Early Risk Factors in the Development of Alcohol and Other Substance Use Problems

Leon I. Puttler, Hiram E. Fitzgerald, Robert A. Zucker

Addiction Research Center and Substance Abuse Section, Department of Psychiatry, University of Michigan

University Outreach and Engagement & Department of Psychology, Michigan State University

Disclosure Statement

Leon I. Puttler, Ph.D.
Department of Psychiatry, Univ. of Michigan

The Psychology of Boys at Risk:
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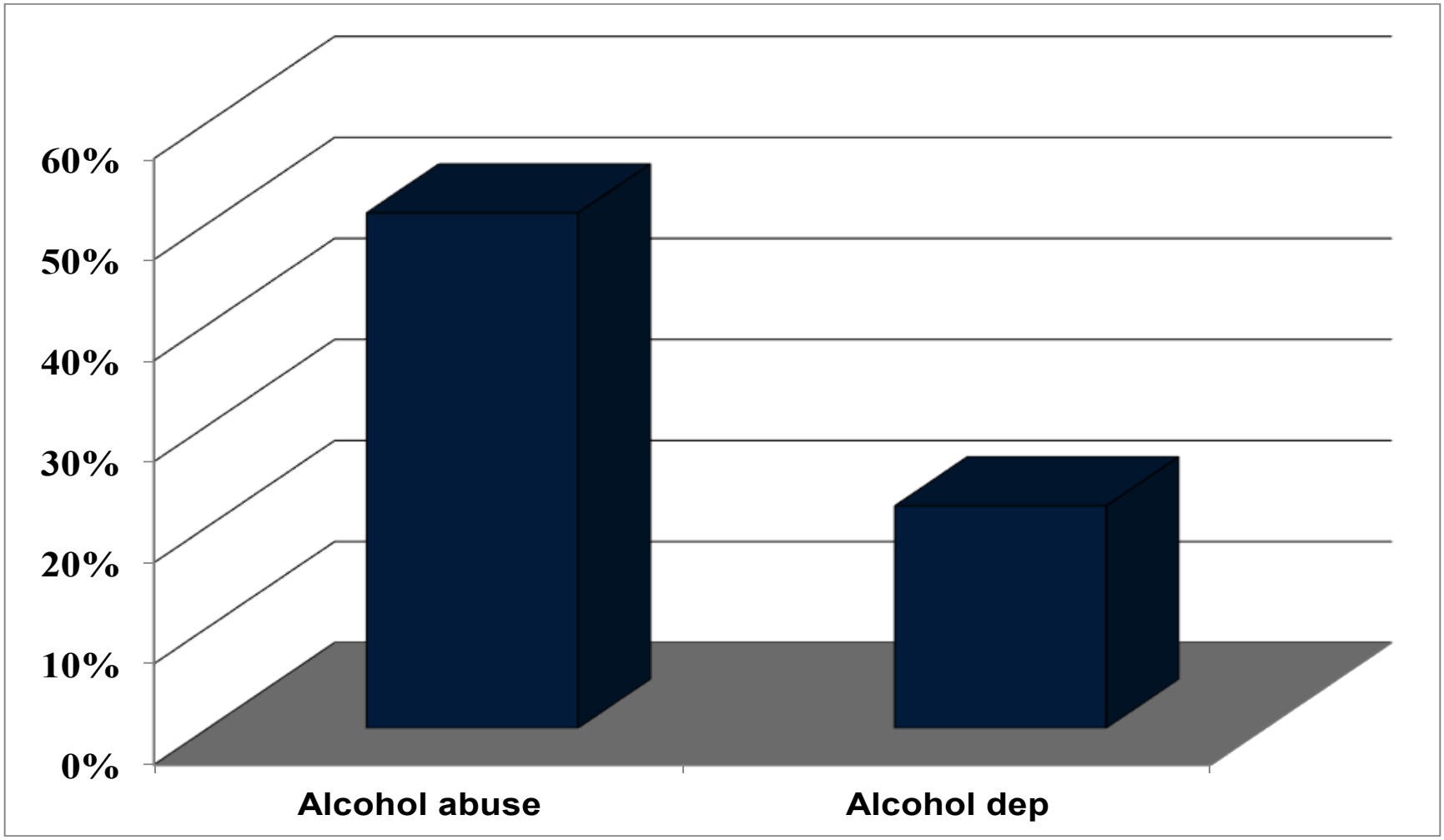
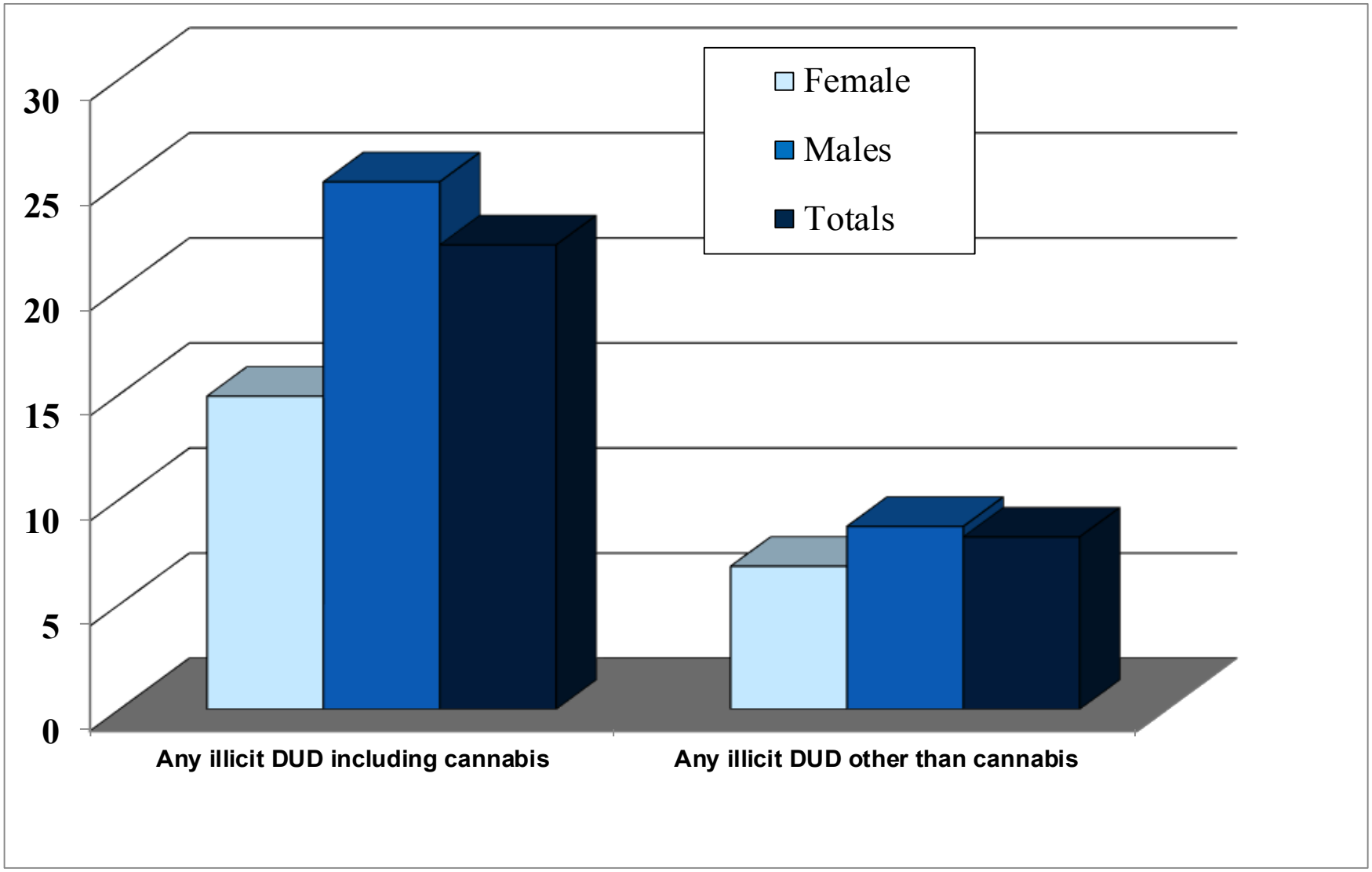
Michigan Longitudinal Study

Ongoing Since 1986

Rates of Alcohol Use Disorders in MLS Young Adults ages 19-22



Other Drug Use Disorder Lifetime Diagnosis Rates for G2 MLS Participants by Ages 24-26 (in percent)



Organizing Characteristics of the AUD System: Genotype, Endophenotype, Phenotype

- **Multidimensional**
  - Involving alcohol specific and non-alcohol specific but predisposing risk variables
- **Developmental**
  - The model is cumulative, involving the aggregation of risk for an AUD endpoint when multiple component risk factors are present
- **Epigenetic**
  - Since aggregation occurs across time, increasing complexity and evolution of structure over the course of development
- **Contextual**
  - Development always occurs in context; therefore, contextual factors should also contribute to phenotypic emergence

Sources of Risk Over the Life Course
(1 of 3)

- **Through individual characteristics**
  - Biological diathesis (genetic, endophenotypes, congenital, perinatal)
  - Externalizing behavior, aggression, behavioral undercontrol, oppositional defiant disorder, delinquency
  - Negative emotionality, depression
  - Attention problems, ADHD
  - Shyness, social withdrawal, social phobias

Sources of Risk Over the Life Course
(2 of 3)

- **Through family characteristics**
  - Drug/Alcohol abusing or addicted parents
  - Parents with antisocial personality disorder
  - Parents with clinical depression
  - Parents with alcohol use disorders
  - Parents in conflict
  - Abusive or neglectful parents

Sources of Risk Over the Life Course (3 of 3)

- **Through social environment characteristics**
  - High drug use environments
  - High stress environments (violence, poverty, unemployment)
  - High risk peer groups

Sources of Resilience

- Ongoing nurturing relationships with the same adults
- Physical protection, safety, and regulation of daily routine
- Experiences responsive to individual differences in such characteristics as temperament
- Developmentally appropriate practices related to perceptual-motor, cognitive, social stimulation, and language exposure
- Limit-setting (discipline), structure (rules and routines), and expectations (for positive outcomes)
- Stable, supportive communities (violence free) and culture (a sense of rootedness and connectedness)

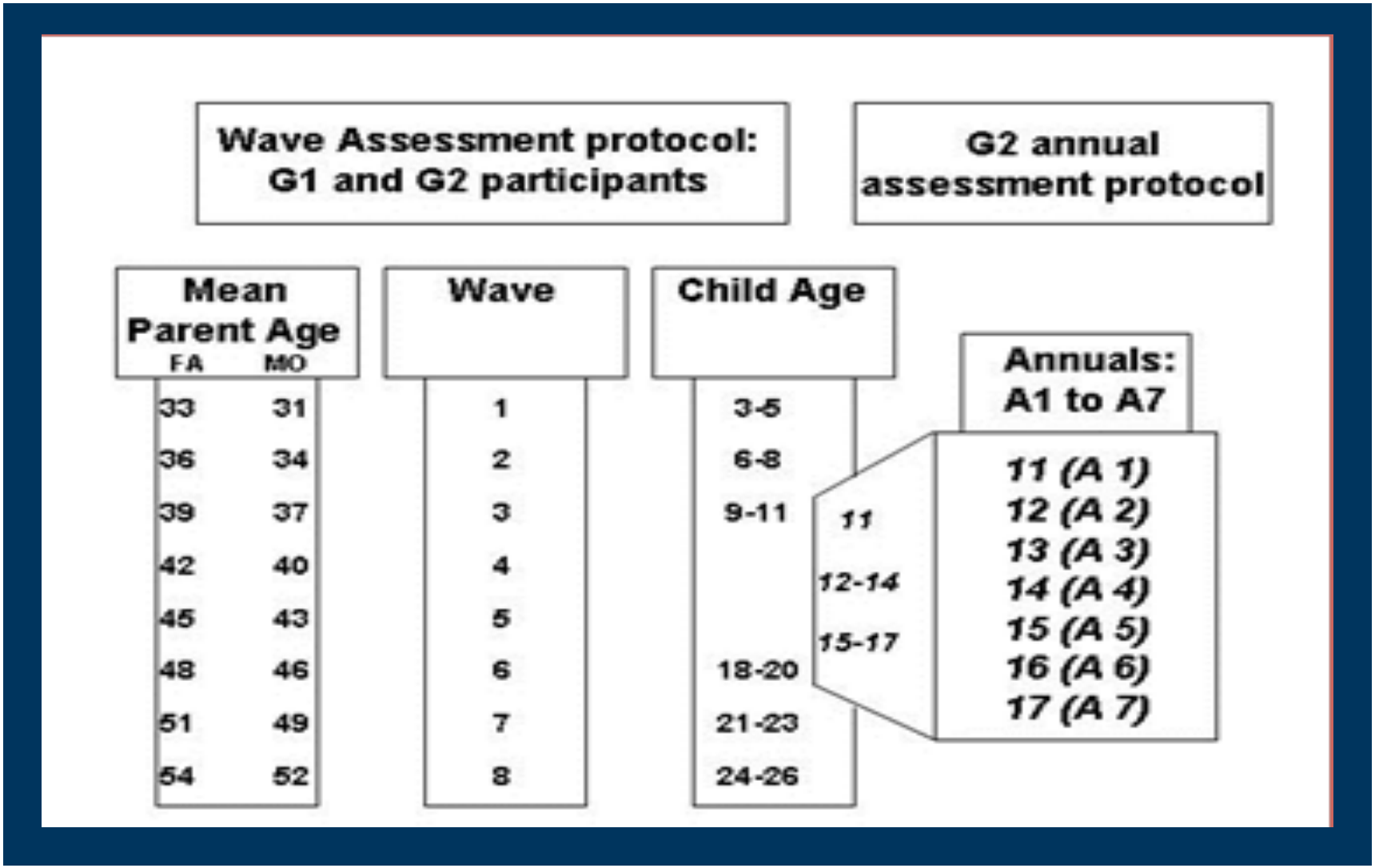
Michigan Longitudinal Study

- High risk for SUD family study using a population based community recruitment strategy for enrollment
- 466 families
- At least one initially 3-5 year old boy
- Both biological parents
- All siblings within +/- 8 years of age of target son
- N~ 2,400 individuals
- High and medium risk families all have alcoholic father (drunk driver or community canvass ascertainment); mother SUD Dx free to vary
- Low risk families = No SUD parents; community canvass located ecologically matched control families from the same or parallel lower SES neighborhoods
- Assessments of all family members at 3 yr intervals (Cross-Domain Structure)
- Yearly assessments for G2s between 11-26.
- Currently in Waves 9 (ages 27-29) to 11 (ages 33-35) for core group.

Early Specific Aims

- Mapping the evolution of a range of risk & protective factors
- Identify the evolution of alcohol specific learning
- Representation of the development of risk among subtypes of alcoholics

MLS Study Design



Child Assessment Core Structure

CONTENT STRUCTURE: CHILD/YOUTH/YOUNG ADULT

I. Child Vulnerability Structure
- Family History of Alcoholism/Depression
  - ***Genogram and Family History***
  - ***Demographic Questionnaire***
- Difficult Temperament
  - ***Children's Dimension of Temperament- Revised (C-DOTS-R)***
  - ***Dimensions of Temperament Survey- Revised (DOTS-R)- (Adult Ratings of Self/Partner/Child)***

II. Child Core Risk Marker Variables (Nonalcohol and Nondrug Related)
- Broad Band Externalizing
  - ***Child Behavior Rating Scale: School-Age Revision (CBRS)***
  - ***Child Behavior Checklist (CBCL)***
  - ***Teacher Report Form (TRF)***
  - ***Youth Self Report Form (YSR)***
- Narrow Band Externalizing
  - Aggression
    - ***CBCL***
    - ***Parent Daily Report***
    - ***Roberts Apperception***
    - ***Antisocial Behavior Checklist-Adolescent (ASB-R Adol)***
  - Impulsivity
    - ***Child Behavior Checklist***
    - ***Delay of Gratification Task***
  - Antisocial Behavior
    - ***ASB-R Adol***
- Broad Band Internalizing
  - ***CBRS***
  - ***CBCL***
  - ***TRF***
  - ***YSR***
  - ***Roberts Apperception Test***
- Narrow Band Internalizing
  - Depression
    - ***CBCL Depression Scale (CBCL-D)***
    - ***YSR***
    - ***TRF***
    - ***Roberts Apperception Test for Children***
  - Negative Mood
    - ***Diagnostic Interview Schedule (DIS)***
    - ***Diagnostic Interview Schedule-Child (DIS-C)***
    - ***DOTS-R***
    - ***CBCL***
    - ***C-DOTS-R***
    - ***TRF***
    - ***YSR***
    - ***Roberts Apperception Test for Children***
    - ***California Child Q-Sort***
    - ***Child Health & Development History***
    - ***MAACL-R/6***

Child Assessment Core Structure (cont.)

III Child Adaptation and Failure
- IQ/Cognitive Functioning
  - ***Stanford Binet Form L-M***
  - ***Wechsler Intelligence Scale for Children (WISC-3)***
  - ***Symbol Digit Modalities Test-Child***
  - ***Wechsler Adult Intelligence Scale (WAIS-3)***
- School Performance
  - ***Wide Range Achievement Test (WRAT-3)***
  - ***CBCL***
  - ***TRF***
  - ***YSR***
  - ***School Performance - Teacher***
- Self Conception/Esteem
  - ***Harter Perceived Competence Scale for Children/Youth***
- Physical Health/Development
  - ***Health History-Child***
  - ***Height and Weight***
  - ***Naomi Morris Scale of Physical Development (Pubertal Stage)***
  - ***Vineland Adaptive Behavior Scale***
- Psychopathology/Psychiatric Diagnosis
  - ***Robert's Apperception Test for Children***
  - ***Brief Symptom Inventory***
  - ***DIS-C***
  - ***DIS-C (Parent Report)***
  - ***DSM-III-R Child/Youth Checklist & Diagnosis***
  - ***MAACL-R/6***

IV Alcohol and Other Drug Involvement: Child
- Schemas/Expectancies
  - ***Beverage Opinion Questionnaire***
  - ***Smells Task***
  - ***Appropriate Beverage Task***
  - ***Alcohol Expectancy Questionnaire***
  - ***Alcohol Concepts***
- Use
  - ***Drinking and Drug History Form for Children/Youth/Young Adult***
  - ***DIS-C***
  - ***Diagnostic Interview Schedule (DIS)***
- Problems Associated with Use
  - ***Drinking and Drug History Form for Children***
  - ***Interactions Questionnaire***
  - ***DIS-C***
  - ***DIS***

MLS Design Features

- Cross-level measurement structure involving:
  - Comprehensive Psychosocial Assessments
  - NeuroCognitive Risk (Executive Functioning)
  - Genotyping
  - Assessment of neural systems underlying risk (fMRI, MRI)
  - Sleep as a risk factor

Risk Over Time Continuity Pathway

Infancy and early childhood	Difficult temperament, poor parenting, insecure to disorganized attachment, regulatory difficulties
Preschool to kindergarten	Lower self-regulation, externalizing behavior problems, social withdrawal, poor school readiness
Childhood	Behavioral problems, oppositional behavior, impulsivity, social withdrawal, poor school performance
Late middle childhood	Family disorganization (divorce/separation, loss of job, health or social problems or other family members), poorer parent monitoring
Adolescence	Earlier onset of alcohol and other drug involvement, heavier alcohol and other drug problems, delinquency, depression.
Adulthood	Antisocial personality disorder, mood disorder, substance abuse disorder

Adapted from Fitzgerald, Zucker, Puttler, Caplan & Mun (2000) and Fitzgerald & Das Eiden (2007)

Two Discontinuity Pathways Suggesting Differentiation Occurring During the Transition from Elementary to Middle School

Discontinuity Pathway 1	Discontinuity Pathway 2
Infancy and Early Childhood Normative patterns of development during infancy	
Preschool School readiness, behavior within normal limits, adaptive temperament.	
Childhood Good school adaptation and performance; good friendship network.	
Late Middle Childhood	
Family disorganization (divorce/separation, loss of job, health or social problems of other family member**); poorer parent monitoring**; **shift in more deviant peer network**; increasing emergence of externalizing behavior, **developing pattern of internalizing problems.**	Family disorganization (divorce/separation, loss of job, health or social problems of other family member); shift in peer network; increasing **emergence of externalizing behavior**.
Adolescence	
Alcohol and other drug involvement, minor delinquency. Poor or adverse outsider or parent response: **undependability of both parents, less available prosocial network; difficulties self-correcting.**	Alcohol and other drug involvement, minor delinquency. Poor or adverse outsider or parent response and/or personal concern moving back on track; shorter clinical course.

Adapted from: Zucker, Chermack, & Curran (2000)

Social Visibility of Parental Alcoholism and Family Psychosocial Adaptation during the Early Child Rearing Years among MLS Participants (Boys at Ages 3 to 5)

Father's Psychopathology

	High Risk		*Community Canvass*		*Community Controls*		
	n = 158		n = 60		n = 90		F
Beck Depression	**3.04**	(3.19)	2.47	(2.60)	1.85	(2.11)	4.95**a
Hamilton Depression	**15.54**	(10.22)	13.37	(12.89)	7.82	(7.11)	16.32***ac
Child Antisocial Behavior	**11.69**	(7.78)	**8.53**	(4.74)	6.49	(4.51)	18.32***abc
Adult Antisocial Behavior	**12.18**	(7.97)	**7.71**	(4.11)	5.35	(3.46)	33.73***abc
Lifetime Alcohol Score	**11.24**	(2.00)	**10.19**	(1.68)	7.70	(2.01)	89.94***abc
Axis V	**53.64**	(10.05)	**63.39**	(8.62)	67.38	(10.27)	57.33***abc

(MANOVA-Father Recruitment Source [Multivariate F (12,556) = 18.68, p < .001])

*p < .05 **p < .01 ***p < .001; a DWI > control; b DWI > community; c community > control

Zucker, Fitzgerald et al., 2000

Social Visibility of Parental Alcoholism and Family Psychosocial Adaptation during the Early Child Rearing Years among MLS Participants (Boys at Ages 3 to 5)

Mother's Psychopathology

	High Risk		***Community Canvass***		***Community Controls***		
	n = 158		n = 60		n = 90		F
Beck Depression	3.60	3.54	2.57	2.22	2.97	3.33	2.29b
Hamilton Depression	**17.54**	10.82	16.67	14.27	12.95	10.81	4.46*ac
Child Antisocial Behavior	**8.17**	6.60	**6.10**	4.17	4.65	3.41	11.98***abc
Adult Antisocial Behavior	**6.56**	3.94	4.96	3.27	4.34	3.71	12.09***a
Lifetime Alcohol Problems	**10.43**	1.88	10.23	1.30	9.11	1.25	8.83***ac
Axis V	**57.67**	11.28	63.35	7.45	66.13	9.85	19.78***ab

*p < .05 **p < .01 ***p < .001; a DWI > control; b DWI > community; c community > control

Zucker, Fitzgerald et al., 2000

Early Findings
3-5 Year Old Boys

- COAs higher in externalizing behavior
- COAs had greater levels of difficult temperament
- COAs had lower IQ
- COAs greater recognition of alcoholic beverages

Sources: Poon et al. (1997); Puttler et al. (1998); Zucker et al. (1995)

Early Findings in Boys Using Family Subtype as a Risk Factor

3-5 Year Olds

• Externalizing behavior	AAL>NAAL>Control
• Internalizing behavior	AAL>NAAL=Control
• Hyperactivity Index	AAL>NAAL=Control
• Risky Temperament	AAL>NAAL=Control

6-8 Year Olds

• Externalizing behavior	AAL>NAAL>Control
• Internalizing behavior	AAL>NAAL=Control
• IQ	COAs < Control*
• Academic Functioning	COAs < Control*

* No differences observed between AAL and NAAL

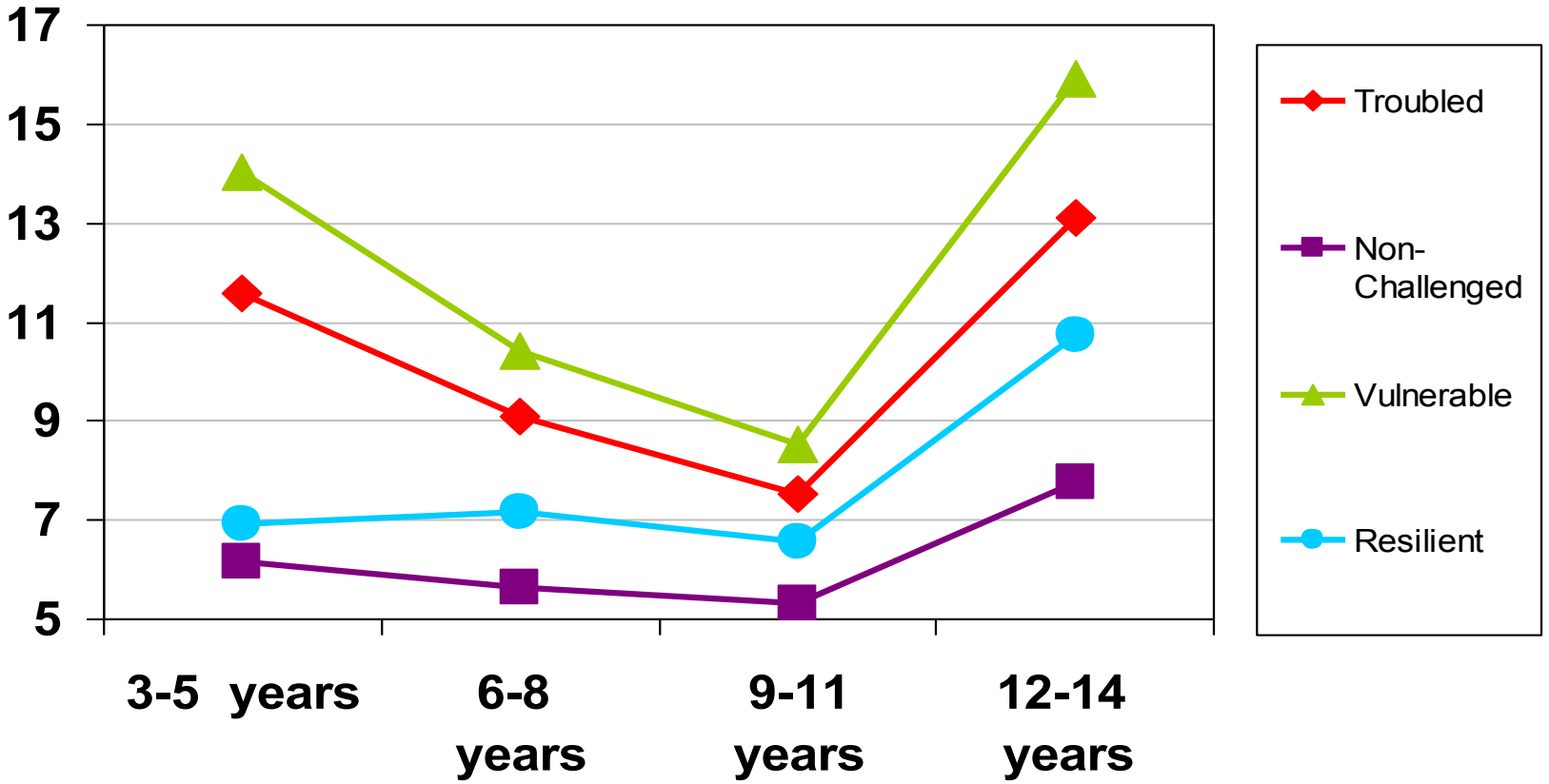
Sources: Bingham et al., 1996; Ellis et al., 1994; Puttler et al., 1998

The Different Adaption Groups During the Preschool Period

Family Adversity	Child Psychopathology: *Normal Range*	Child Psychopathology: *High*
Low	**Non-Challenged**	**Troubled**
High	**Resilient**	**Vulnerable**

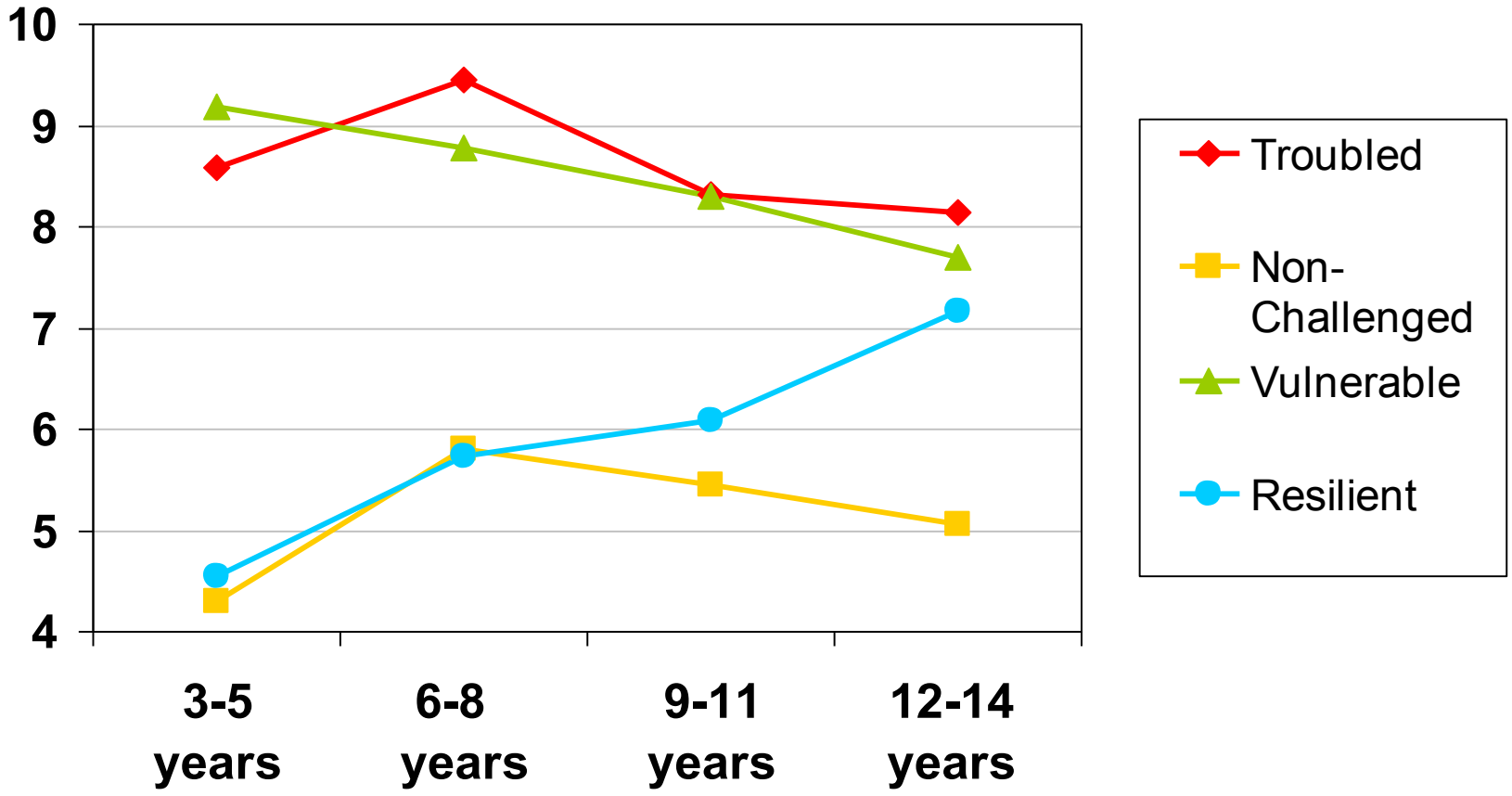
Zucker, R. A., Wong, M. M., Puttler, L. I., & Fitzgerald, H. E. (2003). Resilience and vulnerability among sons of alcoholics. In S. V. Luthar (ed). *Resilience and vulnerability: Adaptation in the context of childhood adversity* (pps 76-103). Cambridge, UK., Cambridge University Press.

Stability and Change in Externalizing Symptoms Through Early Adolescence



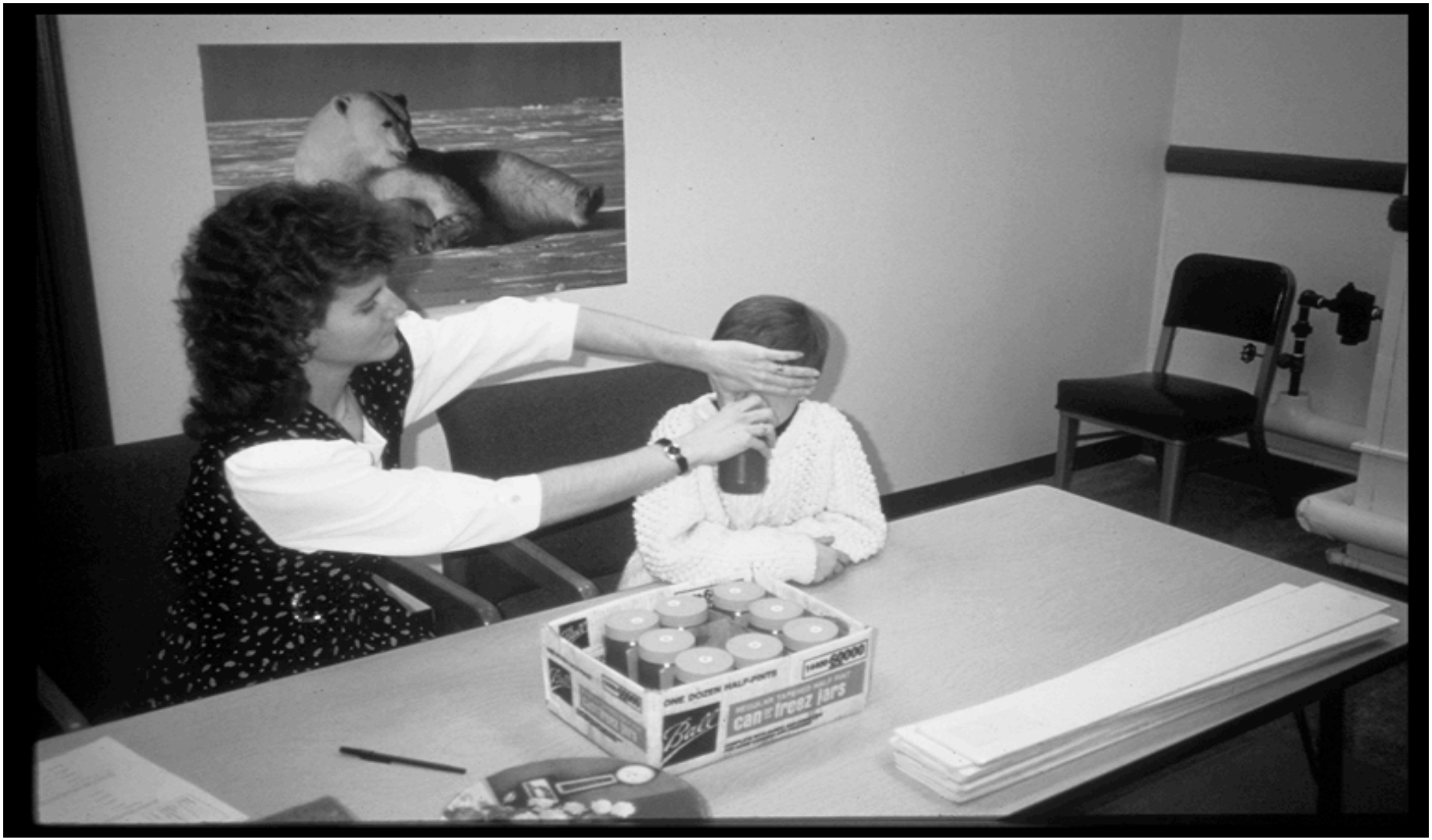
Zucker, Wong, Puttler & Fitzgerald, (2003). In S. S. Luthar (ed). Resilience and vulnerability (pps 76-103). Cambridge

Internalizing Symptoms

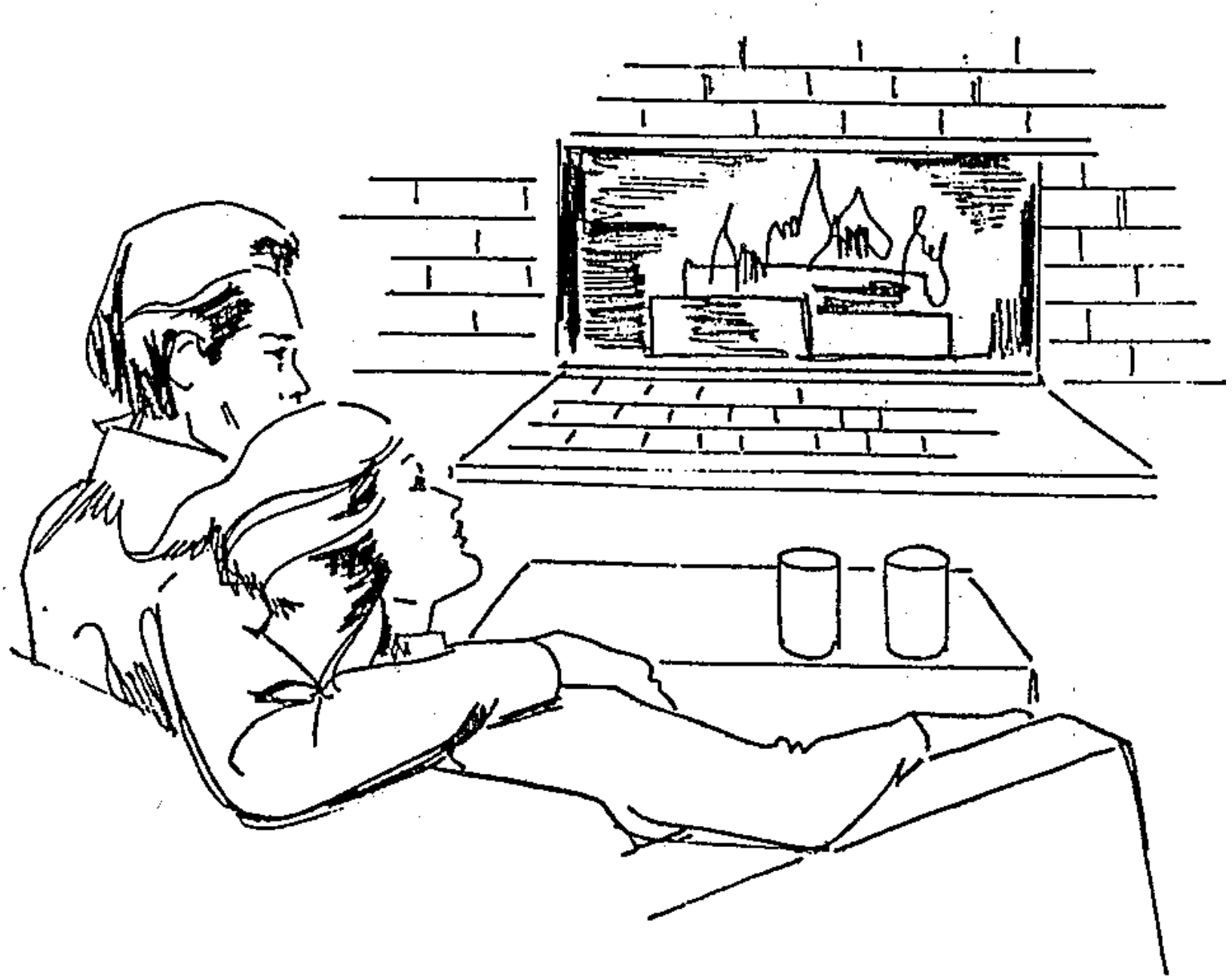


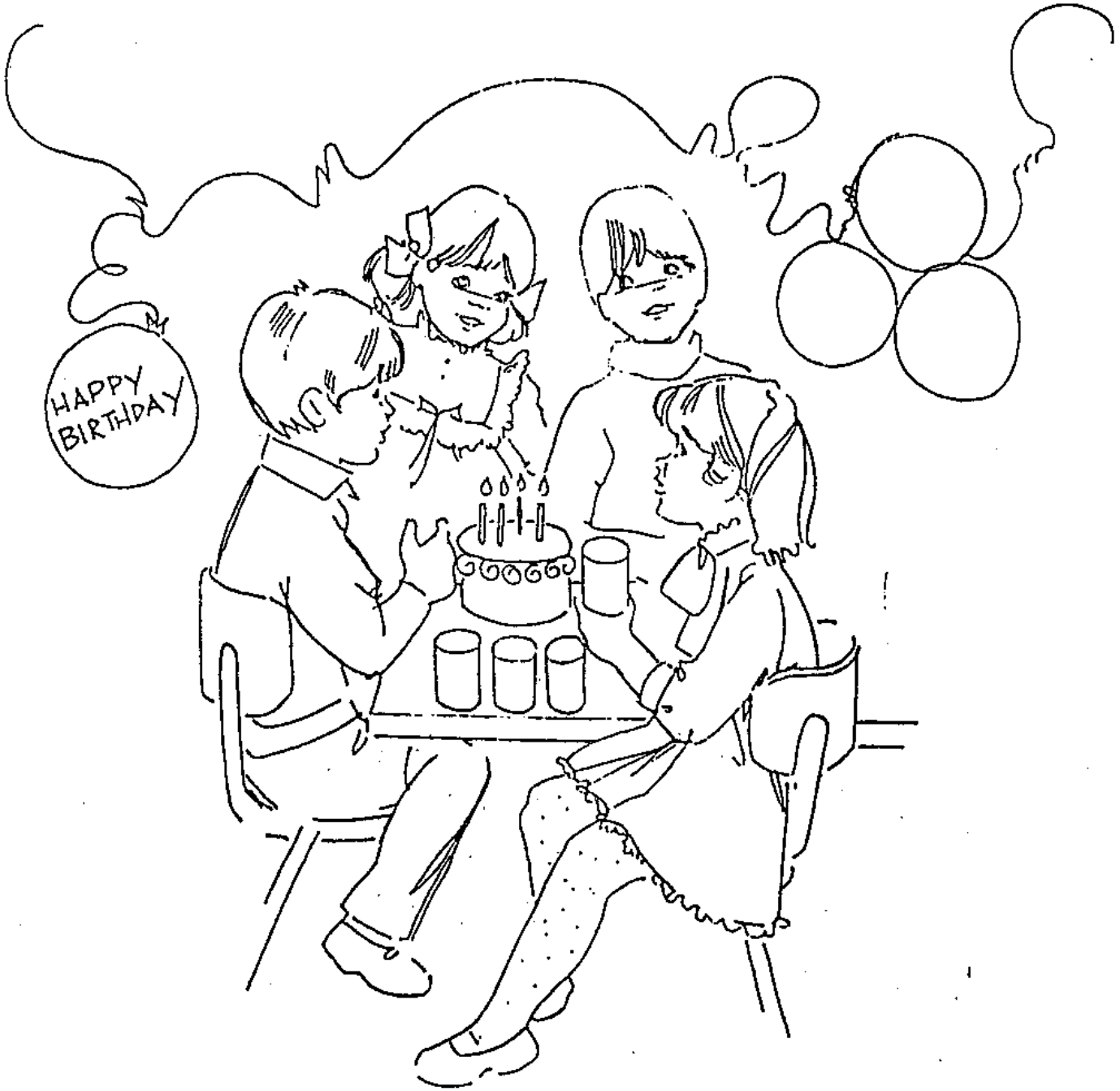
Zucker, Wong, Puttler & Fitzgerald, (2003). In S. S. Luthar (ed). Resilience and vulnerability (pps 76-103). Cambridge

Early Alcohol Recognition




Oxford




HAPPY
BIRTHDAY

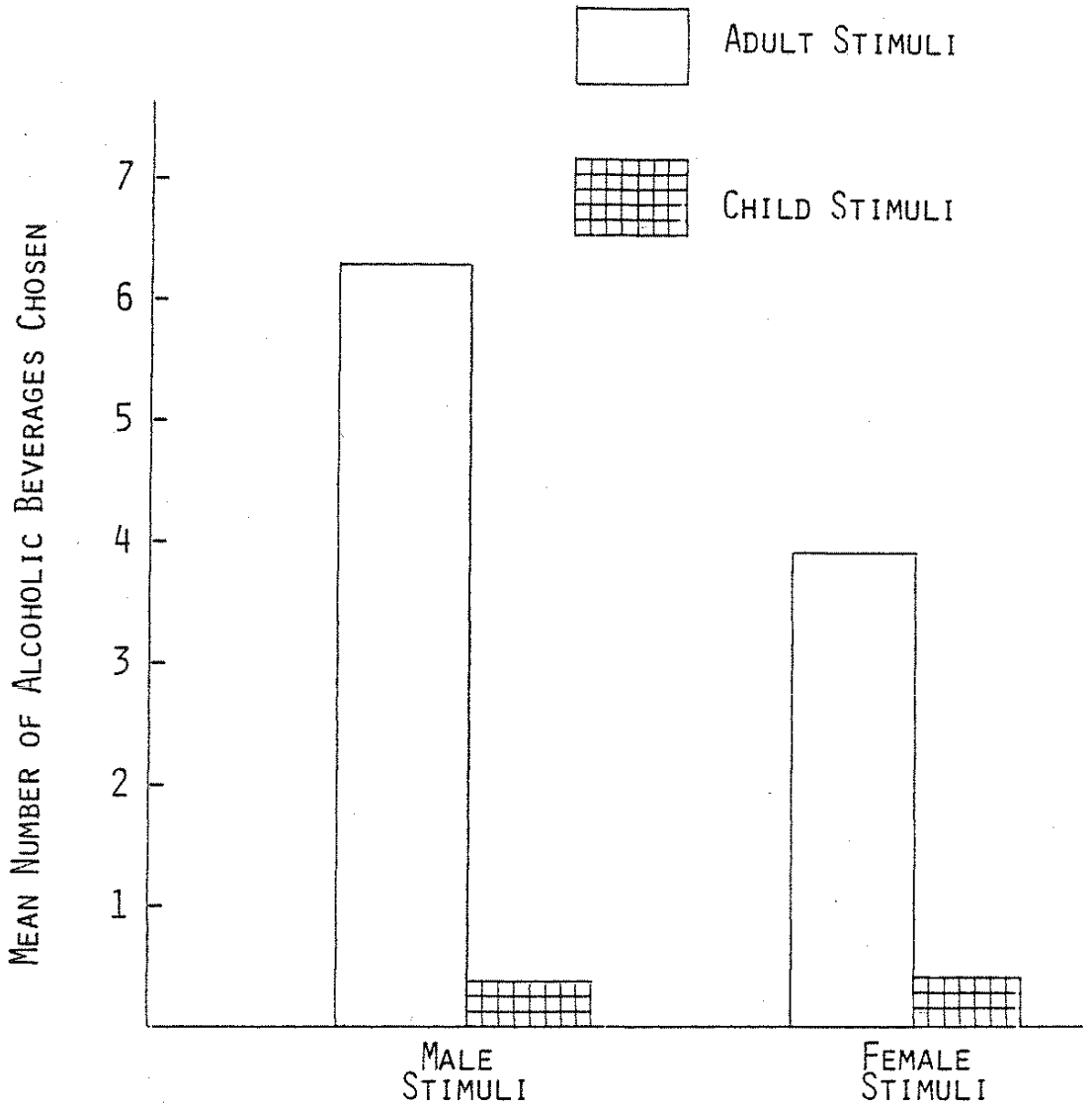
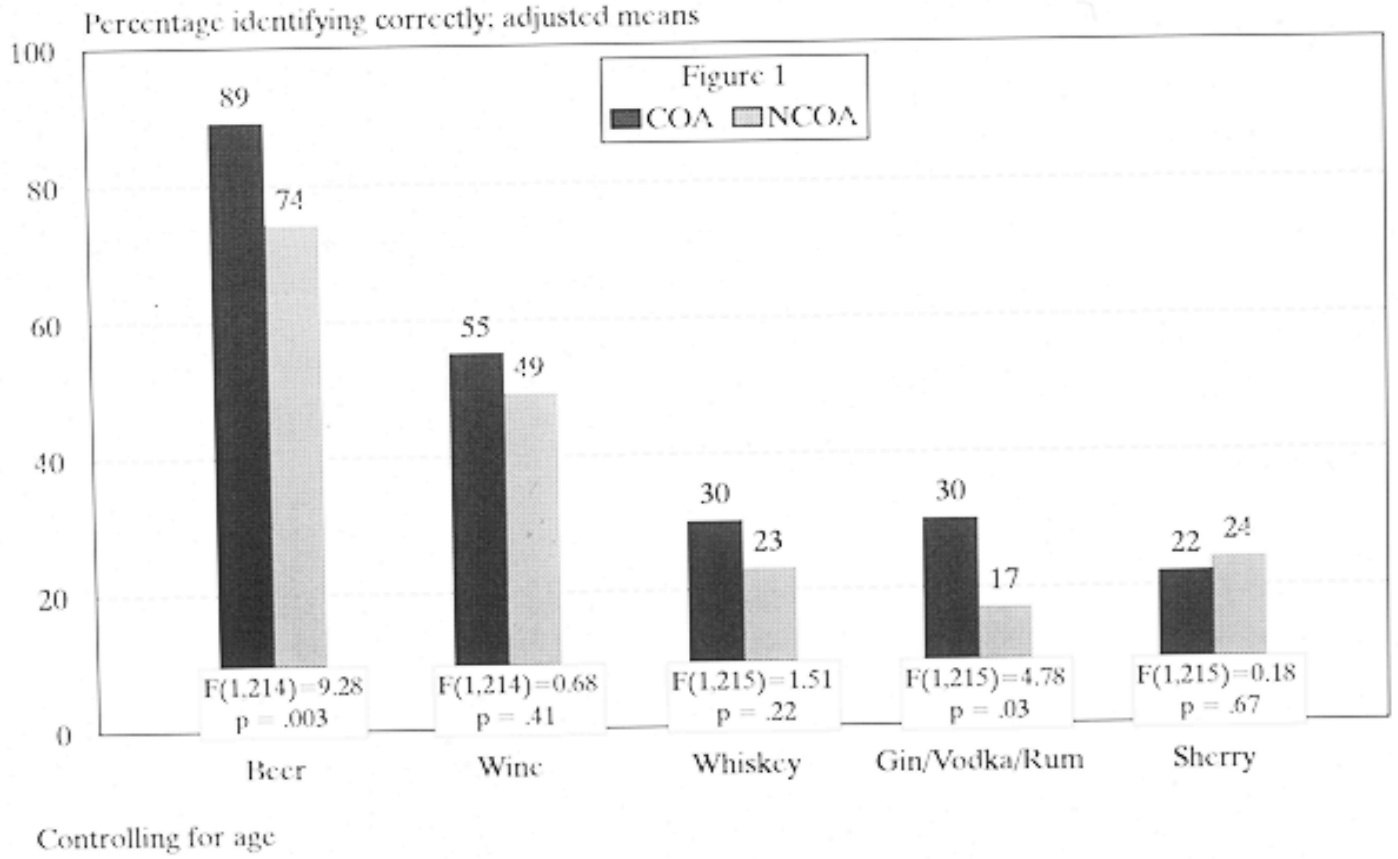


Figure 3. Mean Number[1] of Alcoholic Beverage Drinking Choices Made By Preschoolers as Related to Sex and Age of Stimulus Figure (N = 131)

Knowledge Of Specific Alcoholic Beverages Among Preschooler COAs and Non-COAs



Zucker et al., 1995

Components of an Organizing Schema for Alcohol Abuse/ Dependence and Co-active Psychopathology Evident in COAs by Five Years of Age

Sensory-Perceptual
- Sensory identification of substances
- Perceptual discrimination of substances

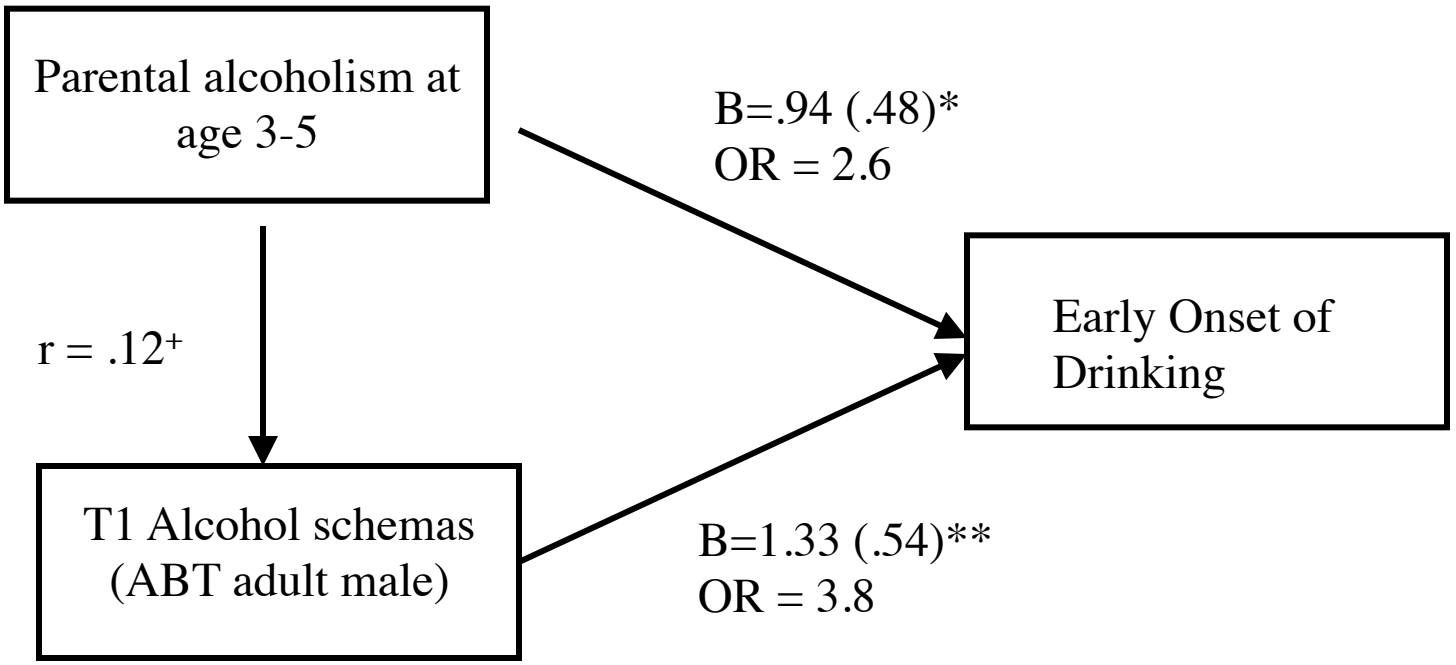
Cognitive-Motivational
- Attributions about who are appropriate users
- Expectancies related to outcomes based on use

Affective
- Self-regulatory, self-control processes
- Interpersonal relationships

Social
- Role models
- Peer relationships
- Dominance hierarchies/power

Biological
- Familial history
- Congenital history

Logistic Regression: Early Onset of Drinking (≤ 14) Predicted from Alcohol Schemas @ age 3 to 5 Even When Parental Alcoholism is Covaried Out (M+F)

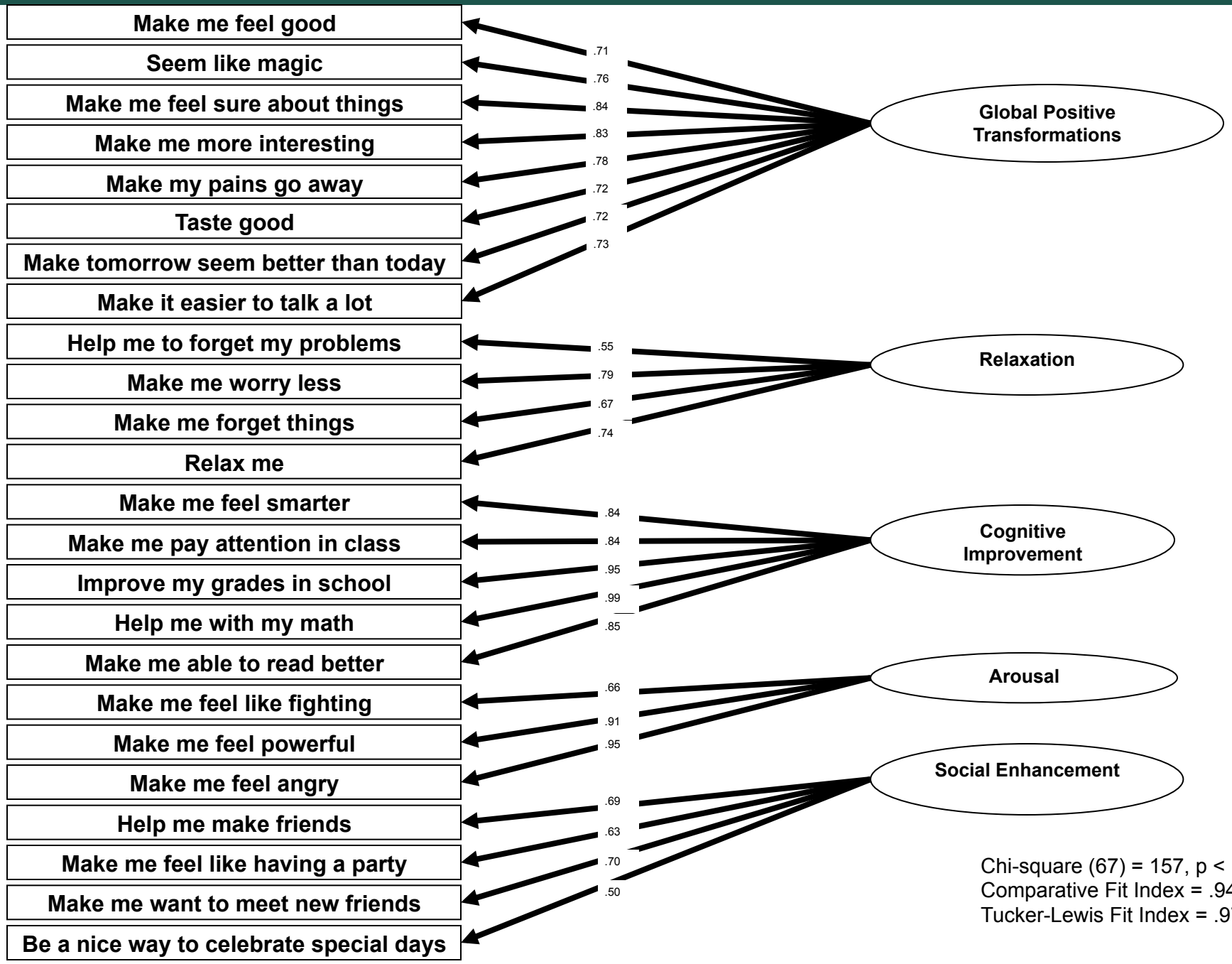


Alcohol Expectancies During Middle Childhood

- Beverage Opinion Questionnaire
- Confirmatory Factor Analysis Model for the Beverage Opinion Questionnaire Producing a Five Scale Solution

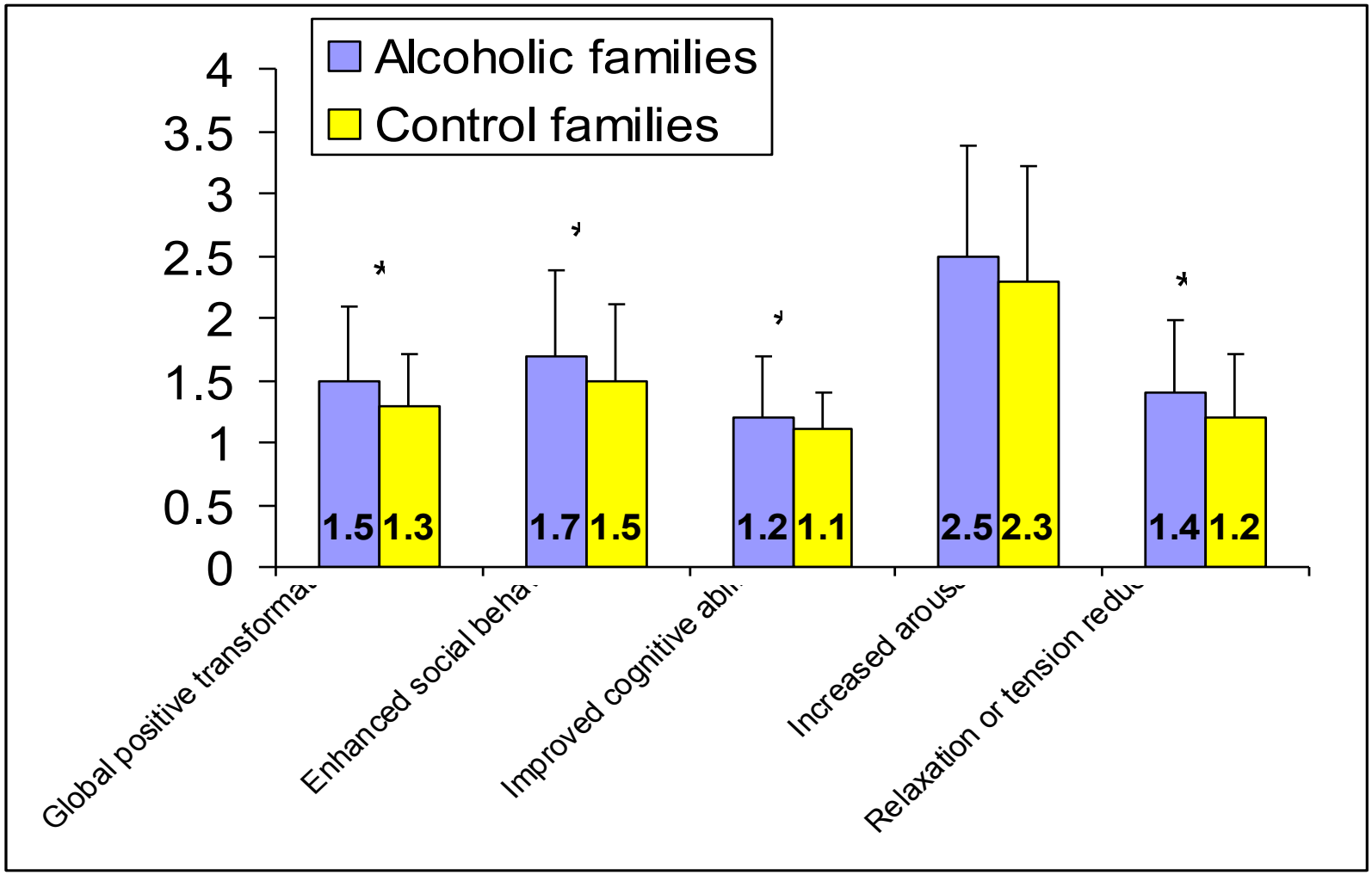
Jester et al. (2014)

Drinking beer or wine would . . .

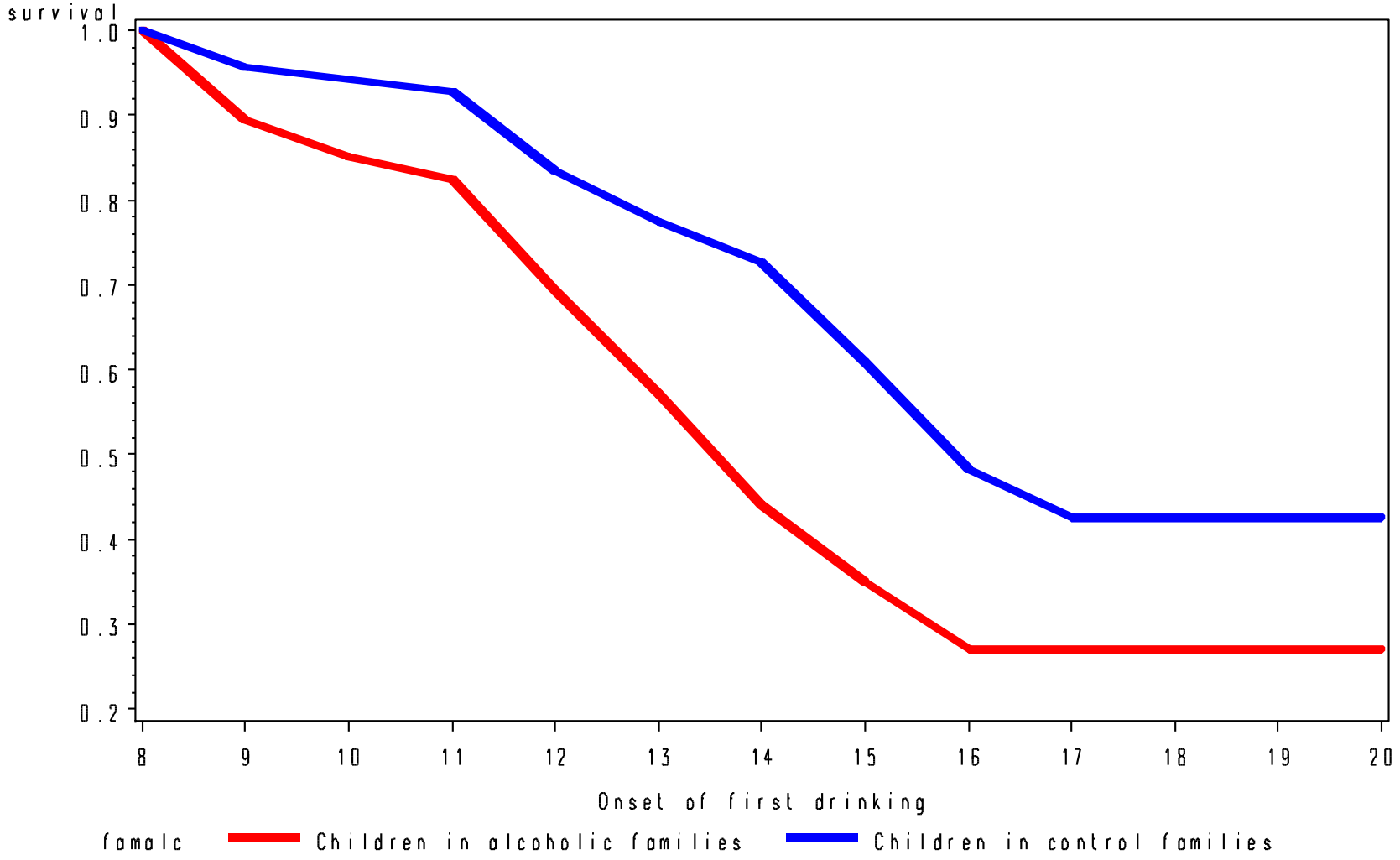


Chi-square (67) = 157, p < .001
Comparative Fit Index = .94
Tucker-Lewis Fit Index = .97

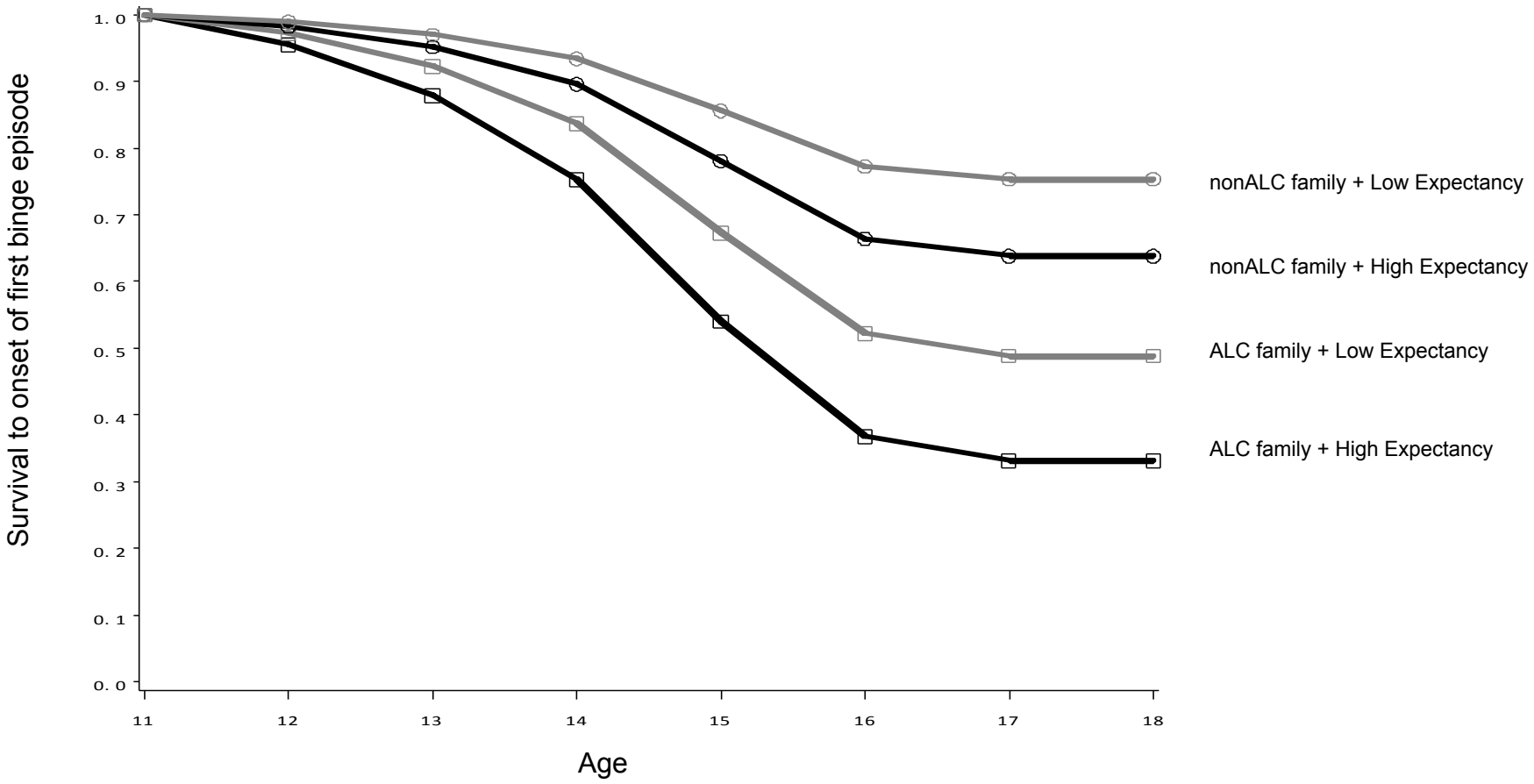
Standardized Alcohol Expectancy Subscale Scores for Children in Alcoholic and Non-Alcoholic Families



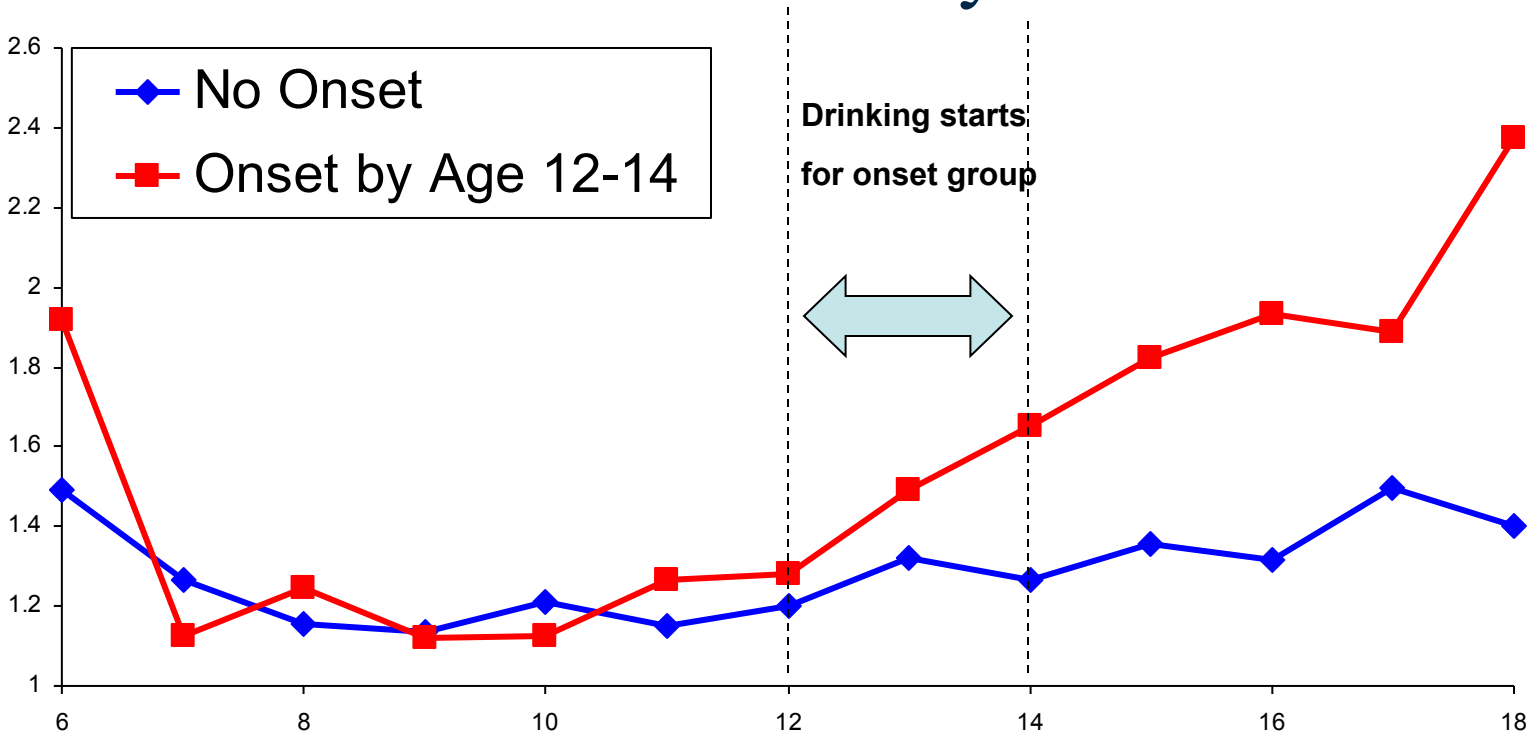
Survival to Time of First Drink for Children in Alcoholic and Non-Alcoholic Families



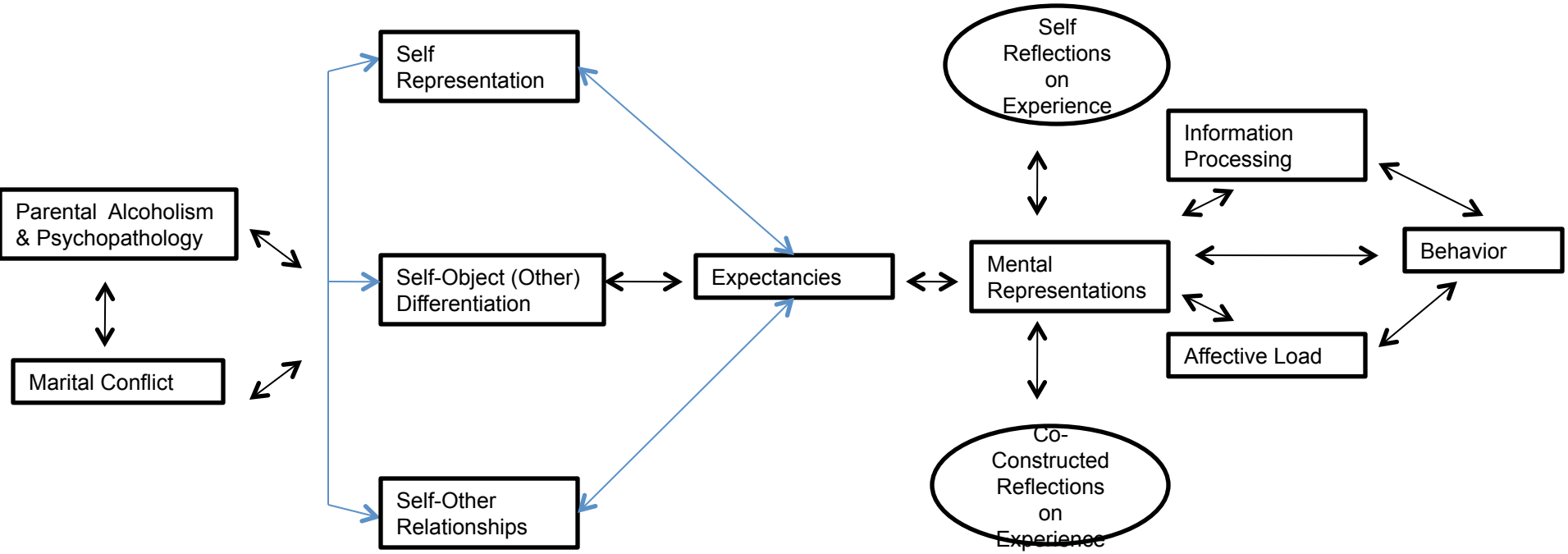
Survival to Time of First Binge: Survival Analysis Estimates for the Effects of Family Alcoholism (ALC vs. nonALC) and Global Positive Transformations Expectancy Levels (o = high, square = low) at 9 - 11



Trajectories of Development of Positive Expectancies for Children Who Start Drinking Between Ages 12-14 and Those Who Delay Onset.



Mental Representations and Priming for Alcoholism and Co-Active Psychopathology



Fitzgerald, Wong & Zucker (2013). In N. E. Suchman, M. Pajulo, & L. C. Mayes (eds). *Parenting and substance addiction: Developmental approaches to intervention* (pp.126-155). New York: Oxford University Press.

MLS Design Features

- Cross-level measurement structure involving:
  - Comprehensive Psychosocial Assessments
  - NeuroCognitive Risk (Executive Functioning)
  - Genotyping
  - Assessment of neural systems underlying risk (fMRI, MRI)
  - Sleep as a risk factor

Neurocognitive Goals and Questions

- To evaluate the predictive power of executive functions, in particular response inhibition, in relation to early onset of alcohol and drug use and problem alcohol use in early to mid adolescence .
- To evaluate these influences while taking into account some obvious other contributors, namely low IQ, parental alcoholism and antisocial personality disorder (ASPD).
- Would executive functioning or response inhibition emerge as a unique contributor to risk above and beyond these better known but more distal factors?

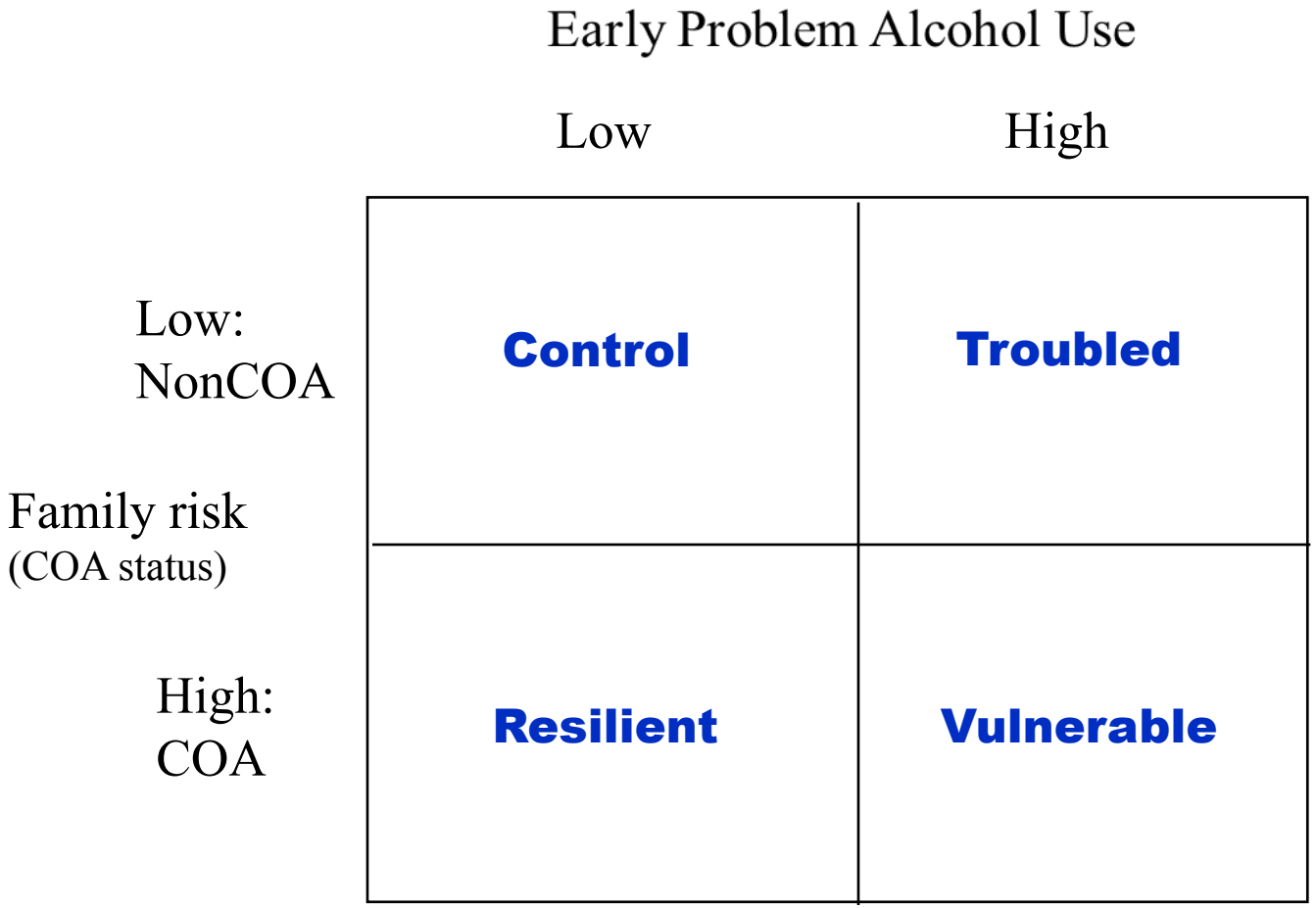
Results

- Poor response inhibition predicted alcohol involvement onset, alcohol problems, and number of other drugs used.
- These relationships existed over and above the contribution of low IQ, paternal alcoholism, paternal antisocial personality disorder, child ADHD or conduct disorder symptoms, or shared family history.
- The models explained 20-40% of residual variance in outcome scores.

Genetics Initiative

- Ongoing analyses still in early stages
- No direct links to date of true genetic markers
- However, especially at younger ages, markers are more likely to predict precursors of SUD like rule-breaking behavior (Trucco et al., JCPP, 2014) and peer influence of individuals impacting rule-breaking behavior.
- Evidence also about different genotypes impacting child's acceptance of parenting practices (Trucco et al., 2013)
- Newer analyses also beginning to look at our genetics data with our fMRI data

fMRI Work: Examining Adaptation to Emotional Arousal in Late Adolescence (16-20) for Resilient and Nonresilient Youth

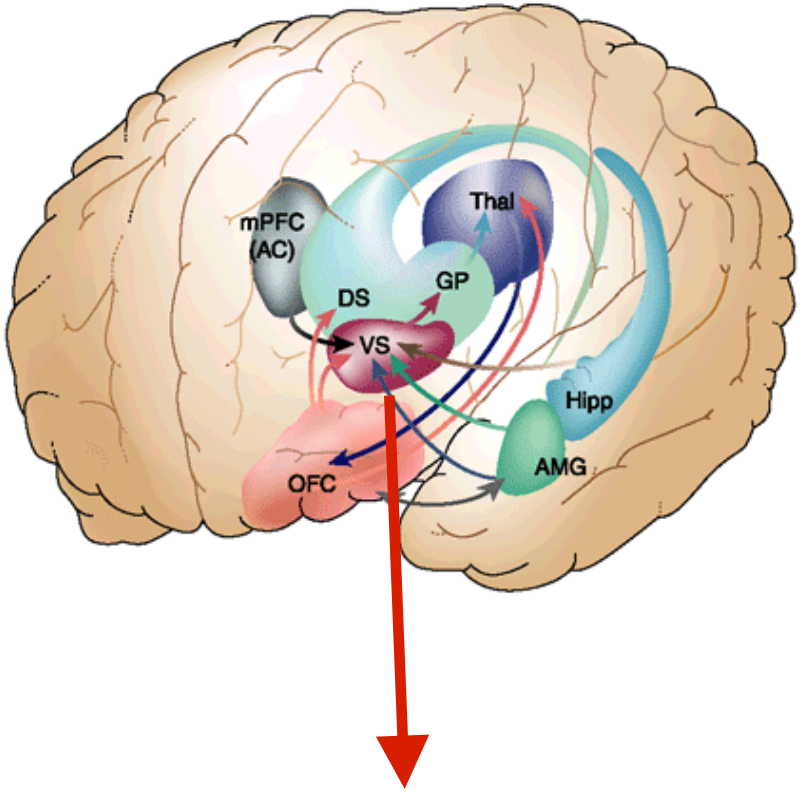


Source:Heitzeg, M.M., Nigg, J.T., Yau, W-Y. W., Zubieta, J.K. & Zucker, R.A. (2008). Affective circuitry and risk for alcoholism in late adolescence: Differences in frontostriatal responses between vulnerable and resilient children of alcoholic parents. *Alcohol Clin Exp Res*, 32(3), 414–426.

Vulnerability, Activation Patterning, and Behavior

- Vulnerable COAs appear to suppress full emotional processing – particularly negative emotion.
- One consequence of this is the inability to engage adaptively with emotional arousal.
- Results also imply lower ability to anticipate negative outcomes, a greater likelihood of responding without understanding nuance, leading to inappropriate, potentially problematic behavior.
- Other findings support this interpretation. Vulnerable Ss were higher in externalizing (aggressive/delinquent) behaviors.

Vulnerability and Emotion Processing- the Ventral Striatum



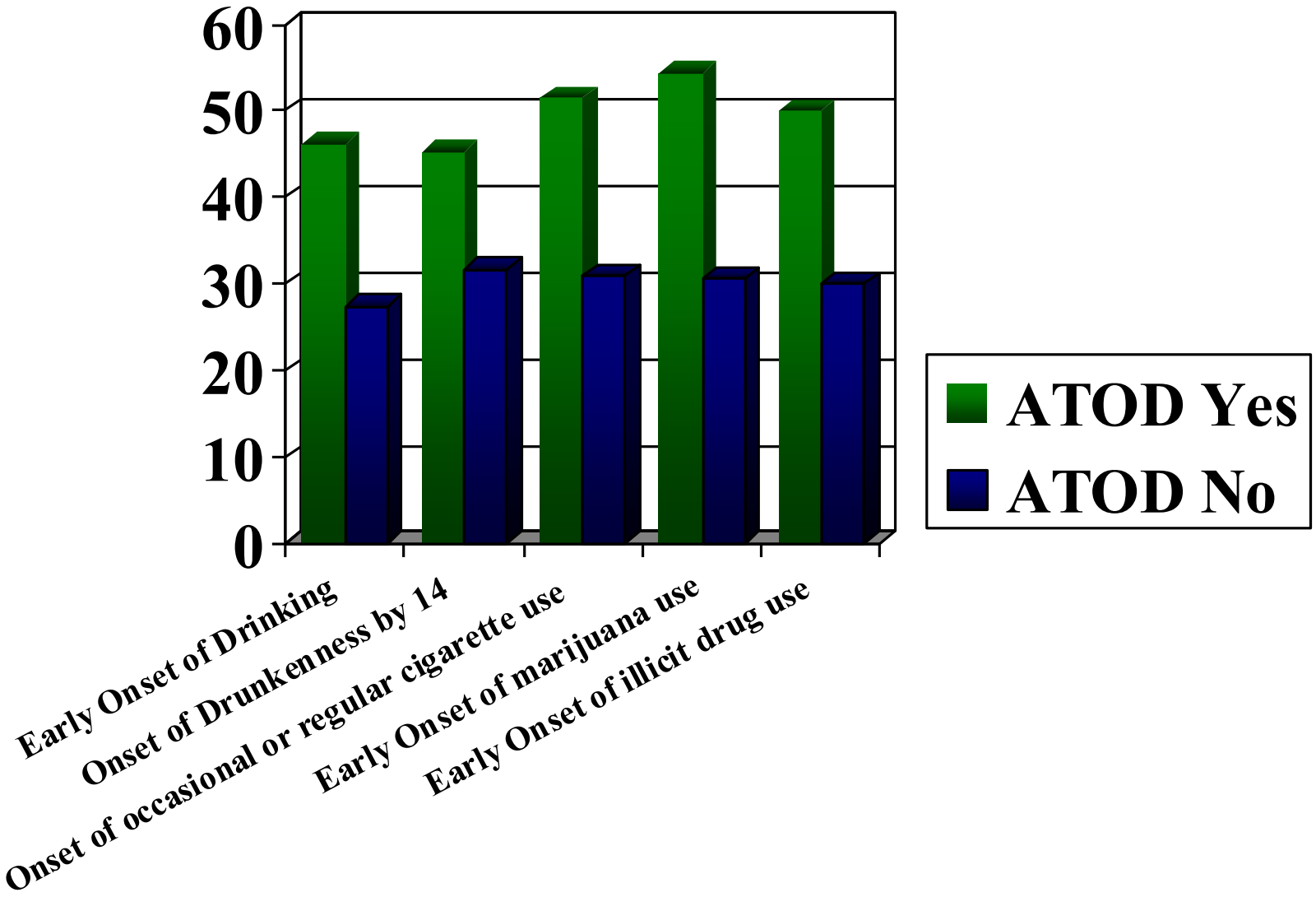
Early weakness in modulating emotion is related to poor outcome.

Heitzeg, M. M. (March, 2011). Externalizing behaviors and functional brain responses: Relationships to core psychological systems proposed to underlie SUD risk. Addiction Research Center, University of Michigan.

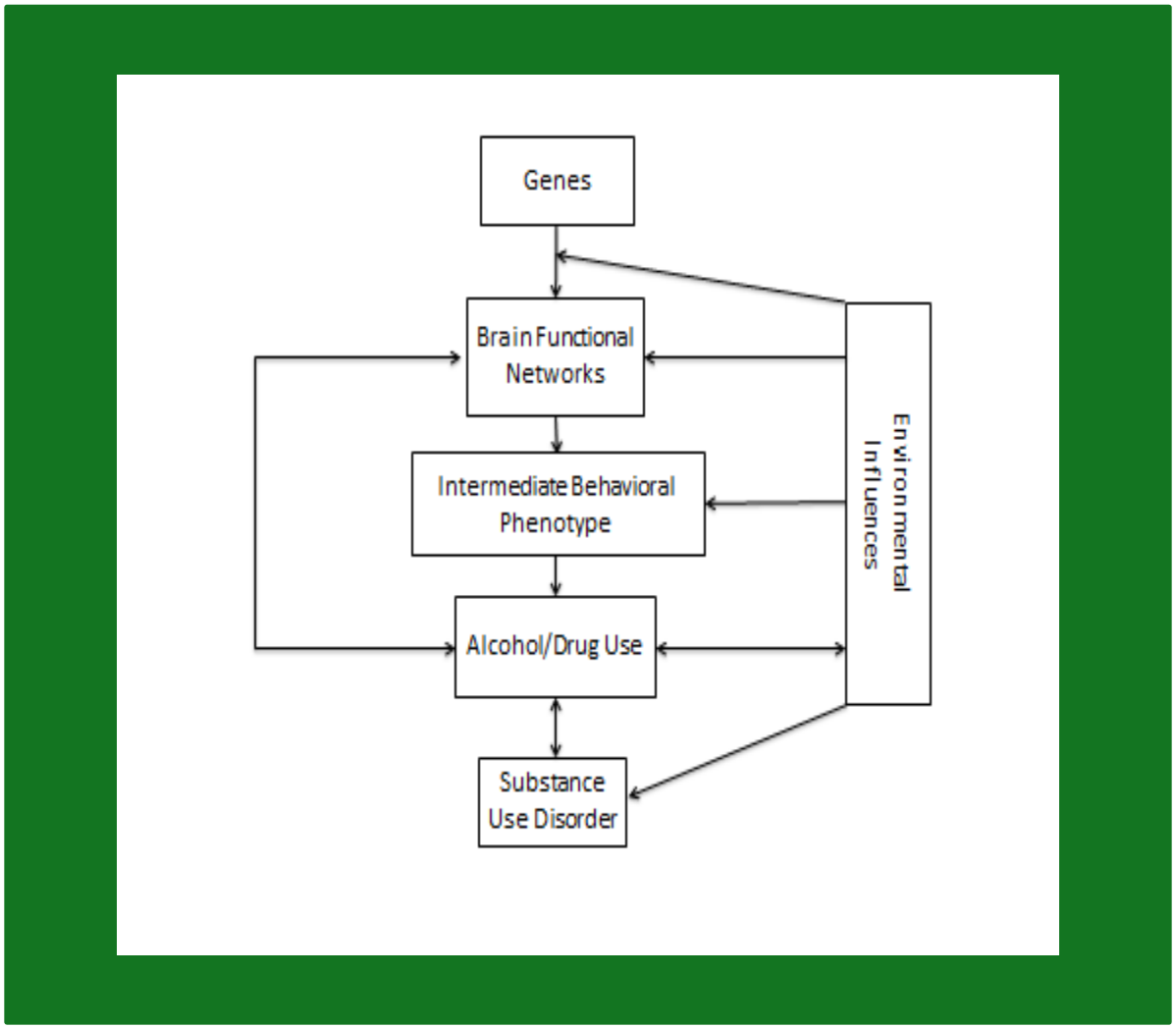
Sleep Problems Indicator

- Sleep problems in early childhood (ages 3-5)
  - Measured by mothers' ratings on the Child Behavior Checklist (CBCL)
  - Two sleep problem items: having trouble sleeping, and overtiredness; combined to form a composite indicator of sleep problems (0=absence of either problem; 1=presence of either or both problems

Percentage of Ss having Childhood Sleep Problems as Related to Onset of Adolescent Alcohol and Other Drug Use

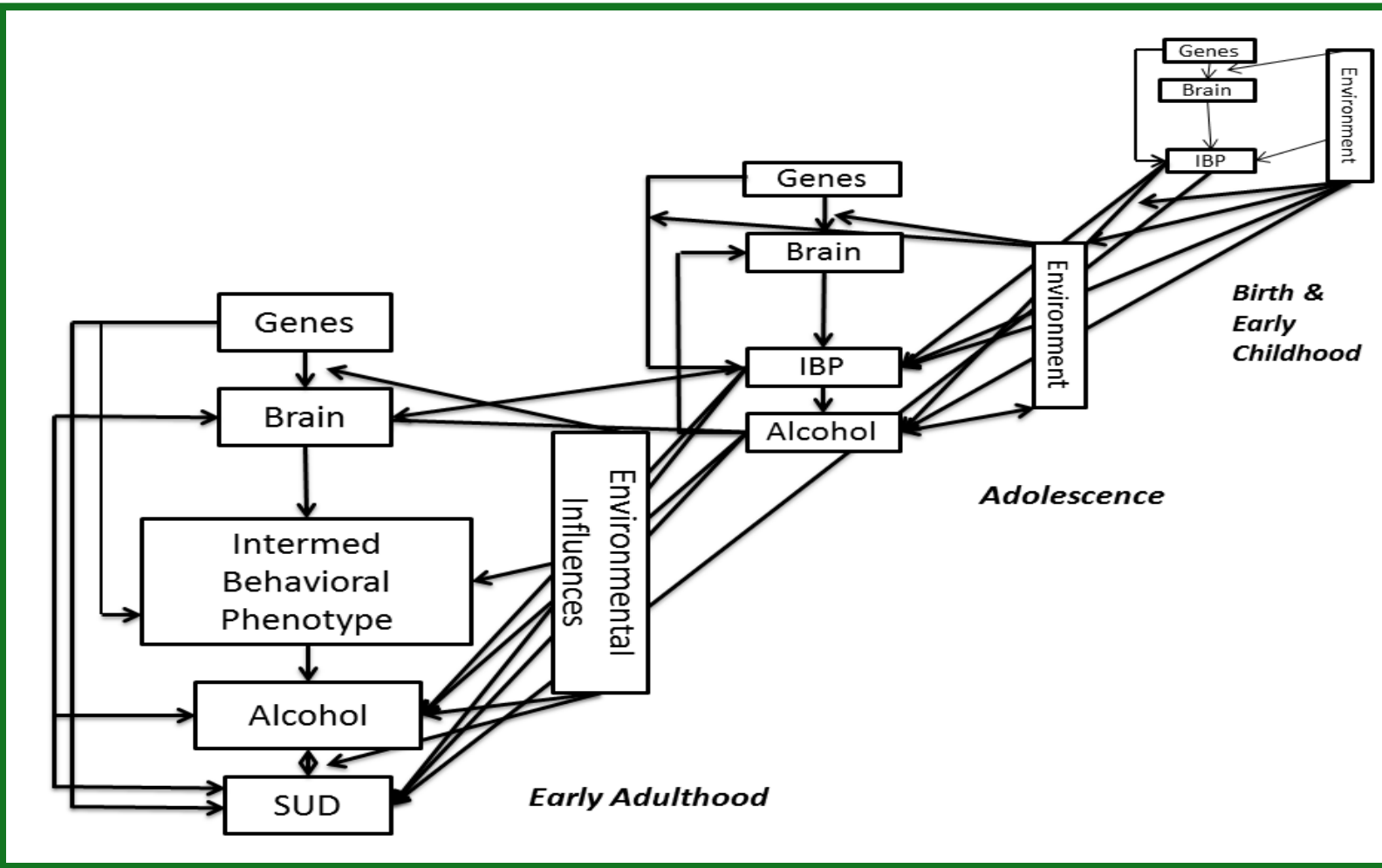


Heuristic Model of a Cross-Sectional Developmental Systems Framework for the Development of Substance Use Disorder



(Zucker, Hicks, & Heitzig, in press)

Flow over Time of Heuristic Model of Developmental Systems Framework for the Development of Substance Use Disorder



(Zucker, Hicks, & Heitzig, in press)

MLS Research Team

Two References For Broader Perspectives Beyond the Michigan Longitudinal Study

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Contact Information

Leon I Puttler, Ph.D
Project Director, Michigan Longitudinal Study
Research Area Specialist Lead, Department of Psychiatry
University of Michigan
Ann Arbor, MI 48109

Phone: (517) 353-5926
Fax: (517) 432-3764
Email: puttlerl@umich.edu