Adolescent Substance Abuse and Co-Morbidity

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- RISK FACTORS

Domains of Factors Associated with Drug Use (Newcomb, 1997)

I. Cultural/Societal

- -Laws favorable to drug use
- -Social norms favorable to drug use
- -Availability of drugs
- -Extreme economic deprivations
- -Neighborhood disorganization

II. Interpersonal

A. Childhood Interpersonal Factors

- Family alcohol and drug behavioral (modeling) and attitudes (Kandel, ’78, Johnson, ’99)
- Poor and inconsistent family management practices- poor family monitoring led to ETOH and cigarette initiation when children were not monitored under age 11 and
- MJH, cocaine and inhalants use occurred more often when children were not monitored during middle childhood (Chilcoat, ’96, Bennett, ’94)

- Parent personality and other characteristics-lack of closeness and involvement with children's activities, maternal passivity and low academic aspirations (Brook, '80)
- Family conflicts-family disruption, negative communication problems and lack of anger control (Baumind, '83, Reilly, '79)
- Physical or sexual abuse (Bennett, '94)

B. Adolescent Interpersonal Factors

- General stressful life events (i.e. relocation)
- Peer rejection in school and other context
- Association with drug using peers-peer attitudes and peer attachment rather than parent attachment had more influence (Bauman, ’94, Kandel, ’78, Brook, ’80)

III. Psychobehavioral

A. Child and Adolescent Psychobehavioral Influences

- Age of first use-higher % of those who start <11 yo met criteria for dependence than those that start 14-15 yo
- Rapid progression of SUD occurred with earlier onset & frequency and not duration of use (DeWitt, ’00, Kandel ’92)
- Earlier onset had shorter time span between 1st exposure to dependence than adult onset groups Clark,’98)

III. Psychobehavioral cont.

- Early and persistent behavior problem
- Academic failure
- Low degree of commitment to school

Hops (1999) has shown that substance abuse in adolescents at age 14-15 can be predicted by social and academic failure by age 7-9.

III. Psychobehavioral cont.

- Tapert (2002) has shown that adolescents with attention difficulties predicted substance abuse and dependence eight years later.
- Tapert's work controlled for intake substance involvement, gender, education, conduct disorder, family history of substance abuse, and learning difficulties.

Attention difficulties were not necessarily related to ADHD.

B. Psychobehavioral Antecedents and Consequences Throughout Life

- Alienation, rebelliousness, or antisocial personality and sensation seeking

Cloninger's Type 2 (1987) & Babor's Type B (1992) -genetic precusors, rapid course of onset, severe sx. deviant behavior with high novelty seeking, low harm avoidance & low reward dependence

B. Psychobehavioral Antecedents and Consequences Throughout Life

- Psychopathology (psychiatric co-morbidity)
- Attitudes favorable to drug use
- Cognitive motivations or expectancies for drug use
- Inability to delay gratification

IV. Biogenetic

- Inherited susceptibility to drug use
- Psychophysiological venerability to drug effects

(Newcomb, 1997)

IV. Biogenetic-

1.) Gene expression (Nestler, 94)- Chronic exposure to alcohol and other substances in the ventral tegmentum and nucleus accumbens may form permanent 2nd messengers that turn on genes that increases sensitization to the reinforcing effects of substances and tolerance.

2.) D2 receptor on Chromosome 11 (Blum, '90) and allele Al associated with alcoholism (also, Tourette's, ADHD and autism)

IV. Biogenetic-

3.) Reward deficiency syndrome-variants of 3 different dopamine genes have higher number of symptoms associated with ADHD, addiction, & compulsivity. 2 variants have fewer sx. and one variant even less-

(Blum, 1996)

4.) Repeated self-administration of cocaine appears to be associated with the D1 receptor (Weiss, ’96)

IV. Biogenetic-

5.) D2 activation can trigger cocaine seeking (Self, '96)

6.) Early onset substance abusers have a low ratio of plasma tryptophan, which suggests a decline in serotonin levels and these teens were incarcerated for violent crimes (Buydens and Branchey, '89)

IV. Biogenetic-

7.) Nicotine self administration may be explained by the nicotine receptor-mice lacking the beta 2-subunit of the nicotine receptor failed to self-administer (Picciotto, '98)

8.) Tolerance in Children of alcoholics-children of alcoholics had to use greater proportions of alcohol before the reflex response to a stimulus was delayed to the same degree found in responses of children of non-alcoholics (Schukit, '99)-will discuss later

IV. Biogenetic-

9.) Adoption studies have shown:

- PROTECTIVE FACTORS

  -RESILENCE-Good life events and an internal locus of control seem to cushion the development of substance use disorders in sons of alcoholics (Springer, '95)

  -stable environment

  -high degree of motivation

  -strong parent-child bond consistent parental supervision & discipline

  -bonding to pro-social institution

  -association with peers who hold conventional attitudes

  -consistent community wide anti-drug use messages (Glantz, '98)

Risk for Substance Abuse

PRE-ADOLESCENT AND ADOLESCENT NEUROBIOLOGICAL RISK OF SUBSTANCE ABUSE

Important elements:

1. Timing of exposure-effect of stimulants for treatment of ADHD
2. Developmental vulnerability-normal verses developmental delays that become fixed secondary to events that occur during adolescents and how these abrupt halts in development may increase risk of substance abuse
3. Genetic vulnerability-effect of genetics in combination with events that may increase experimentation with substances secondary to events that occur during adolescence

1. TIMING OF EXPOSURE

- **Children treated with stimulants for ADHD have less risk for substance abuse than those untreated (Biederman, 1999, Wilens, 2003)**

- Castellanos (JAMA, 2002)-reviewed total cerebral volume of treated and untreated adolescents with ADHD. Results=equal
- However, total white matter in unmedicated was lower than medicated and normals.
- Perhaps the trophic effect on myelination, dendritic branching, and length of spines is somehow protective

- Use of diffusion-tensor MRI indicated increase in white matter in the temporal-parietal area (responsible for reading ability) was related to increased reading performance (Beaulieu and Phillips, 2005)

Developmental vulnerability

- **Adolescence-3 Changes occur :**

1. pre-frontal cortex in adolescents is immature (does not have proper connections to other parts of the brain which would allow inhibition to occur quickly especially in emotionally charged situations)and may not be able to quickly inhibit the enactment of the motivational drive mechanisms (Luna).

2.Hormones influence the secondary motivational circuitry which increases the sensitivity to substances of abuse in the same way they influence sexual drives.(Chambers, 2003)

3.Pruning of serotonin neurons increases impulsivity (Chambers, 2003)

Developmental vulnerability

Pruning may be the reason developmental delays become fixed during adolescence and the reason for less success when entering adolescence academically.

Success in academics and/or sports prior to adolescents is important-more likely to seek these pleasurable activities

However, these transformations may also increase motivation to use, increase impulsive experimentation with little ability to inhibit these impulses especially in children who enter adolescence with little academic success. (Dahl)

Genetic vulnerability

c. Initiation vs. progression to dependence

In adoption studies conducted by Kendler (1998), 485 monozygotic and 335 dizygotic female twins demonstrated that cannabis initiation was influenced by genetic and familial environmental factors while cannabis abuse and dependence were solely related to genetic factors.

This was also true for cocaine use versus abuse and dependence.

Genetic vulnerability

b. Increased risk for alcoholism of adopted away children of alcoholics (Goodwin, 1974) and an increased risk for substance abuse other than alcohol in adopted away studies (Cadoret, 1974).

However, alcohol use by adoptive parents did not increase risk for alcohol abuse in adoptive children without a family history of abuse (Cloninger, 1985).

Genetic vulnerability

d. Role of dopamine=directs brain to things that are salient and pleasurable

- **If drugs increase dopamine to higher levels=increase in magnitude of effect**
- **Result=decrease in postsynaptic receptors and therefore, natural reinforcers are no longer salient but drugs are.**
- **Decreased D2 receptors can be the result of drugs or people may be born with decreased D2 receptors.**
- **People with increased D2 if given IV cocaine have an aversive reaction**
- **Therefore, an increase in D2 receptors may be protective and a decrease may be more vulnerable**

(Genetic component) (Volkow, 2002c)

A 50% increase in D2 receptors (using an adenovirus in mice), decreased ETOH intake by 70% (Volkow, 2002b)

Decreased D2 receptors can lead to dependence

(Volkow, 2002a, and Mol. Psychiatry, 2004) Decreased D2 receptors influences compulsion. Decreased D2 in the nucleus accumbens=decreased metabolism in orbital frontal gyrus (OFC) and cingulate gyrus (CG)=executive function

CG=initiates ability to restrain control

OFC=shifts attention to something that is salient

If teach animal to press lever to get food, when food is D/C'd, motivation to press bar decreases because response no longer salient

If destroy OFC, will continue to press bar even though not salient=drug abusers continue to use even though taking drugs is not pleasurable

Volkow feels the reason is the CG can no longer inhibit response and the OFC begins driving the compulsion=**dependence**

3.Genetic vulnerability-especially in child who has never had stimulants or who has had little academic success

a. Schukit (1999) has shown greater tolerance in children of alcoholics (1999).

   In his study children of alcoholics had to use greater proportions of alcohol before the reflex response to a stimulus was delayed to the same degree found in responses of children of non-alcoholics. Reflex response to a stimulus in children of non-alcoholics was delayed to the same degree on lower proportions of alcohol.

- CO-MORBIDITY

A. Depression

1.)Gender-

a. Whitmore (1997)-although ADHD, Depression and Conduct Disorders may play an important role in SUD in males, depression may be the primary variable related to SUD in women.

b. Rao (2000) in a study comparing depressed females without previous SUD to non-depressed controls, the risk for SUD in both groups was high (34.6% vs 24.2%)

- Females with depression had earlier onset of SUD than females without depression.
- Females with depression and SUD had :

-more anxiety and elevated cortisol near sleep onset (when the hypothalamic-pituitary is expected to be less active) than depressed females without SUD

-more psychosocial impairment

2. Bipolar Disorder (BPD)

a. Mid adolescent youths with adolescent onset BPD were at significantly increased risk for SUD relative to those with child onset BPD.

-Adolescent BPD had 8.8 times> risk than child onset BPD and conduct D.O. or other co-morbidity did not account for the risk (Wilens, et al, 1999)

Neurotransmitters

Decreased NAA in DLPFC

On MRS in adult BP

(N-acetylaspartate) NAA =

(dec neuronal density)

and TLE =mania)

(Chang, 2003)

LeDoux, 1977

L & R- DLPFC NAA dec

from child to adulthood

putamen (mood)

(Chang, 2003, Winsberg, 2000)

Reason: as BP pt gets older,

Brake can't work anymore

to circuits

Cortical & Subcortical

(brake) (gas)

DLPFC, amygdala (fear

ACC, ant insula

VMPFC hypothalmus

thalmus

caudate/

brainstem

- 3. Dysthymia
  - a. Among hospitalized adolescent substance abusers with dysthymia and PSUD, 53% had Dysthymia prior to the development of PSUD. (Hovens, et al, 1994)
  - b. In a study of 156 inpatient adolescent substance abusers with Major Depression, 60.4% had secondary depression and 16.7% had primary form. (Bukstein, et al, 1992)

B. Anxiety

-In the results of the International Consortium in Psychiatric Epidemiology,the onset of anxiety disorders was more likely to precede that of substance disorders in all countries. (Merikangas, et al, 98)

PTSD-

a. In a treatment population with early-onset alcoholism, 50% had at least one lifetime anxiety D.O. diagnosis. In this sample, the most common anxiety disorder was PTSD (25%). (Clark, et al, 1992, 1995)

2. Social Phobia

a. Development of SUD in socially phobic adolescents may increase the risk for developing PTSD because they cannot cope with trauma effectively due to their pre-existing condition (Deykin, 1997)

b. In one study, social phobia and agoraphobia (from epidemiological surveys, field studies and family studies), preceded the onset of alcoholism while generalized anxiety disorder and panic disorder did not. (Kushner, et al, 90)

c. Social phobia in girls was often followed by major depression and ETOH dependence and suicidal-related behaviors (Nelson, 2000)

d. Children with aggression should be evaluated for shyness. One study demonstrated that boys with aggression and social phobia were better predictors of future cocaine use than aggressiveness alone (Swan, 1995)

C. Suicidality

1. Completed suicide among 10-19 yo were 4.9 times more likely to have been drinking than those who used other methods of suicide.(Brent, et al, '87)
2. Psychological post mortem studies of adolescents committing suicide found that 70% were drug and alcohol abusers. (Shoffi, et al, '93)

3. Substance abuse was a substantial risk factor for suicide when coupled with co-morbid affective illness. (Brent, et al, '93)

-Correlation- decreased serotonin is often associated with suicide (Heintz, 2001) and alcohol can decrease serotonin

4. Suicide victims were more likely than controls to show the following risk factors: -
active substance abuse

-legal problems

-co-morbid major depression

-suicidal ideation within the past week

-family history of depression substance abuse

-presence of a handgun in the home
(Bukstein, et al, '93).

- 5. Higher levels of depressive sx and greater cigarette and illicit drug use distinguished suicidal ideators from attempters (Windle, et al, '97)

- D. Conduct Disorder

1. (Riggs, et al 95)
   - Males with CD and substance abuse had more aggressive sx of CD including stealing (with & without confrontation), destruction of property, weapon fights, breaking and entering and torturing animals.

-Females had more running away behavior than boys

2. In Girls with SUD and Conduct D.O. or only Conduct D.O., both groups scored poorly in I.Q., executive function language competence and school grades than the SUD group alone (Giancola, 2000)
3. Adolescents who develop conduct disorder before the development of SUD have a poorer prognosis than those that develop conduct disorder during SUD (Randall, et al, 1999)

- E. Eating Disorders

a. Bulimia patients had a higher incidence of substance abuse than restrictive anorexics (Bulik, et aI, '92)

b. Bulimic women with substance abuse had higher novelty seeking treatments than bulimic women without substance abuse (Bulik, et al, '94)

F. Sexual Abuse

- On every measure of substance abuse, the abused group had scores indicative of more serious abuse involvement
- The abused group used MJH and stimulants more often, used drugs more frequently got drunk more often & initiated drug use at a younger age
- The abused group were more likely to use to deal with feelings, problems or inadequacies

G. ADHD

1. ADHD and Conduct disorder is a higher risk for developing substance abuse (Wilens, et al, 93)
2. In a prospective study following a 2 groups of children for 8 years: one with ADHD and Conduct disorder and one with ADHD alone. The ADHD/CD group used 2-5 times more alcohol and cigarettes than the ADHD group alone.(Barkley, et al,90)

3. In a study with 626 pairs of 17 year old twins found:

- Increased risk of substance abuse among adolescents with conduct disorder that persist,
- ADHD did not increase the risk of substance abuse unless associated with Conduct disorder (Disney, et al, '99).
- 4. In a 10 year follow up of children with ADHD, the most frequently abused drug was al MJH. (Mannuzza, et, '93)

5. Adult ADHD risk-Risks in ADHD was greater than control (52%vs27%).

6. If an adolescent does have a diagnosis of ADHD and is treated, the risk of developing a substance abuse problem is reduced by 50% (Wilens, 2003),)

Remember: AUTISM and overlap with ADHD

H. Learning Disorders and Processing Problems

- Hops (1999) has shown that substance abuse in adolescents at age 14-15 can be predicted by social and academic failure by age 7-9.
- Tapert (2002) has shown that adolescents with attention difficulties predicted substance abuse and dependence eight years later. Tapert's work controlled for intake substance involvement, gender, education, conduct disorder, family history of substance abuse, and learning difficulties.

The attention difficulties were not necessarily related to ADHD/ADD.

- (Lazar & Frank, ’98) Compared ADHD and LD group, LD group alone and ADHD group alone on neuropsych testing.
- ADHD and LD group and LD group alone performed sig worse than ADHD group alone.
- **Therefore, something was responsible for the poor performance in groups with LD**

- That something else may be Processing problems (Kataria, ’92, August, ’98)
- Behaviors of central auditory processing problems (CAPD), a cause of processing problems, can be distinguished from ADHD (Chermak, ’98)
- Language disorders seen with CAPD, even when corrected with speech therapy, can be manifested as a Disorder of Written Expression (Johnson, ’95)

- (Simkin, 2001)
- Tested 77 children with ADHD/ADD alone or with an anxiety disorder or depression that was well controlled for.
- Average IQ=126, no one had IQ<100
- Used WISC III, Woodcock Johnson III and Cognitive Battery

- 92% Disorder of Written Expression
- 88% Auditory Processing Problem
- 70% Processing problem
- Therefore, the above difficulties may be one source of attention problems Tapert alluded to that can lead to SUD if not identified.

I. Fetal alcohol syndrome/effects (FAS/FAE)

Four components of attention:

- Focus
- Sustaining focus
- Shift
- Encoding
- ADHD and stimulant treatment improves all of the above but stimulant treatment in FAS/FAE children only improves focus and shift (Mattson, ’99, Coles, ’97)

- % of FAS in forensic unit 3-10X greater than accepted worldwide incidence
- % of these youth with any alcohol related diagnosis is 10-40X the accepted worldwide incidence (Fast, et al, 1999)
- Those without FAS but with alcohol related effects-60 to 90% escape ID in normal population (Mattson, 1998)

J. Schizophrenia-(Hambrecht,et al, 2000)

Vulnerability hypothesis- 3 groups using MJH

- a. Group I-Frequent use =decreased threshold for appearance of D.O since used several years before onset of D.O.
- b. Group 2-Vulnerable group where dopaminergic stress factor may precipitate the onset of D.O.
- c. Group 3-may use the MJH to self medicate since they developed the D.O before using MJH (may apply to all D.O.'s)

TREATMENT

I. Psychopharmacology

- Wellbutrin and cylert were found to be effective in treating juvenile offenders with ADHD (Riggs, '96, '98)
- Fluoxentine was effective in the treatment of depressive disorders in drug- dependent delinquents (Riggs, '97)-
- FDA implications-Do you have to use Prozac?

- Methylphenidate improved ADHD and substance abuse disorders (Riggs, 1998)

(Stimulant use not recommended initially with substance abusers)

- Tenex or clonidine have been helpful in treating Tic disorders and impulsivity associated with ADHD

- Nortryptiline has been used with ADHD and tic disorders
- Modafinil has been found to be effective in children with ADHD in an open-trial study (Rugino, 2001)
- But-Modafinil has been found to have weak reinforcing effects in drug experienced individuals

  (Deroche-Gamonet, 2002, Jasinki, 2000)

  Therefore, would not use at this time initially
- Ongoing drug screens are essential as is treatment for the substance abuse problem

Aversion and craving treatment in adolescents

- Naltrexone useful in one case of 17 year old alcoholic male (Wold, 1997).
- Lithium in alcohol abusing adolescents and bipolar relieved manic sx and decreased alcohol use (Geller, 1998)
- Odansterone (anti-nausea) decreased alcohol drinking only in early onset alcoholics (<25 yo) (Johnson, 2002)

- Future hopeful Tx:

- Buproprion relieved symptoms of withdrawal in adult with amphetamine withdrawal 2-3 days after starting SR 150 mg (Chan-Ob, 2001)

- D1-class agonist and NMDA antagonist with D2 agonist decreased sensitization to cocaine in rats and effect continued 2 weeks after drugs stopped. Pergolide and memantine combination approved for human use (LI, Y, 2000)

II. Cognitive Behavior-

- a. Behavior therapy (using stimulus control, Urge control and Social control) vs supportive therapy effectiveness was compared
- Number of adolescents using drugs by end of treatment for behavior group was 73% and for supportive group was 9%. A Large decrease in scores of depression alcohol use by both groups decreased by 50%
- Percent attendance at school decreased significantly and large decrease in scores of depression occurred for behavior group but only slightly for the supportive group

- Parent satisfaction with youth increase from 42% to 72% on behavior group but stayed the same in supportive group (50%)
- Youth satisfaction with parents increase from 69% to 85% with behavior group and stayed the same with the supportive group (63%) (Azrin, 94)

B.) Cognitive Behavior Treatment (CBT) vs Psychoeducational treatment (PET) were compared

- On 3 month follow up, adolescents who were in the CBT group improved on severity of peer problems as compared to adolescents in PET group
- Trend toward improvement on the drug and alcohol severity measures was observed for adolescents in the PET group (Kaminer, 99)

III. 12 Steps

a. Inpatient and halfway house adolescents using AA/NA programs were followed for two years at 6, 12 and 24 months.

- 6 months-71% of boys and 79% of girls who completed the program were abstinent, while 37% and 30% of non-completers were abstinent (45% of completers and abstinent had successful functioning in school, while this was true for 25% of non-completers)

- 12 months-abstinent rates for boys who completed the program fell to 48% and increased for non-completers to 44%
- For girls completers had small decrease to 70% and non-completers to 28%. Only 29% of completers and abstinent were functioning well while 18% of non-

  completers were functioning well.

- For 24 months, non-completers and completers showed no difference in abstinence (30% vs 40%) .Girl completers fell slightly to 61 % and non-completers to 27%
- Whether a non-completer or completer, 72% of those who did not use at 24 months were functioning well. Only 33% of those who used intermittently and 37% of those who used frequently were socially adaptive

- .** By two years 84% of high frequency AA/NA attenders were abstinent/essentially abstinent

- Therefore high frequency attendees and girls who completed the program did better than boys who completed the program

  (Alford, ‘91)

B.) Predictors of high frequency attendance (one or more meetings per week) were strong agreement with the need for frequent, lifelong attendance, and need to "surrender" to a higher power (Fiorentine, 2000)

C.) 142 adolescents (ages12-18) followed at 6,12 and 24 months in 12 step programs:

- Teens with less drug and ETOH use post-treatment improved in their functioning emotionally, interpersonally with families, school, work and recreational activities
- Abstainers displayed best psychosocial functioning
- Those who returned to substance abuse and those who became more severe with use accounted for majority of dropouts (Brown, 1994)

Bottom Line of Successful Treatment:

- Predictors of successful tx. occurs when the adolescent feels there is a conflict within the family, the parent identifies the seriousness of the condition in the youth, adolescents are older, female, and parents had higher expectations (Crowley, 2001)

IV. MOTIVATIONAL ENHANCEMENT THERAPY

Determine motivation to change (Prochaska and DiClemente, 1982)

Stages:

- **Precontemplation** (no plans to change) .
- **Contemplation** (intend to quit but no prior commitment)
- **Preparation-**committed to quitting
- **Action**
- **Maintenance**

A. Principles

- Empathy
- Avoiding arguments
- Go along with Resistance
- Support self-efficacy
- Develop discrepancies

B. Traps .

- Premature focus
- Confrontation/denial
- Blaming
- Question and answers
- Expert

C. Try to elicit self-motivational statements in 4 ways:

- Problem recognition
- Concern
- Intention to change
- Optimism for change

D. **FRAMES**

- **F**eedback-personal .
- **R**esponsibility
- **A**dvice
- **M**enu of options .
- **E**mpathy
- **S**elf Efficacy

E. Strategic approaches:

- Shift focus
- Re-frame-emphasize risk in behavior or reframe a weakness as a strength
- Agreement with a twist (reflection with a re-frame)
- Personal control
- Siding with the negative

V. Family therapy

- A. Multisystemic Family Therapy (Henggler, 96, 99

- B.Multidimensional Family Therapy
  (Liddle, '96, '99)

BOTTOM LINE: Early assessment and intervention of all risks factors is essential