.4** **9.4** **39.2**

F **1.8** **15.0** **7.3** **34.0**

Injured Others

M **2.7** **28.8** **6.0** **23.7**

F **1.3** **20.0** **4.2** **19.4**

Bully Others

M **3.1** **19.7** **6.8** **21.7**

F **4.4** **30.0** **6.3** **34.0**

Source: Hesselbrock, V., et al., 2000



Sociocultural Models of Etiology

- Family violence
- Family interaction
 - Family disease
 - Family systems
 - Behavioral family
- Peer influence
- Social environments



Social Policy Issues

- Controlling alcohol abuse through:
 - Availability
 - Legal constraints
 - Taxation



Clinical Heterogeneity

Alcohol-Related Features of Type A and Type B Alcoholics

Characteristic	Males		Females	
	Type A	Type B	Type A	Type B
Onset of Alcohol Symptoms (years)	17.9 (5.5)**	15.5 (2.9)	19.6 (6.3)	17.9 (6.1)
Onset of Regular Drinking (years)	17.3 (4.6)**	15.5 (3.7)	18.9 (5.4)	17.8 (6.2)
Onset of Problem Clustering (years)	25.1 (9.2)**	20.6 (6.3)	25.6 (8.8)*	23.0 (7.6)
Longest Abstinence (months)	21.7 (43.4)	20.0 (24.1)	19.2 (31.3)**	36.7 (48.0)
% Alcohol Treatment (any)	58.9**	96	25.9**	88.6
% Inpatient Treatment	47.6**	86.7	13.9**	70.9
% Currently Abstinent (6 months)	24.8*	38.7	9.1**	26.6

*p < .05

** p < .01

Source: Schuckit et al., 1995

Comparison of Type A and B Men on the 17 Dimension Scores

	Dimension	Type A	Type B
Dim. #	Number of Subjects (and %)	424 (85%)	75 (15%)
1.	Familial Alcoholism	0.4 (0.2)	0.4 (0.3)
2.	Childhood Disorder (Conduct)	1.7 (1.6)**	3.0 (2.2)
3.	Bipolar Character Dimension-HA	11.7 (6.7)**	19.1 (7.3)
	Bipolar Character Dimension-RD	17.1 (4.6)*	15.6 (4.6)
4.	Onset of Problem Drinking	25.1 (9.2)**	20.6 (6.3)
5.	Oz. of Alcohol Consumed Per Day	2.7 (4.2)*	5.1 (8.8)
6.	Relief Drinking	1.1 (0.9)**	2.4 (0.8)
7.	Dependence Syndrome	6.0 (1.9)**	8.7 (0.5)
8.	Benzodiazepine Use	0.6 (0.9)**	1.2 (1.1)
9.	Polydrug Use	11.3 (2.9)*	12.2 (3.3)
10.	Medical Conditions	0.3 (0.6)**	1.4 (0.9)
11.	Physical Consequences	1.9 (1.4)**	4.5 (1.1)
12.	Social Consequences	3.0 (1.8)**	4.8 (1.0)
13.	Lifetime Severity (Pseudo-MAST)	9.4 (4.1)**	15.1 (2.2)
14.	Years Heavy Drinking	9.1 (8.2)**	16.4 (10.2)
15.	Depressive Symptom Count	3.2 (3.5)**	6.2 (3.3)
16.	ASP Symptom Count	3.6 (2.0)**	5.6 (1.8)
17.	Anxiety Severity	0.1 (0.3)**	0.6 (0.9)

Mean score shown with standard deviation in parentheses. * $p < .05$ ** $p < .01$

Source: Schuckit et al., 1995

Comparison of Type A and B Women on the 17 Dimension Scores

	Dimension	Type A	Type B
Dim. #	Number of Subjects (and %)	143 (64%)	79 (36%)
1.	Familial Alcoholism	0.4 (0.3)	0.4 (0.3)
2.	Childhood Disorder (Conduct)	0.7 (0.9)**	1.4 (1.5)
3.	Bipolar Character Dimension-HA	14.1 (7.0)**	19.0 (7.1)
	Bipolar Character Dimension-RD	19.9 (4.2)	18.7 (4.5)
4.	Onset of Problem Drinking	25.6 (8.8)*	22.9 (7.6)
5.	Oz. of Alcohol Consumed Per Day	2.1 (3.3)	1.4 (3.8)
6.	Relief Drinking	0.4 (0.7)**	1.7 (1.0)
7.	Dependence Syndrome	4.6 (1.5)**	7.9 (1.1)
8.	Benzodiazepine Use	0.4 (0.8)**	1.2 (1.2)
9.	Polydrug Use	10.1 (1.8)**	12.0 (3.3)
10.	Medical Conditions	0.1 (0.3)**	1.0 (0.9)
11.	Physical Consequences	1.3 (0.9)**	3.4 (1.4)
12.	Social Consequences	1.6 (1.4)**	4.5 (1.3)
13.	Lifetime Severity (Pseudo-MAST)	5.3 (2.6)**	12.2 (2.4)
14.	Years Heavy Drinking	5.4 (6.0)**	8.4 (7.2)
15.	Depressive Symptom Count	4.2 (3.5)**	5.7 (3.3)
16.	ASP Symptom Count	1.8 (1.6)**	4.1 (1.9)
17.	Anxiety Severity	0.3 (0.6)	0.4 (0.7)

Mean score shown with standard deviation in parentheses. * $p < .05$ ** $p < .01$

Source: Schuckit et al., 1995

Sequence of Development of Alcohol-Related Life Experiences for Men and Women

Item #	Life Experience	Men (n=317)		Women (n=161)	
		Rank	Age	Rank	Age
1.	Physical fights while intox.	1	19.44	1	20.90
2.	Use in hazardous situations	2	20.60	5	22.56
3.	Hit others (non-fight)	3	20.87	6	22.72
4.	Arguments while drinking	4	21.00	8	22.80
5.	Started when not want to	5	21.72	2	22.06
6.	Drink more than intended	7	22.32	3	22.30
7.	Problems at school/work	8	22.87	9	22.93
8.	Hit/threw things while drinking	6	21.77	30	25.99
9.	Lost friends due to drinking	9	23.20	11	23.50
10.	Blackouts	10	23.46	10	22.98
41.	Liver, ulcer, pancreatitis	41	33.32	40	30.44
42.	3rd abstinence of 3+ months	42	37.37	43	33.25
43.	Convulsions following abstinence	43	38.93	36	28.33
44.	4th abstinence of 3+ months	44	39.72	44	37.18

Source: Schuckit et al., 1995

Overall rho = .84; p < .0001



What We Know

- Alcohol dependence is highly heritable.
- There is no evidence that specific genes ‘pre-determine’ alcoholism.
- Social, psychological, and environmental factors interact along with genetic susceptibility to influence overall risk for alcoholism.
- Individual variations in alcohol sensitivity and affective tolerance are likely important determinants.



What We Know (cont'd)

- Genetic studies may help us to understand the biological bases of alcohol dependence.
- There may be genes which are 'protective.'
- The identification of protective and susceptibility genes may lead to the development of targeted prevention and intervention strategies that work.



Appendices

Additional Information Slides



Antisocial Personality Disorder (ASPD) and Alcohol Dependence

- Alcoholics with ASPD typically have earlier onset and a more severe form of alcoholism than alcoholics without ASPD.
- Male and female alcoholics with ASPD have a similar course and chronicity of alcoholism.
- ASPD alcoholics have approximately two times more comorbid psychopathology (anxiety, affective, other substance) than non-ASPD alcoholics.
- Female alcoholics with ASPD are particularly disadvantaged educationally and economically. Further, they have significant psychological and physical problems due to alcoholism similar to ASPD males.
- Female ASPD alcoholics display aggressive behaviors (both antisocial and alcohol-related behaviors) similar to ASPD alcoholic males.
- ASPD alcoholics are 2-3 times more likely to have received treatment, and at an earlier age, than non-ASPD alcoholics.

Prevalence of Aggressive Behaviors Apart from Alcohol Use Among Alcohol Dependent Subjects

BEHAVIOR:	No ASPD		ASPD	
	MALES	% FEMALES	MALES	% FEMALES
Start phys. fights	10.5	4.0	48.2	37.5
Got into phys. fights	40.8	16.4	74.8	63.4
Used a weapon	4.1	2.0	29.5	16.7
Damaged property	15.1	5.2	50.9	40.0
Intentionally injured someone	2.7	1.5	18.7	16.7
Challenged parents/teachers	23.2	25.4	62.7	74.2
Temper tantrums	11.4	14.6	32.4	41.7
Was a "bully"	5.0	5.0	21.2	34.2

Gene Count Comparison

