

# Juvenile Training Immersion Program:

## Lesson 4 – Adolescent Development

### ANNOTATED BIBLIOGRAPHY OF KEY ADOLESCENT DEVELOPMENT STUDIES

The following brief summaries highlight several aspects of adolescent development that are important to consider when representing youth in the juvenile justice system. The studies included focus primarily on youth's psychosocial development. Psychosocial development refers to internal psychological processes that are influenced by and interact with social/environmental cues. Many developmental and legal scholars argue that certain psychosocial characteristics of adolescence (susceptibility to peer influence; lack of future orientation; lower impulse control) should mitigate the culpability of young offenders because their decision-making capacities are often still immature and not fully developed. However, some of these same psychosocial characteristics (*e.g.*, lack of future orientation) also speak to youth's vulnerabilities in interrogation settings.

A couple of the studies reviewed discuss youth's cognitive development (*e.g.*, how youth think, reason and process information). Since youth are still developing cognitive capacities, they are at a higher risk than adults of being incompetent to stand trial, and for invalid waivers of *Miranda*.

#### **I. Susceptibility to Peer Influences (Psychosocial Development)**

The following studies speak to the important role peers play in adolescents' poor judgment and risky behaviors. Such evidence helps to explain why adolescents, more so than adults, commit crimes in groups. This is a critical psychosocial characteristic of youth to consider, particularly when we think about issues of mitigation and culpability. Highlighting how a youth may have been influenced by peers involved in the same incident may be critical for mitigating a client's behavior.

**Laurence Steinberg & Katherine Monahan, *Age Differences in Resistance to Peer Influence*, 43 DEVELOPMENTAL PSYCH. 1531 (2007).**

#### **Purpose**

- To explore age differences in susceptibility to peer influences:
  - across a diverse demographic group;
  - using a measure specifically designed to examine resistance to peer influences in neutral rather than anti-social scenarios.
- To determine whether growth in resistance to peer influences increases "linearly" (*e.g.*, gradually increases as youth age) throughout adolescence.

#### **Methodology**

- Used data that had been previously collected from three different studies in order to have a diverse group of participants who varied in age (10 to 30), gender, social class and ethnicity.
  - Additionally, the samples consisted of individuals from the community, as well as those who had been arrested.

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- Resistance to Peer Influence (RPI) was measured by a self-report questionnaire that directed participants to choose between two statements in order to best describe how they would respond to pressure from peers in different scenarios.

### Results

- Results indicate that youth from ages 14 to 18 increase in their resistance to peer influences. By 18, youth appear to reach maturity in regard to resistance to peer influence, and show little growth in this capacity. In fact, their scores are comparable to those of 30-year-olds.
- Additionally, researchers reported demographic differences with some groups, showing more resistance to peer influences than others.

### Relevance

- Although teenagers may be more susceptible than adults to the influence of their peers, middle adolescence is an important time period for developing a resistance to peer influences.

**Margo Gardner & Lawrence Steinberg, *Peer Influence on Risk Taking, Risk Preference, and Risky Decision Making in Adolescence and Adulthood: An Experimental Study*, 41 DEVELOPMENTAL PSYCHOL. 625 (2005).**

### Purpose

- To investigate the influence of peers on risk-taking and risky decision-making in adolescents and adults.

### Methodology

- An experimental study conducted in a laboratory setting with a sample of 306 individuals recruited from both the community and from an undergraduate university. Participants consisted of three groups: a) adolescents ages 13 to 16 years old; b) youth ages 18 to 22 years old; and c) adults ages 24 and older.
- Researchers used self-report questionnaires and a behavioral task to assess risky decision-making and risk-taking.
  - For the behavioral task, researchers used a simulated driving task on the computer to assess participants' risky decision-making. Participants had to decide whether or not to break as they approached a changing stoplight. The time it took the light to change from yellow to green varied, and so did the probability of crashing in the intersection.

### Results

- Individuals in middle and late adolescence were much more likely than adults to take more risks and engage in riskier decision-making when tested in groups than when tested alone.

### Relevance

- Demonstrates that adolescents are more susceptible to the influence of their peers than adults, particularly when engaging in risky behavior and/or risky decision-making.

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Jason Chein et al., *Peers Increase Adolescent Risk Taking by Enhancing Activity in the Brain's Reward Circuitry*, 14 DEVELOPMENTAL SCI. F1 (2011).

### Purpose

- To explore a possible explanation for why peers influence adolescent risk-taking by using fMRI equipment to study brain activity while completing a risk-taking task in the presence of peers.
- Researchers were interested in whether the presence of peers activates regions of the brain differently for adolescents than for adults.
  - The two brain systems thought to be involved in risky decision-making are the cognitive control system and the incentive processing/socio-emotional system.
  - The cognitive control system of the brain is related to impulse control, as well as better reasoning and planning.
  - The incentive processing/socio-emotional system of the brain is associated with the processing of rewards and punishments, as well as emotions and social information.
  - Adolescence is thought to be a time when the incentive processing/socio-emotional system of the brain is easily aroused and highly sensitive to social feedback, while the cognitive control system is still immature and developing.

### Methodology

- An experimental study conducted in a laboratory setting with: 40 participants age 14 to 18 years old; 14 participants age 19 to 22 years old; and 12 participants age 24 to 29 years old.
- Researchers used a simulated driving task on the computer to assess participants' risky decision-making. Participants had to decide whether or not to break as they approached a changing stoplight. The time it took the light to change from yellow to green varied, and so did the probability of crashing in the intersection.
- While completing the computer driving task, brain activity was assessed using fMRI technology.
  - One group of participants completed the driving task with no peers present. A second group of participants were told that their peers were observing them from a monitor in another room. These observers were allowed to communicate periodically with participants over an intercom. The observers were instructed to let participants know that they were making predictions about the participants' outcome, but the observers were not allowed to make comments that might overly bias participants' performance on the task.
  - In order to determine if there was a difference in brain activity when participants completed the game alone or in the presence of peers, brain activity and responses to the driving task were aligned temporally.

### Results

- Adolescents, more so than young adults or adults, took more risks with peers than when alone, and crashed more with peers than when alone.
- In the presence of peers, adolescents demonstrated heightened brain activity in the incentive processing/socio-emotional system in comparison to young adults and adults.
- Adult participants did not show an increase in the incentive processing/socio-emotional system of the brain during the simulated driving task. Instead, young adults and adults showed more recruitment of the cognitive control system while completing the driving task, both in the presence of peers and alone.

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### Relevance

- Results support a neurodevelopmental explanation for the influence of peers on risky behavior in adolescence. The findings suggest that the presence of peers increases the salience of immediate rewards, and activates the incentive processing/socio-emotional system of the brain, which subsequently increases risky decision-making.
- Results also suggest that adults, due to maturation, are better able to recruit the cognitive control system of the brain in order to engage in better-reasoned decision-making when confronted with risky situations.

**O'Brien et al., *Adolescents Prefer More Immediate Rewards when in the Presence of Their Peers*, 21 J. RES. ON ADOLESCENCE, 747 (2011).**

### Purpose

- To test the hypothesis that adolescents' preferences for immediate rewards, versus delayed rewards, increases in the presence of peers.
- To investigate the mechanism underlying the influence of peers on risky decision-making. The authors propose that the presence of peers increases adolescents' sensitivity to the immediate rewards of a risky decision.

### Methodology

- An experimental study conducted in a laboratory setting with a sample of 100 participants, ages 18 through 20.
  - Participants were recruited from a college campus.
  - Participants were asked to bring two friends with them to the study, and were randomly assigned to a group or alone condition.
- Participants were administered a delay-discounting task on the computer.
  - The delay-discounting task required participants to choose between smaller immediate rewards (e.g. US \$200 today) or larger delayed reward (e.g. US \$1000 in six months).
  - "Discount" refers to the extent to which participants discount the larger reward, due to the delay in receiving the larger reward.

### Results

- Participants who were in the presence of their peers were more likely than when alone to:
  - Prefer immediate rather than delayed rewards.
  - Discount the value of delayed rewards.
- Researchers compared the results of the present study with a study conducted by Laurence Steinberg and colleagues (2009) (see summary on Future Orientation) that used the same delay-discounting task. In the Steinberg and colleagues study, the results of youth age 14 to 15 that did the discounting task alone paralleled the results of 18- to 20-year-olds who completed the task in the presence of peers. Thus, even 18- to 20-year-olds may make immature decisions that resemble 14- to 15-year-olds when they are in the presence of peers.

### Relevance

- Results suggest that an adolescent tendency towards riskier decision-making in the presence of peers is due to a shift in "reward processing." Youth tend to value more the immediate rewards of

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a risky decision (e.g. unprotected sex) than considering the long-term consequences of such a decision (e.g. disease or pregnancy).

**Ashley R Smith, Jason Chein & Laurence Steinberg, *Peers Increase Adolescent Risk Taking Even When the Probabilities of Negative Outcomes Are Known*, 50 (5) DEV. PSYCHOLOGY (2014).**

### Purpose

- To investigate how peer observation affects adolescent risk taking when the information necessary to make an informed decision is explicitly provided
- Whether the magnitude of the peer effect differs as a function of the likelihood of a negative outcome

### Methodology

- An experimental study conducted in a laboratory setting with 52 adolescents (23 females), ages 15-17
  - Participants were recruited from a large urban community
- Participants were randomly assigned to complete newly developed probabilistic gambling task (PGT) either alone or with understanding that they are being observed by a peer
  - On each trial participant was presented with a wheel, divided into three distinct sections each indicative of probability of winning losing or neither winning nor losing
  - Participants were told that each section was exactly indicative of the chance of landing on that section and achieving the specified outcome
  - Each participant began the task with 100 tokens and on each trial they were asked if they want to play

### Results

- Participants were more likely to take risk when being observed than when being alone. The peer effect was demonstrated even when individuals were given specific information about the probability that a risky decision will result in a positive or a negative outcome.

### Relevance

- Important implications for educational programs. Providing adolescents with information about the likelihood of negative outcomes may not be as effective when targeted behaviors are those that tend to occur when adolescents are with their peers such as substance use, reckless driving or unprotected sex.

## II. Compliance with Authority

**Thomas Grisso et al., *Juveniles' Competence to Stand Trial: A Comparison of Adolescents' and Adults' Capacities as Trial Defendants*, 27 LAW & HUM. BEHAV. 333 (2003).**

### Purpose

- To investigate the influence of cognitive and psychosocial maturity on adjudicative-related capacities in adolescents.

### Methodology

- The sample consisted of:

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- 927 youth ages 11 to 17: approximately half were detained in a detention facility or jail and half resided in the community with no current justice system involvement.  
466 adults ages 18 to 24: approximately half were detained in a jail and half resided in the community with no current justice system involvement.
- Interviews were conducted in detention or jail settings for the detained participants and in a laboratory setting for community participants.
  - A standardized measure, the MacCAT-CA, was used to evaluate individuals' capacity to understand, reason about and appreciate critical aspects related to capacities to serve as trial defendants.
  - Another measure, the MacJen, used responses to different vignettes to assess the influence of psychosocial characteristics (*e.g.*, compliance with authorities, risk perception, future orientation) on adolescents' decision-making in the adjudicative context. The MacJen gives three different vignettes that ask youth about the choices they would make in certain legal contexts. The first vignette depicts a youth being asked to respond to a police interrogation. The second vignette asks a youth to decide on whether or not to disclose information to his attorney. The third vignette asks a youth to make a choice about whether or not to accept a plea agreement.

### Results

- *Cognitive Development:* Adolescents 15 years old and younger were significantly more cognitively impaired than 16- and 17-year-old adolescents and young adults in abilities related to competence to stand trial.
  - Adolescents aged 11 to 13 years old showed the most significant impairments.
  - 33% of the 11- to 13-year-olds and 20% of the 14- to 15-year-olds were “as impaired in capacities relevant to adjudicative competence as are seriously mentally ill adults who would likely be considered incompetent to stand trial by clinicians who perform evaluations for courts (p. 356).”
  - Also, adolescents with lower IQs demonstrated significant impairment in capacities.
- *Psychosocial Development:* Psychosocial characteristics such as compliance with authorities, risk appraisal and future orientation were found to influence adolescents' decision-making in three different legal scenarios: confessing to police, accepting a plea and disclosing to an attorney.
  - Youth 15 years old and younger were significantly more likely than older youth to make decisions that represented compliance with authorities and to choose options associated with higher risks.
  - Those youth who were aged 14 years and younger were significantly less likely to consider the long-term consequences of their choices.

### Relevance

- *Cognitive Development:* Many youth, particularly younger youth and youth with low IQs, are at risk for not being competent to stand trial. Unlike with adult defendants where incompetence may be found due to mental retardation and/or mental illness, youth may be incompetent to stand trial due to developmental immaturity.
- *Psychosocial Development:* Not only are youth more likely to be impaired in adjudicative capacities related to understanding, reasoning and appreciation, but psychosocial immaturity may make youth particularly vulnerable to poor decisions in legal contexts. For example:

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- Youth's tendencies to be more compliant with authorities may increase their vulnerability to police coercion.
- Youth's lack of future orientation may impede their ability to fully understand the implications of waiving their right to silence when being interrogated by police.

### III. Present Orientation and the *in*Ability to Delay Rewards (Psychosocial Development)

This study demonstrates that youth, more so than adults, lack consideration of future consequences. While these findings speak to issues of mitigation and culpability, they also suggest that youth's difficulty in thinking about long-term consequences may make them vulnerable to being coerced into waiving *Miranda* rights or making a statement.

**Laurence Steinberg et al., *Age Differences in Future Orientation and Delay Discounting*, 80 CHILD DEV. 28 (2009).**

#### **Purpose**

- To investigate age differences in future orientation and the ability to delay rewards.

#### **Methodology**

- An experimental study conducted in a laboratory setting with a sample of 935 individuals, ages 10 to 30 years. Participants were recruited from the community in several cities across the United States.
- Used both self-report questionnaires and behavioral tasks to assess future orientation and preference for delayed versus immediate rewards.
  - Self-report questionnaire assessed participants' abilities to think about the future, plan ahead and anticipate future consequences.
  - Behavioral task was a "delay-discounting" task, a standardized measure designed to assess participants' tendencies to choose immediate versus delayed rewards. This task was administered on a computer and presented participants with several choices between a smaller amount of pretend money that they could receive immediately (*i.e.*, \$5.00) versus a larger amount of money they could receive in a week (*i.e.*, \$100).

#### **Results**

- Researchers did find age differences in future orientation as measured by the self-report questionnaire and the behavioral task.
  - Younger adolescents, more so than individuals age 16 and older, demonstrated a weaker orientation toward the future.
    - Younger adolescents were less likely to think about the future and anticipate future consequences of decisions.
    - Planning ahead continued to develop into young adulthood.
  - In the "delay-discounting" task, younger adolescents, more so than individuals age 16 and older, preferred smaller immediate rewards than larger delayed rewards.



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### Relevance

- The evidence suggests that adolescents' (in contrast to adults') preference for immediate versus delayed rewards is more closely linked to adolescents' ability to think about the future and anticipate future consequences, and not their ability to self-regulate.
- The authors also note that "future orientation" has different dimensions, and adolescents' ability to anticipate consequences may occur along a different timetable than their ability to plan ahead.
  - Authors suggest that adolescents' difficulty in anticipating future consequences is more closely linked to a sensitivity to rewards, which is attributed to development of a particular brain system (socio-emotional system), more highly aroused in early adolescence.
- The authors note that evidence demonstrating adolescents' weakened future orientation, or inability to anticipate the consequences of their actions, is often applied to discussions of adolescents' capacity for "premeditation" or "planfulness" in the context of criminal culpability.
- However, adolescents' weakened future orientation may increase their vulnerability to coercion in the interrogation context, as well.

**Andrey P. Anokhin, Simon Golosheykin, Richard C. Mulligan, *Long-Term test-retest reliability of delayed reward discounting in adolescents*, 111 BEHAVIORAL PROCESSES (2015).**

### Purpose

- Asses longitudinal stability of individual differenced of delayed discounting measures in middle to late adolescence
- Determine whether delayed discounting undergoes systematic changes during middle and late adolescence

### Methodology

- An experimental study conducted in a laboratory setting with a sample of 126, 16 year olds and 111, 18 year olds re-tested at age 18 and 20 respectively.
- Participants completed delayed discounting (DD) task in which participants are presented with series of hypothetical choices. Participants have to choose between a variable hypothetical amounts of money available immediately and after a delay (six possible temporal delays).
  - Participants completed 138 trials of DD task

### Results

- Results showed stability of DD over two different two year periods
- There is age related decline in propensity to impulsive choice with most of the change occurring before the age 18

### Relevance

- Long-term stability of DD makes it a suitable measure for prospective longitudinal designs
- DD can be used as a potential prospective predictor of problem behaviors such as substance abuse or pathological gambling



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### IV. Sensation-Seeking and Impulsivity (Psychosocial Development)

These findings speak particularly to the issue of immaturity and culpability, and are important to consider when mitigating illegal behavior in adolescents. In general, youth are more likely than adults to display less impulse control and more sensation-seeking behaviors. It appears that these characteristics are a normal part of adolescent development. See, however, final study in this section correlating presence of mother's with increase in safe behavior.

**Laurence Steinberg et al., *Age Differences in Sensation-Seeking and Impulsivity as Indexed by Behavior and Self-Report: Evidence for a Dual Systems Model*, 44 DEVELOPMENTAL PSYCHOL. 1764 (2008).**

#### **Purpose**

- To explore age differences in sensation-seeking (tendency to seek stimulating and novel experiences) and impulsivity (lack of self-control).
- Researchers predicted that sensation-seeking and impulsivity:
  - Occur along different timetables
  - Are connected to the increased vulnerability to risk-taking found in adolescence

#### **Methodology**

- An experimental study conducted in a laboratory setting with a sample of 935 individuals, ages 10 to 30 years. Participants were recruited from the community in several cities across the United States.
- Used both self-report questionnaires and behavioral tasks to assess sensation-seeking and impulsivity.

#### **Results**

- Age differences were found for both impulsivity and sensation-seeking, but they developed along different timetables.
  - Sensation-seeking behaviors increased between the ages of 12 to 15 (initiating around the beginning of puberty), and then steadily declined.
  - Impulsivity was found to steadily decline from age 10 through adolescence and well into early adulthood. Adolescents younger than 16 demonstrated significantly less impulse control than 16- to 17-year-olds, and 16- to 17-year-olds demonstrated significantly less impulse control than 22- to 25-year-olds.

#### **Relevance**

- After age 15, adolescent vulnerability to risky behavior steadily decreases as sensation-seeking decreases, and impulse control continues to increase into early adulthood.
- Evidence from this study is consistent with adolescent brain research that demonstrates that the brain systems (cognitive control system) linked to impulse control and self-regulation does not fully develop until early adulthood. In contrast, the brain systems (socio-emotional system) linked with sensation-seeking becomes more highly aroused in early adolescence.

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Elizabeth P. Shulman & Elizabeth Cauffman, *Reward-Biased Risk Appraisal and Its Relation to Juvenile Versus Adult Crime*, 37 LAW & HUM. BEHAV. 412 (2013).

### Purpose

- To examine the development differences in the appraisal of risk and to see how this difference related to involvement in the court system. The authors call the tendency to perceive more rewards than risk when facing risky situations, “reward bias.” They hypothesize that compared to adults; adolescents have more reward bias and higher reward bias is associated with higher engagement in illegal activity.

### Methodology

- To measure risk perception, subjects were asked to imagine themselves engaging in identified risky behavior (e.g., having unprotected sex, stealing from a store, or fighting) and rate the likelihood of a negative outcome, how serious the negative consequence could be, and how potential costs compare to potential benefits.
  - **Study One**
    - Community-based sample consisting of 935 subjects age 10-30, ethnically diverse, males and females, working or middle class, with no involvement in the legal system
  - **Study Two**
    - Sample of over 1,400 community and pre-adjudication court-involved youths and adults.
    - Data was analyzed using five participants in each group: 12-13 years old (early adolescence), 14-15 years old (middle adolescence), 16-17 years old (later adolescence), 18-21 years old (late adolescence) and those 22-24 years old (young adults).

### Results

- **Study One**
  - Age was related to reward bias such that reward bias increased during adolescence (peaking for 16-17 years old) then decreased with age.
  - Males are more likely to demonstrate a reward bias.
- **Study Two**
  - In the sample involved in the justice system, reward bias decreased with age and was highest in the 12-13 year old group.
  - The decrease in reward bias was true even for those who pled guilty or were found guilty of a crime in the past.

### Relevance

- This is yet another study that demonstrates that adolescents, more so than adults, tend to focus on the reward rather than the risk.
- These findings are consistent with the dual system theory that postulates the risk and reward system of the adolescent brain is “stronger” than the cognitive control system.

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**Michael Dreyfuss et al., *Teens Impulsively React rather than Retreat from Threat*, 36 DEVELOPMENTAL NEUROSCIENCE 220 (2014).**

### Purpose

- To examine if adolescents respond more impulsively than adults or children when confronted with a frightening or threatening stimuli relative to one that is neutral. This study considered behavioral and FMRI data.

### Methodology

- 57 subjects between the ages of 6-27 years old. Children were ages 6-12, adolescents 13-17 and adults 18 and older.
- Subjects were shown calm and fighting faces. They were told to press the button when they saw a calm face and not to press it if they saw a frightening face. Subjects were instructed to respond as quickly as they could and they only saw the face for 500 ms, so they didn't have a lot of time to think about it. The subjects were in an FMRI while they did the task.

### Results

- The experimenters were interested in the condition that required subjects to suppress a response; that is, not respond, when they saw a frightening face, a potential threat. Subjects made a false alarm or error if they responded to the threat.
- Compared to adults or children, adolescents were more likely to respond incorrectly or impulsively respond to the fearful stimuli.
- Compared to females, males were more likely to make false alarms.
- Compared to children or adults, when doing the task, the limbic region of the adolescent brain was more active.

### Relevance

- Adolescents, compared to children or adults, are more likely to act impulsively when they are faced with threatening stimuli. (Other research has shown they are also more likely to act impulsively when faced with positive stimuli.) The take home is that as a normal developmental process, adolescents are more impulsive.
- Just as adolescents responds differently, their brains functions differently than the brains of adults or children.

**Gayle R. Byck et al., *Sensation Seeking Predicting Growth in Adolescent Behaviors*, 46 CHILD PSYCHIATRY HUM DEV, (2015).**

### Purpose

- To examine whether sensation seeking was associated with individual growth curves for conduct problems, sexual risk taking, and substance use in low-income African American adolescents

### Methodology

- The study included 592 adolescents (51.2% female) aged 13 through 18 and their primary caregivers
  - Participants came from an annual community-based, multiple-cohort longitudinal study
- Participants took part in a 2h interview between 2009 and 2011

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### Results

- Growth curves showed that baseline levels and growth for sexual risk taking and substance abuse were significant for boys and girls
- Boys and girls had different associations between sensation seeking and baseline levels and growth of adolescent risk behaviors
- Girls showed an association between growth in sexual risk behaviors and the Pleasure Seeking/Danger/Novelty subscales
- Boys did not show any association between growth in sexual risk behaviors and the sensation seeking subscales
- Girls who were less fearful and more prone to becoming bored were having greater increases in risky sexual behavior and substance use as well as baseline conduct problems, the same was not true for boys

### Relevance

- Knowledge about the relationship between adolescent risk taking and sensation seeking can help in the targeted design of prevention and intervention programs for the understudied population of very low-income, African American adolescents

**Bernd Figner, Rachel J. Mackinlay, Friedrich Wilkening, & Elke U. Weber, *Affective and Deliberative Processes in Risky Choice: Age Differences in Risk Taking in the Columbia Card Task*, 35 J OF EXPERIMENTAL PSYCH (2009).**

### Purpose

- To test the dual-system explanation of adolescent risk taking
- Introduce a novel risky decision-making task, the Columbia Card Task (CCT)

### Methodology

- Four experiments were conducted to investigate risk taking and use of relevant information by adolescents and adults in both a “hot” affective and a “cold” deliberative condition (only two will be discussed here)
- Within a given trial of CCT game, cards can be turned over as long as gain cards are encountered. Each gain card adds a specified gain amount to the trial payoff, and the player can voluntarily stop the trial at any point and claim the obtained payoff. As soon as a loss card is encountered, the trial terminates
  - The average number of cards turned over across trials was used as an indicator of a participant’s level of risk taking.
    - To trigger affective processes in the hot version, players were allowed to make stepwise incremental decisions about turning over an additional card and provided them with immediate feedback
    - In the cold CCT participants were asked to indicate only the number of cards that they wanted to turn over on a given trial, not which cards they would choose
  - Study one and two
    - looked at risk taking and information use in the hot CCT (study one) or cold CCT (study two) in three age groups: younger adolescents, older adolescents, and adults; age range 14-57

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- There were total of 76 participants in study one and 84 in study two

### Results

- Study one
  - The results showed greater risk taking by the two adolescent age groups (14–16 and 17–19 years) than the adult group (20 years and older),
  - The positive correlation between need-for-arousal and risk taking suggested that affective processes influenced risk taking in the hot version of the card game.
  - Adults took more information into account than the two adolescent groups.
  - Overall, the results of study one were consistent with traditional cognitive–developmental and dual-system explanations of adolescents
- Study two
  - There were no age effects in risk taking or information use in the cold CCT. This is consistent with the observation that cold tasks, like making hypothetical choices between lotteries without feedback, tend not to elicit increased risk taking in adolescents

### Relevance

- Consistent with predictions from dual-system models of decision making which imply that adolescent risk taking is caused by the relative dominance of affective processes over deliberative processes in situations in which the affective system is sufficiently triggered the study found increased risk taking in adolescents in the hot but not the cold CCT.

**Elizabeth Shulman & Elizabeth Cauffman, *Deciding in the dark: Age differences in intuitive risk judgement*, Developmental Psychology (1) (2014).**

### Purpose

- Examine age differences in immediate assessment of risk.
- Examine how the presence of peers impacted immediate assessment of risk.
- Examine how the assessment of risky activity as favorable acts varied with age.

### Methodology

- 282 subjects, ages 10-30 years old, with average IQ.
- Subjects were shown pictures of risky (e.g. taking pills at a party, swimming where there are sharks) and non-risky behavior (e.g. studying, eating a sandwich). They had two seconds to indicate how risky they found the behavior. The researchers called this risk favorability. Higher scores indicated the subject thought it was a good idea or viewed the risk as favorable. By imposing the time limit, the researchers were trying to tap into the subjects' "gut" reaction.
- Social manipulation: for 19 activities, subjects saw a solo or group version of the activity and had to indicate the risk favorability.
- Subjects were then asked to rate if they had or hadn't participated in the risky activities.
- Subjects were given an instrument to measure their impulse control and sensation-seeking.

### Results

- Social manipulation: regardless of the subjects' age, there was no difference in risk favorability between performing the task solo or in a group.

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- Age was associated (curvilinear relationship) with of risk favorability for males and females but on average, females rated the risk favorability 39% less than males. Further, the tendency to rate risky activity as a good idea was higher in early adulthood than in adolescence.
- Higher sensation-seeking scores were associated with higher risk favorability.
- Decreased impulse control (more impulsivity) scores were associated with higher risk favorability.
- Experience with risky activity is associated with higher risk favorability.

### Relevance

The tendency to rate risky behavior as more favorable is associated with age and peaks during early adulthood. Both sensation-seeking, and impulsivity are associated with higher risk favorability but neither mediates the effect of age.

**Eva H. Tezler, Nicholas T. Icheien, & Yang Que, *Mothers know best: redirecting adolescent reward sensitivity toward safe behavior during risk taking*, 20 SOCIAL COGNITIVE & EFFECTIVE NEUROSCIENCE 1383-1391 (2015).**

### Purpose

- To test whether parents actually change the ways in which adolescents think and reason about risk during active deliberation and automatic decision-making
- To test whether parental presence increases neural coupling between ventral striatum and prefrontal cortex.

### Methodology

- An experimental study conducted in a laboratory setting with: 25 fourteen-year-old and their mothers; 15 males and 10 females. Mother's median age was forty-four years old. Participants were predominantly European American (n=18) or African American (n=5).
- Researchers used a simulated driving task on the computer to assess participants' risky decision-making. Participants had to decide whether or not to break as they approached a changing stoplight. The time it took the light to change from yellow to green varied, and so did the probability of crashing in the intersection.
- While completing the computer driving task, brain activity was assessed using fMRI technology.
  - Adolescents completed two rounds of the task, one round with their mother telling them they were watching and one round when they were alone. Each round included 26 intersections. Participants played two practice rounds prior to entering the scanner.
  - In order to determine if there was a difference in brain activity when participants completed the game alone or in the presence of their mothers, brain activity and responses to the driving task were analyzed using a psychosocial interaction (PPI) analyses to examine functional coupling between the ventral striatum and the cognitive control regions.

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### Results

- Adolescents made significantly more risky decisions when alone than with their mothers present.
- Maternal presence facilitated coupling between neural regions involved with reward and cognitive control processes when youth made safe but not risky decisions.
- Adolescents showed greater use of the ventrolateral prefrontal cortex when making safe decisions in the presence of their mothers.
- Adolescents showed a decreased activation in the ventral striatum and amygdala following a risky decision in the presence of their mother

### Relevance

- Parental supervision is associated with lower adolescent risk taking.
- Mothers increase the rewarding nature of cognitive control; i.e. mothers boost self-control by increasing prefrontal cortex activation which facilitates more deliberative and safer decisions.
- Mothers “tak[e] the fun out of being risky.”

### V. Capacities Related to Adjudicative Competence and Validity of *Miranda* Warnings (Cognitive and Psychosocial Development)

These studies demonstrate that *on average*, younger youth (15 and under) may be more likely to have impairments related to adjudicative competence and *Miranda* comprehension. These impairments are most likely due to the fact that they are still developing cognitive capacities (*i.e.*, the capacity to think, reason and process information). However, it is important to understand that older youth may demonstrate impairments as well, particularly if they have lower IQs or have learning disabilities. In addition, youth’s psychosocial immaturity (*e.g.*, compliance with adults) makes them more vulnerable than adults to coercion in interrogation settings.

**Jodi Viljoen & Ronald Roesch, *Competence to Waive Interrogation Rights and Adjudicative Competence in Adolescent Defendants: Cognitive Development, Attorney Contact, and Psychological Symptoms*, 29 LAW & HUM. BEHAV. 723 (2005).**

### Purpose

- The following study explored the relationship of youth’s cognitive development, psychological symptoms and attorney-client contact to capacities related to adjudicative competency and *Miranda* waiver.

### Methodology

- Participants were 152 youth detained in a pre-trial detention facility (73 females and 79 males) between 11 and 17 years old.
- Interviews were conducted with youth over the course of two different sessions in the detention facility.



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- In the first session, youth were given Grisso's Instruments for Assessing Understanding and Appreciation of *Miranda* Rights, as well as an assessment of capacities related to adjudicative competence created by Roesch and colleagues: The Fitness Interview Test. In the second testing session, participants were given a battery of tests assessing cognitive abilities and psychological symptoms. Also, participants were asked how many times they met with their lawyer and how long they spent with their lawyer.

### Results

- Researchers had multiple research questions; however, some of the more significant results were:
  - Older youth performed better on tests related to adjudicative competence and *Miranda* comprehension and reasoning than younger youth.
  - Cognitive abilities (*e.g.*, general intellectual ability) for youth who are 11 to 15 years old are significantly lower than for youth who are aged 16 and 17.
  - Cognitive abilities were strongly related to participants' performance on the tests related to adjudicative competence and *Miranda* comprehension and reasoning.
  - Psychological symptoms (*e.g.*, depression, anxiety, behavior problems) were not related to performance on *Miranda* instruments regarding adjudicative competence. However, a symptom of ADHD (*e.g.*, excitement) was related to understanding of *Miranda* warnings, as well as communication with attorneys on a measure of adjudicative competence.
- Youth who had more contact with and time spent with attorneys demonstrated better understanding of adjudicative proceedings and *Miranda* warnings.

### Relevance

- Results suggest that teenagers are still developing cognitive abilities in adolescence. As a result, youth who are 11 to 15 years old are at a much higher risk of being found incompetent to stand trial.
- Also, due to still-developing cognitive capacities, younger youth are at a higher risk of not giving an "intelligent and knowing" *Miranda* waiver.
- Results also suggest that adolescents' limitations in capacities related to adjudicative competence and *Miranda* comprehension are not generally a result of psychopathology, as is often the case with adults. Although symptoms of ADHD may play a role in youth's legal capacities.

**Laurence Steinberg et al., *Are Adolescents Less Mature than Adults? Minors' Access to Abortion, the Juvenile Death Penalty, and the Alleged APA "Flip-Flop"*, 64 AM. PSYCHOL. 583 (2009).**

### Purpose

- Researchers compared adolescents' cognitive capacities with a composite measure of psychosocial maturity examining risk perception, sensation seeking, impulsivity, resistance to peer influence and future orientation.

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### Methodology

- An experimental study conducted in a laboratory setting with a sample of 935 individuals, ages 10 to 30 years. Participants were recruited from the community in several cities across the United States.
- To assess cognitive capacity, a battery of tests assessing basic cognitive skills was administered.
- To assess psychosocial maturity, researchers administered a combination of self-report questionnaires designed to measure risk preference, sensation-seeking, impulsivity, resistance to peer influence and future orientation.

### Results

- Findings support the theory that cognitive maturation and psychosocial maturation occur along different timetables.
- “By age 16, adolescents’ general cognitive abilities are essentially indistinguishable from those of adults, but adolescents’ psychosocial functioning, even at the age of 18, is significantly less mature than that of individuals in their mid-20s.” (p. 592)

### Relevance

- Researchers highlight that adolescents’ poor judgment is not necessarily a result of poor reasoning skills, but more closely linked to adolescents’ psychosocial development.
  - “When it comes to decisions that permit more deliberative, reasoned decision-making, where emotional and social influences on judgment are minimized or can be mitigated, and where there are consultants who can provide objective information about the costs and benefits of alternative courses of action, adolescents are likely to be just as capable of mature decision-making as adults, at least by the time they are 16...  
In contrast, in situations that elicit impulsivity, that are typically characterized by high levels of emotional arousal or social coercion, or that do not encourage or permit consultation with an expert who is more knowledgeable...adolescent decision-making at least until they have turned 18 is likely to be less mature than adults.” (p. 592)

**Heather Zelle, Christina L. Riggs Romaine, & Naomi E.S. Goldstein, *Juveniles’ Miranda Comprehension: Understanding, Appreciation, and Totality of Circumstances Factors*, 39 LAW & HUMAN BEH. (2015).**

### Purpose

- To investigate justice involved youths’ understanding and appreciation of the Miranda warnings’ rights to silence and legal counsel
- Examine the relationship between totality of circumstances factors and understanding and appreciation of rights

### Methodology

- Participants were 183 youth (140 boys) recruited from residential post adjudication facility, detention center and a short-term holding facility for youths adjudicated delinquent and awaiting placement
- Participants completed a battery of tests which included:
  - Miranda Rights Comprehension Instruments
  - Comprehension of Miranda Vocabulary-II (CMV-II)

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- Comprehension of Miranda Rights-II (CMR-II)
- Comprehension of Miranda Rights-Recognition-II (CMR-R-II)
- Function of Rights in Interrogation (FRI)
- Demographic questionnaire
- Wechsler Abbreviated Scale of Intelligence (WASI)
- Wechsler Individual Achievement Test (WIAT)

### Results

- Vast majority of youths struggled with multiple words that are common within Miranda warnings which is consistent with previous research
- It appears that youths are at risk for miscomprehending the warnings, even before they consider the warnings as whole statements, simply because the individual words in the warnings are too complex
- Age and Verbal IQ were associated with understanding and appreciation supporting the association between the totality of circumstances factors and Miranda comprehension

### Relevance

- Results from this study point to novel empirically supported indicators of totality of circumstances factors that should be considered and suggest that additional investigation of developmental factor is needed.
- Findings underscore the necessity of multimodal assessment and interpretation when conducting capacity to waive Miranda rights evaluation

## VI. Desistance

**Edward P. Mulvey et al., *Trajectories of Desistance and Continuity in Antisocial Behavior Following Court Adjudication Among Serious Adolescent Offenders*, 22 DEV. & PSYCHOPATHOLOGY 453 (2010).**

### Purpose

- To examine patterns of anti-social behavior in serious offenders after court involvement in order to obtain a better understanding of how adolescents' reduce their offending behavior over time.

### Methodology

- Data used in this analysis/article draws from a larger study called the "Pathways to Desistance" in which 1,354 serious offenders are interviewed over a 7 year period.
- Analyses for the current study used 1,119 male adolescents who had been adjudicated of a serious offense (e.g. includes all felony offenses, as well as misdemeanor weapon offenses and misdemeanor sexual assaults).
- Participants ranged between 14 and 18 years old, with an average age of 16. The sample was ethnically diverse: 19.6% white, 41.1% African American, 34.7 % Hispanic. Data was collected in two cities: Philadelphia, PA and Phoenix, AZ.
- Participants for the current analyses were interviewed twice a year for up to 3 years. Interviews consisted of a number of measures to assess self-reported offending, mood/anxiety and substance use problems, attitudes toward the legal system, psychosocial maturity, parenting, peers, as well

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as prior arrest history. Several demographic characteristics were also collected in addition to an assessment of neighborhood disadvantage.

### Results

- Researchers clustered participants into 5 different groups based on their offending patterns. They highlighted in particular those participants who persisted in offending and those who desisted from offending.
  - Two years after being adjudicated for a serious offense, a majority of youth (73.8%) reduced their offending to low or zero involvement in offending behavior.
  - For those youth who self-reported the lowest level of offending, placement in an institution raised their level of self-reported offending after release from institutional placement.

### Relevance

- The authors conclude that the majority of serious offenders are not necessarily “bad actors” destined for adult criminal activity. Most serious offenders demonstrate low or zero involvement in criminal activity years after court involvement. As a result, this is an important point to raise when highlighting the amenability of a youth to treatment at disposition or in transfer proceedings.
- For youth who have been adjudicated for a serious offense, but demonstrate overall low levels of offending, incarceration or placement in residential treatment facilities has the potential to increase recidivism. As a result, community based alternatives may be a far better rehabilitative option than incarceration or institutional placement, particularly for youth with low levels of overall offending.

## VII. Link Between Trauma and Delinquency

**S.P. Becker & P.K. Kerig, *Post-traumatic Stress Disorder Symptoms are Associated with the Frequency and Severity of Delinquency Among Detained Boys*, 40 J. OF CLINICAL CHILD & ADOLESCENT PSYCHOL. 765 (2011).**

### Purpose

- To investigate a sample of detained boys in order to determine if there is a link between Post Traumatic Stress Disorder (PTSD) symptoms and the number and severity of prior arrests.

### Methodology

- Researchers conducted interviews with detained youth in private interview rooms at a detention facility.
- Researchers administered questionnaires that assessed trauma exposure and PTSD symptoms. Delinquency was measured using official arrest records. Investigators examined the number of lifetime arrests, the severity of lifetime delinquency, the number of past-year arrests and the severity of past-year delinquency.

### Results

- 25.3% of boys reported experiencing community violence, 19.3% reported domestic violence and 19.2% reported witnessing community violence.

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- PTSD symptoms significantly predicted the number of lifetime arrests, the number of arrests in the past year and the severity of delinquency in the past year.

### Relevance

- Findings suggest that trauma and PTSD symptoms are linked to delinquency.
- Findings demonstrate that a high number of youth in the juvenile justice system are exposed to trauma and experience PTSD symptoms.
- Findings suggest that juvenile justice stakeholders should pay more attention to the needs of youth in the delinquency system who are exposed to trauma.

**Carly B. Dierkhising et al., *Trauma Histories among Justice-Involved Youth: Findings from National Child Traumatic Stress Network*, 4 J. OF PSYCHOTRAUMATOLOGY (2013).**

### Purpose

- Describe trauma histories, mental health problems, and associated risk factors among adolescents with recent involvement with juvenile justice system. Four primary study areas include:
  - Prevalence rates
  - Gender differences
  - Age of first trauma experience and does trauma co-occur
  - How is age of onset of trauma associated with mental health related risk factors

### Methodology

- Data for this study was used from the Core Data Set which includes data from range of community-based mental health clinics, child welfare settings, juvenile justice programs, hospitals, schools and residential treatment centers.
- Data were collected between 2004-2010 from 56 sites located across the country
- The subgroup of participants included in this study was 658 adolescents aged 13-18
- Participants were asked to complete a battery of tests which included:
  - The trauma history profile (THP)
  - UCLA PTSD-RI
  - The National Child Abuse and Neglect Data System (NCANDS)
  - The Child Behavior Checklist (CBCL)

### Results

- Mental health problems were prevalent with nearly one quarter of youth meeting PTSD criteria
- Over one half of the sample indicated posttraumatic stress symptoms in the clinical range
- Youth presented with academic problems, substance/alcohol use and concurrent dependency
- The youth tended to be exposed to trauma beginning early in life
- The youth reported to experience multiple types of trauma

### Relevance

- Justice-involved youth have strikingly high rates of trauma exposure that begins early in life and often occurs in multiple contexts
- Prevention and intervention policies should focus on reducing the likelihood of re-victimization and mental health problems as well as future justice involvement
- Need for trauma-informed juvenile justice system that emphasizes screening, assessment and evidence-based treatment

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Jessica Uy & Adriana Galvan, *Acute stress increases risking decisions and dampens prefrontal activation among adolescent boys*, NeuroImage (2017).

### Purpose

- Examine how acute stress affects risking decision-making in boys ages 15-17 years old.

### Methodology

- Subjects: Adolescents between the ages of 15 and 17 years old and adults between the ages of 25 and 30 years old.
- For each subject, a baseline measure of stress was obtained via self-report and cortisol measurement.
- Multiple times a day subjects rated their stress level. Each subject was randomly told to come into the lab when the stress rating was high and when it was low.
- Once in the lab, a cortisol sample was taken, then subjects performed The Cups Task, a risking decision-making task while in the fMRI. On this task, subjects made advantageous and disadvantageous risk decisions.

### Results

- Salivary Cortisol
  - The differences between baseline and stress conditions were greater under the high stress condition. This indicated subjective experience of stress was supported by a physiological measure.
- Low Stress Conditions
  - Adolescents and adult males made more advantageous risk decisions.
  - The difference between advantageous and disadvantageous decisions was greater for adults than adolescents.
  - Adolescents and adult males showed similar frontal lobe activation when taking advantageous risks.
- Under High Stress Conditions
  - Adolescent males took more disadvantageous risks compared to adult males.
  - Adolescent males showed less frontal lobe activation (compared to low stress). This was not the case for adult males.

### Relevance

Acute stress (as determined by the person experiencing it, not by an observer) impacts adolescents and adults differently. Under high stress conditions, adolescent males take more disadvantageous risks and demonstrate less frontal lobe activation than do their adult counterparts.