

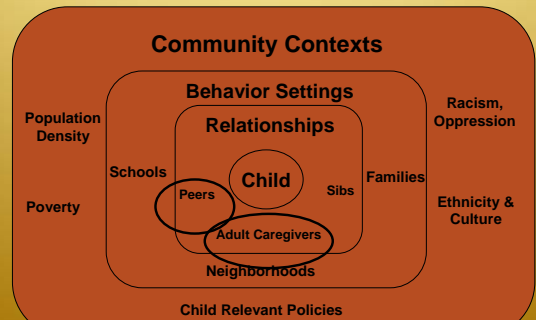
Adolescent Self Regulation and the Brain: Risk, Resilience and Intervention.

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Healthy Brain Conference: Key Impacts and Intervention.
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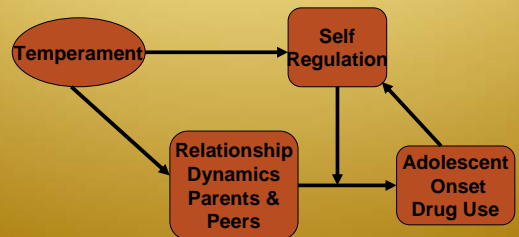
Ecological Framework: Developmental Transactions



Four Goals of this Talk.

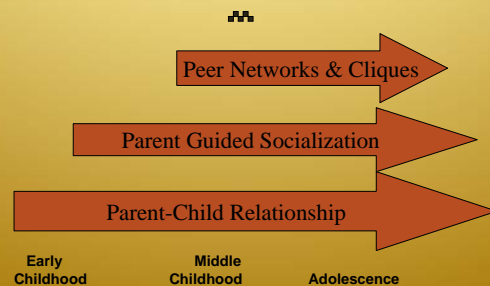
1. To provide an overview of an ecological perspective on children's problem behavior, and to identify the key risk processes.
2. Detail the brain behavior processes underlying child and adolescent development of self regulation, and review evidence that self regulation is a resiliency factor.
3. Examine evidence that adolescent drug use disrupts the refinement of the brain processes underlying self regulation.
4. Provide an overview of a brief, cost effective family intervention that reduces risk and promotes child and adolescent positive development.

A General Model for the Role of Self Regulation in Early Onset Drug Use and Problem Behavior

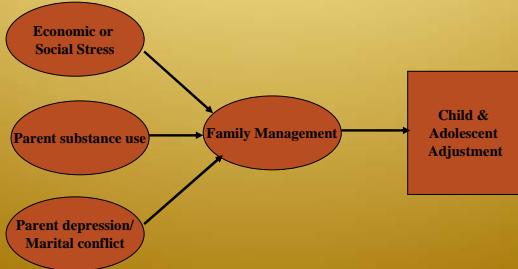


What is the developmental and ecological nature of child and adolescent self regulation?

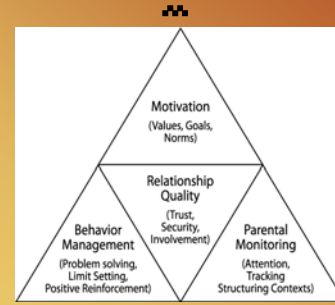
A Developmental Perspective on Relationship Influence



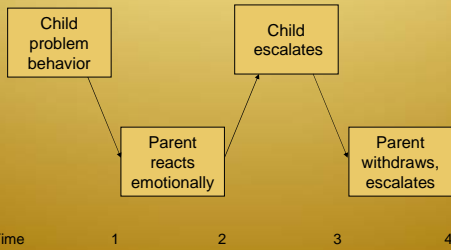
Family Management as a Mediator of Contextual Influences.



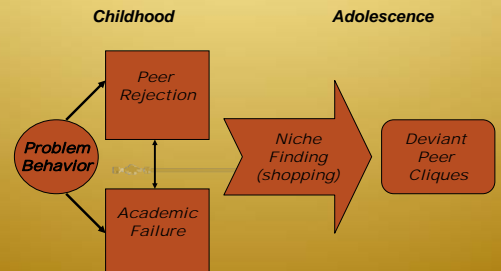
The Family Management Triad (from Dishion & McMahon, 1998).



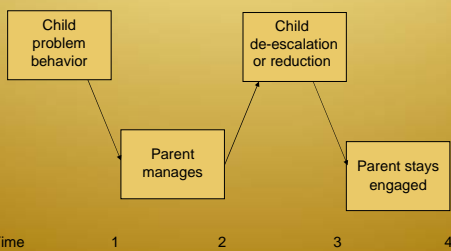
The Coercion Model and Escape Conditioning



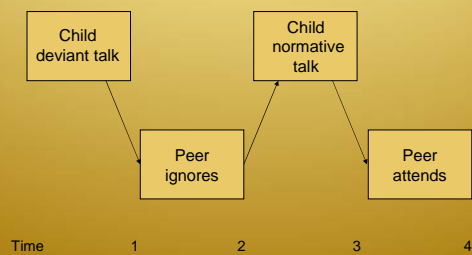
An Ecological Adaptation Model: Deviant Peer Cliques as Social Augmentation.



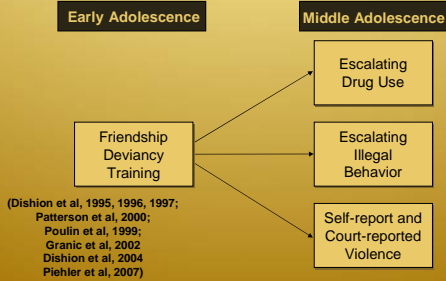
Family Management and Adaptation



Positive Peer Adaptation

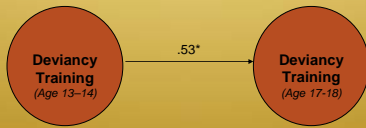


Developmental Research on Peer Contagion and Adolescent Problem Behavior



What is the nature of self regulation and how can it serve to as a resiliency factor for adolescents?

Longitudinal Stability of Deviant Training in Adolescent Friendships
(from Dishion & Owen, 2002)

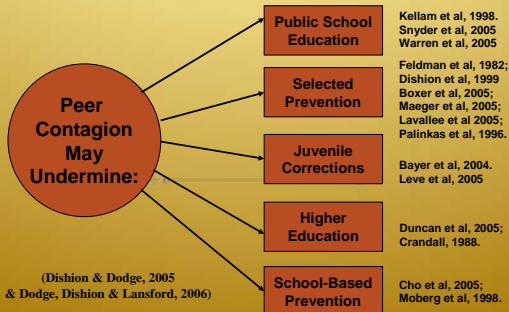


Delay of gratification

✦ Choosing larger, delayed reward over a more immediate, smaller reward



Research Indicating Peer Contagion Undermining Intervention Goals .

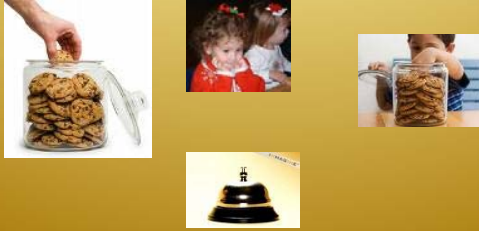


Delay of gratification

✦ Classic study:

- ✦ The Marshmallow (Cookie) Test
- ✦ Walter Mischel and colleagues

The Cookie Test



Attention and delay of gratification

- ✦ Children who are able to wait to touch an attractive toy tend to use distraction as a strategy (Raver, Blackburn, Bancroft, & Torp, 1999)
- ✦ Toddlers' use of distraction to cope with maternal separation predicts use of effective delay of gratification strategies at age 5 (sethi, mischel, aber, shoda, & rodriguez, 2000).
- ✦ Examples from Early Steps

Differences in Delay of Gratification

- ✦ Some kids grabbed the cookie within seconds
- ✦ Others waited up to 20 minutes!
- ✦ At age 18 years:
 - ✦ The kids who waited the least had lower SAT scores
 - ✦ The kids who waited the longest had the highest SAT scores
 - ✦ DOG of age 4 predicted SAT scores almost twice as well as age 4 IQ!

What is attention?

- ✦ We all know what it means, but no single definition
- ✦ "Spotlight"
- ✦ Enhanced processing of selected information to the relative exclusion of unselected information
- ✦ Limited resource

Marshmallow test, continued

- ✦ What helped kids wait?
- ✦ Focusing on *delayed* reward?
- ✦ No: Moving attention away from the reward
 - ✦ Provided kids with distraction strategies in presence of reward (e.g., toy to play with, think of...)
 - ✦ Wait time INCREASED
- ✦ Successful children were able to distract themselves (sing, tap their feet, tell themselves stories, imagine the marshmallow was a fluffy cloud—anything to avoid eating it).
 - ✦ Effortfully re-directing attention

Posner & Rothbart 1999

- ✦ Three attentional networks
 - ✦ Alerting
 - ✦ Orienting
 - ✦ Executive control

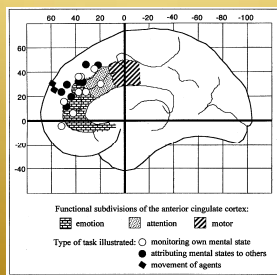
Top-down and Bottom-up Attention

- ✦ You can choose where to put your attention
- ✦ Your attention can be pulled
- ✦ These processes can compete
- ✦ Example: Stroop task

Stroop

red blue orange purple
orange blue green red
blue purple green red
orange blue red green
purple orange red blue
green red blue purple
orange blue red green
green purple orange red

The Anterior Cingulate Cortex (ACC): Activation Patterns Across Imaging Studies*



*Frith & Frith, 2001

Stroop effect

- ✦ Overlearned “reading” response
- ✦ Explicit “color-naming” requirement
- ✦ Automatic (bottom-up) word reading interferes with effortful (top-down) goal

Effortful control

- ✦ Rothbart (1989) coined the term
- ✦ “the efficiency of executive attention, including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors” (2002)
- ✦ The ability to willfully or voluntarily inhibit, activate, or change attention and behavior
- ✦ A primary dimension of temperament, as viewed by Rothbart

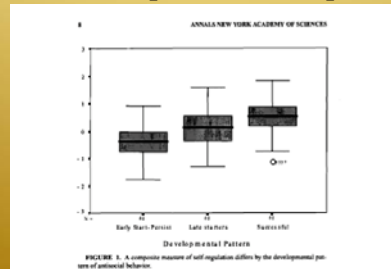
Individual differences in attentional “pull”

- ✦ “Pull” can be influenced by learning history
 - ✦ Habits
 - ✦ Reward contingencies
- ✦ Example: Emotion Stroop
 - ✦ *danger, crisis, failure, fear*
- ✦ Many important emotion-attention interactions

How do we measure attention in children and adolescents?

- ✦ Parent, youth and teacher-report questionnaire
- ✦ Laboratory
 - ✦ Behavioral tasks (reaction time and accuracy)
 - ✦ Directed attention (e.g., Posner Attention Network Task)
 - ✦ Automatic and controlled
 - ✦ Neuroimaging: fMRI
 - ✦ High Density EEG imaging
 - ✦ Event-related Potentials (ERPs)

A Composite Measure of Adolescent Self Regulation by Three Developmental Groups



Study of Self Regulation in Adolescents (Dishion & Connell, 2006)

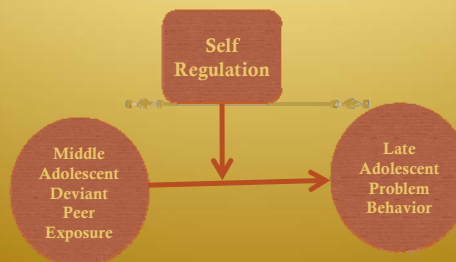
Three Post Hoc Developmental Groups:

Early Start Persistent (n=40): Persistently high levels of problem behavior from age 11 through 17 & 1 arrest;

Adolescent Onset (n=40): No problem behavior until age 16-17

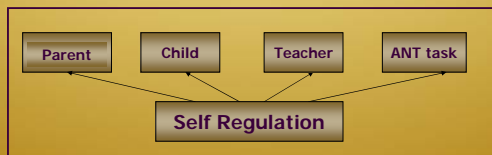
Successful (n=40): Persistently low levels of problem behavior and a GPA above 2.5

Self Regulation as a Resiliency Factor for Deviant Peer Influences



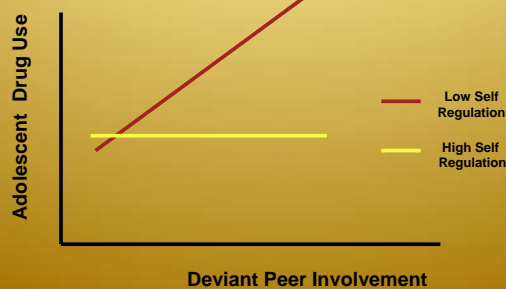
The Adolescent Self Regulation Construct

- ✦ Developmentalists observe some aspect of development and derive psychological constructs to define the phenomena they are studying.

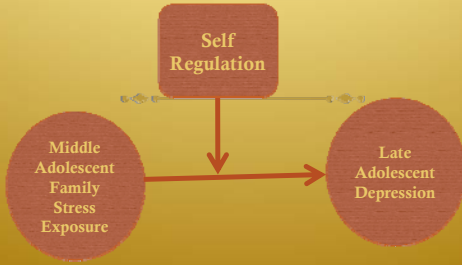


Adolescent Self Regulation as Resilience to Deviant Peer Influences

(adapted from Dishion & Connell, 2006)



Self Regulation as a Resiliency Factor for the Effects of Stress

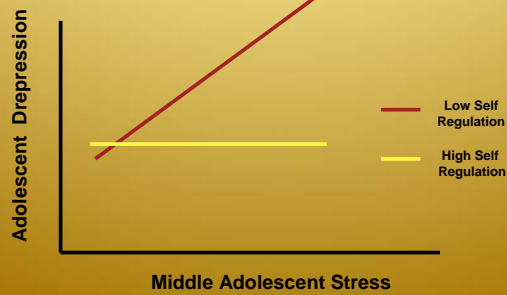


fMRI as a Tool for Studying Adolescent Brain Development

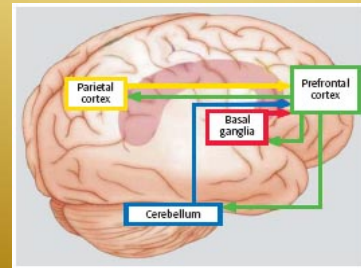


Adolescent Self Regulation as Resilience to Family Stress

(adapted from Dishion & Connell, 2006)

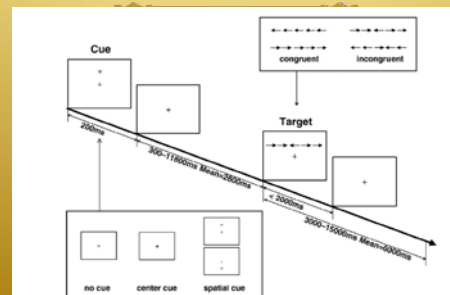


Parts of the Brain Involved in Attention

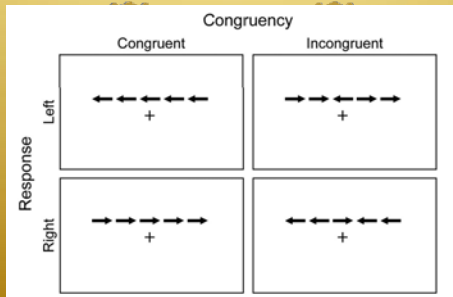


Does Adolescent Drug Use Disrupt the Refinement of Effortful Attention Control and Self Regulation?

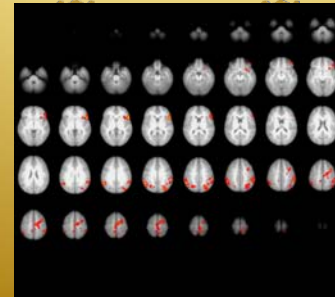
Structure and timing of the Attention Network Test (ANT)



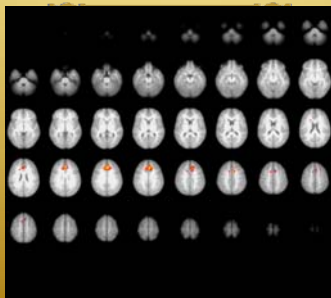
Conflict condition of the Attention Network Task



Substance abuse vs. Normal controls group comparison demonstrating fMRI activation difference of conflict network

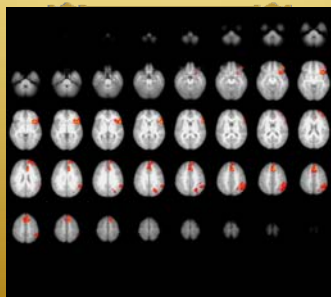


Incongruent vs. Congruent comparison demonstrating fMRI activation maps of conflict network in a group of normal controls

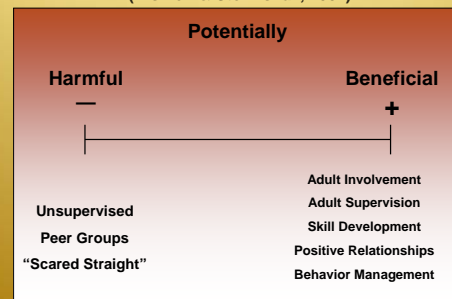


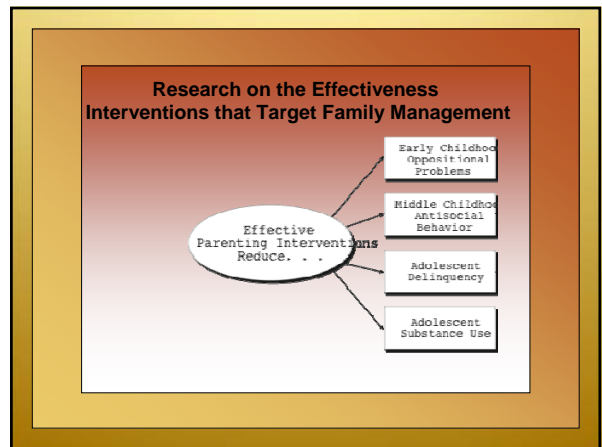
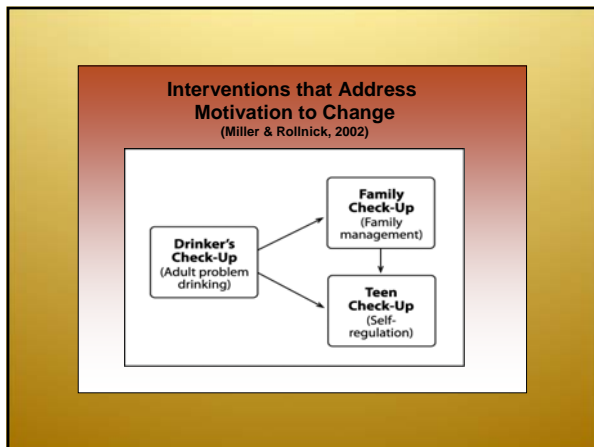
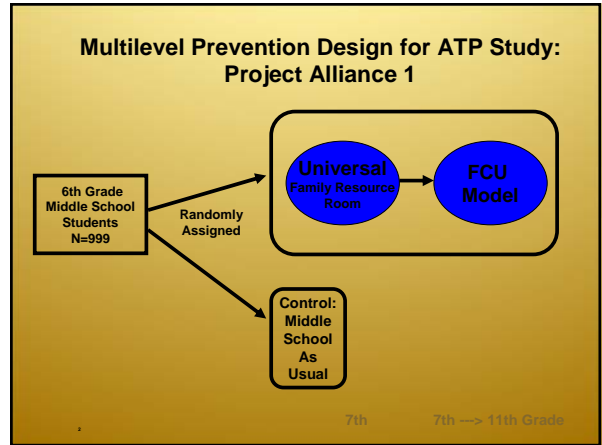
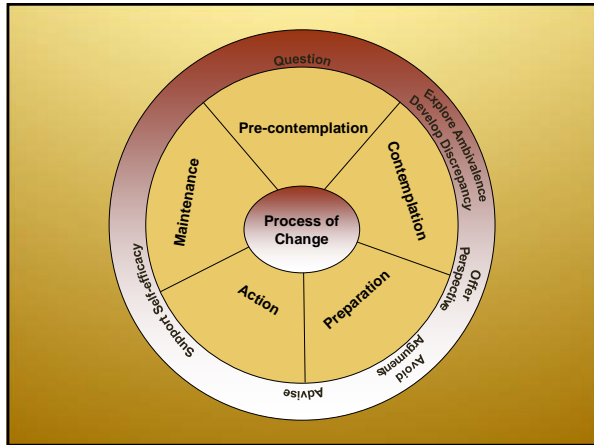
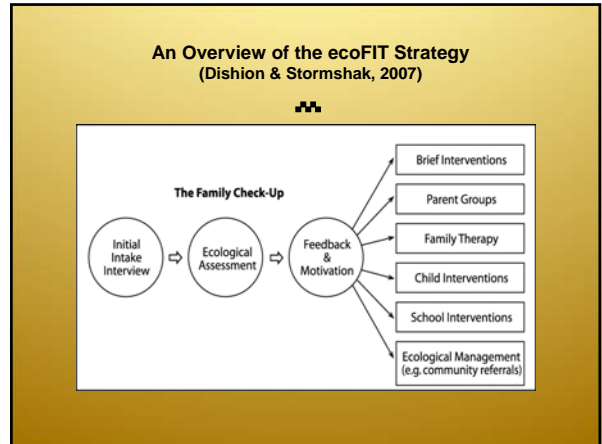
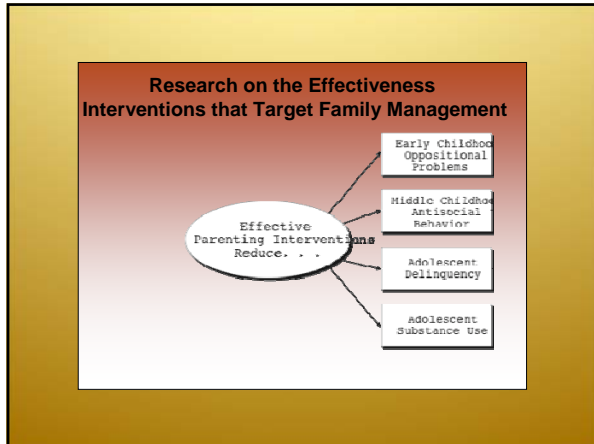
Are there cost effective approaches to intervening to prevent risk processes from emerging and amplifying in adolescence?

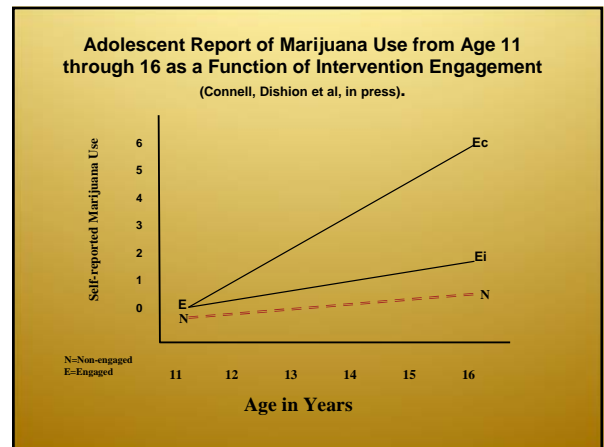
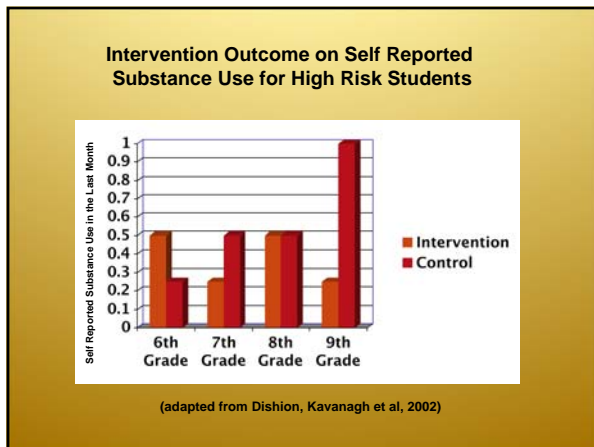
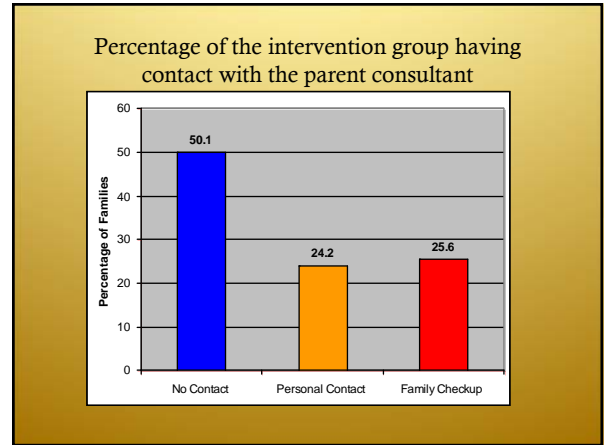
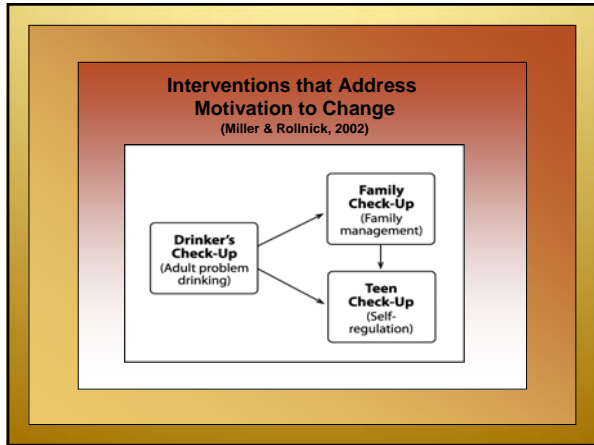
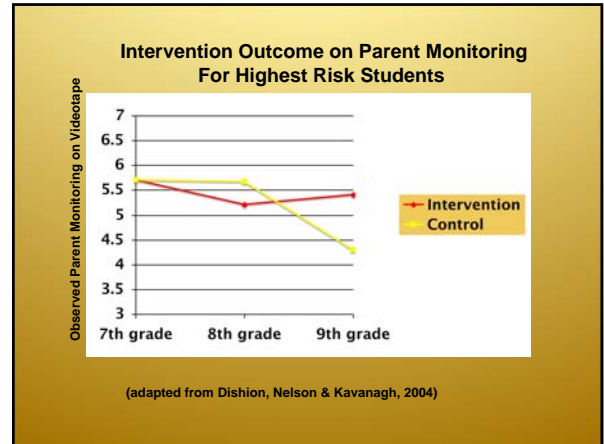
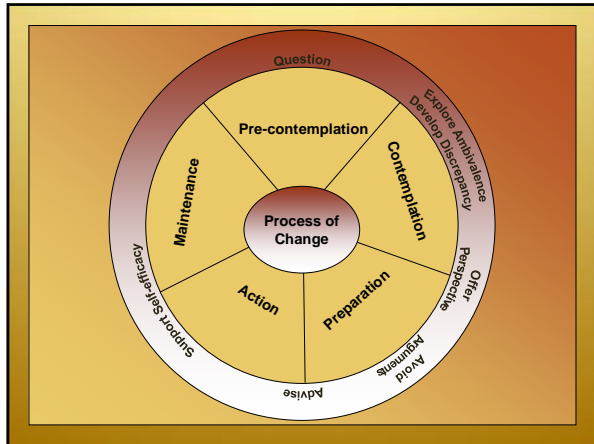
Incongruent vs. Congruent comparison demonstrating fMRI activation maps of conflict network in a group of substance abuse



A Broad Overview of Intervention Outcome Literature (Dishion & Stormshak, 2007)

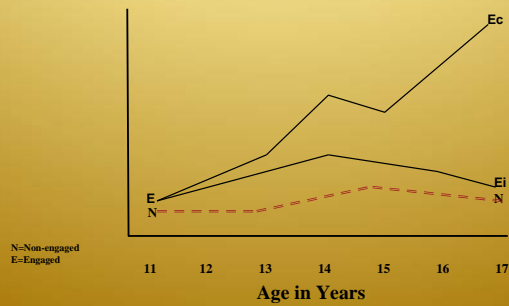






Probability of Arrest from Age 11 through 17 as a Function of Intervention Engagement.

(Connell, Dishion & Yasui, in press).



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Also see :

Dodge, Dishion & Lansford, 2006;

Dishion & Stormshak, 2007

Concluding Comments.

1. Adolescent self-regulation is an outcome of a developmental process that is embedded within family and peer relationships.
2. A key component of self regulation is the ability to direct ones own attention. Individual differences in self regulation are a powerful resiliency factor in adolescence;
3. Activation patterns in the brain for normal versus drug using adolescents suggests attention networks are disrupted by substance use.
4. Family centered interventions can be cost effectively delivered to prevent risk and promote positive adolescent development.

Future Directions.

1. Designing a study that will use our family-centered intervention model to promote early adolescent positive activities and reduce risk processes;
2. Evaluate the impact on CHANGE in the attentional processes and neurocognitive networks underlying self regulation from early to middle adolescence;
3. We need collaborators! Interested?