

Risky Decision Making in Adolescence

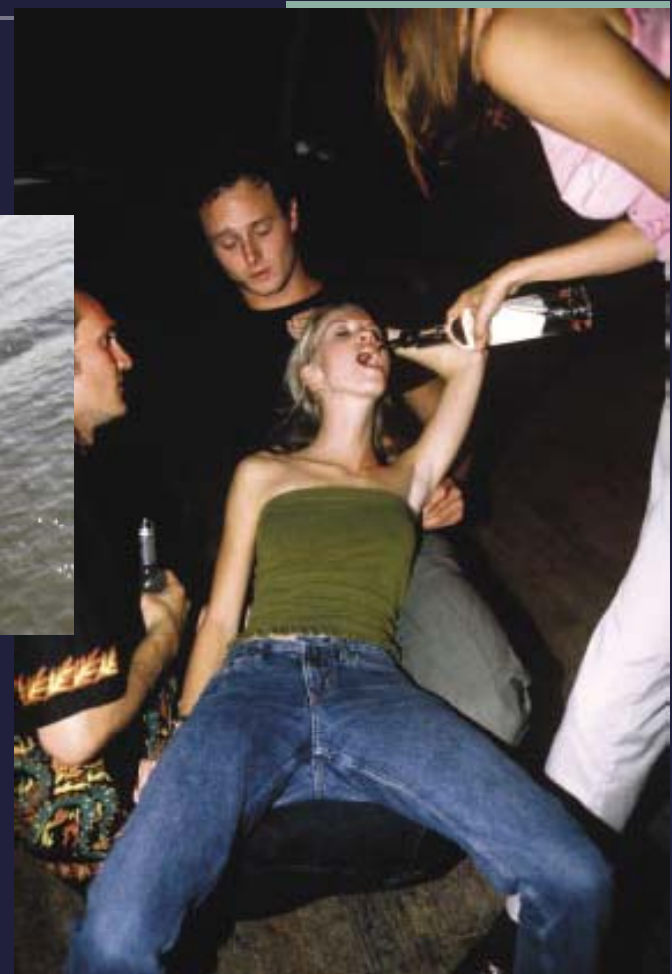
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Overview

- Adolescent risk taking has ramifications for educational attainment and achievement.
- Crime, smoking, drug use, alcoholism, reckless driving, and many other unhealthy behaviors debut and reach their peak in adolescence and young adulthood.
- Changing these unhealthy behaviors in adolescence would have a broad impact on youth, their families, and society.

What do we mean by risk taking?



Risk Taking in Adolescence

- Males and females 16-20 are at least 2X as likely to be in auto accidents than 20-50.
- Auto accidents are the leading cause of death among 15-to 20-year-olds, and 31% of those killed in 2003 had been drinking.
- 40% of adult alcoholics report having their first drinking problems between 15 and 19.
- Pathological or problem gambling is found in 10%-14% of adolescents, and gambling typically begins by age 12.

Risk Taking in Adolescence: STDs

- 1 in 4 adolescent girls has an STD (CDC, 2008)
- Over 9.1 million cases of STDs among 15-24 year-olds each year (CDC, Surveillance Summaries, *MMWR*, June 6, 2008)
- 1994-2003
 - 25–34 years, new HIV diagnoses down 49%
 - But the *leading* cause of death for African-American women aged 25-34 years
 - 13–24 years, new HIV diagnoses remained *stable* during this time period.
- Mental, physical, and economic toll (Reyna & Farley, 2006)

Risk Taking in Adolescence: Pregnancy

- Despite a 1/3 decline since early 1990s, the teen pregnancy rate in the U.S is *still* the highest among comparable countries.
 - 3 in 10 teens becomes pregnant by age 20.
 - 750,000 teen pregnancies annually
 - 51% of Latina teens become pregnant
- Some evidence that the progress in preventing teen pregnancy and childbearing has begun to slow or, in some cases, to reverse.

National Campaign to Prevent Teen Pregnancy. *Why It Matters: Linking Teen Pregnancy Prevention to Other Critical Social Issues*. Washington, DC: National Campaign to Prevent Teen Pregnancy, 2007.

Impact on Educational Outcomes

- Parenthood is the leading cause of school drop out among teen girls.
 - Only 40% of teen mothers ever graduate from high school
 - Compared to 75% of young women who wait until age 20-21.
- < 2% of teen mothers have a college degree by age 30
 - Compared to 9% of young women who wait until age 20-21.
- Children of teen mothers more likely to drop out.
 - 2/3s of children born to teen mothers earn high school degree
 - Compared to 81% of children of later child bearers.
- Children of teen mothers score lower on measures of child development and school readiness.
 - Cognition, language and communication, interpersonal skills
- Children of teen mothers do worse in school.
 - 50% more likely to repeat a grade, are less likely to complete high school than the children of older mothers, and have lower performance on standardized tests.

Education and Teen Pregnancy: Effects in Both Directions

- Strong relationship between academic failure and teen pregnancy
 - Teen pregnancy affects educational achievement of teens themselves as well as that of their children
- School achievement, attendance, and involvement also reduce teen pregnancy.
- ***Those concerned about educating young people should also be concerned with preventing teen pregnancy.***
- <http://www.thenationalcampaign.org/why-it-matters/pdf/education.pdf>





¡Si, se puede!

For copies of publications

- Laboratory for Rational Decision Making at Cornell University:
 - Reyna's publications
- <http://www.human.cornell.edu/che/HD/reyna/publications.cfm>



Risk and Rationality in Adolescent Decision Making

Implications for Theory,
Practice, and Public Policy

Valerie F. Reyna and Frank Farley

http://www.psychologicalscience.org/pdf/pspi/pspi7_1.pdf

Special Issue: Current Theories of Risk and Rational Decision Making



Developmental Review

Volume 28 March 2008

- Fischhoff, B. Assessing adolescent decision-making competence.
- Gerrard, M., Gibbons, F. X., Houlihan, A. E., Stock, M. L., & Pomery, E. A. A dual-process approach to health risk decision-making: The prototype–willingness model.
- Casey, B. J., Getz, S., & Galvan, A. The adolescent brain.
- Steinberg, L. A social neuroscience perspective on adolescent risk-taking.
- Rivers, S. E., Reyna, V. F., & Mills, B. A. Risk taking under the influence: A fuzzy-trace theory of emotion in adolescence.
- Sunstein, C. R. Adolescent risk-taking and social meaning: A commentary.

Programs to Prevent or Change Risky Behaviors Must Answer 3 Questions

- Normative = Ideal

- What behaviors should the program foster?

- Descriptive

- How are adolescents making decisions in the absence of the program?

- Prescriptive

- Which practices can realistically move adolescent decisions closer to the normative ideal?

Ideals, Description, and Prescription

- Better decisions: *Should* do
 - What is a rational decision?
- Description
 - How *do* teens make decisions?
- Prescription
 - How can we *help* teens make better decisions?

Normative Ideals: What is Rational or Adaptive is Not So Simple

- Evolutionary theories have serious shortcomings.
 - Behaviors that promote positive physical and mental health outcomes in modern society \neq those selected for by evolution (e.g., early procreation).
- Traditional economic models have serious shortcomings.
 - Economic models say rational = reach our goals.
 - But adolescents' goals are more likely to maximize immediate pleasure, which implies that many kinds of unhealthy behavior, such as drinking and drug use, would be deemed rational.
- Data show developmental *changes* in goals
- Important for policy to promote positive long-term outcomes, not adolescents' short-term goals.

The Future Self

Ten years ago, I tried
to kill myself in the A lot.

To whoever found me, to the paramedics, doctors,
and hospital staff: THANK YOU
I truly appreciate the gift you gave me.

To my parents: I'm sorry. Thank you. I love you.

To family, friends, Cornell: thanks for welcoming me back.

It has been a good ten years. And whatever
the future holds, I am very happy to be here.

Fig. 3. Letter from a student who attempted suicide, published in the
Cornell Daily Sun on September 14, 2005

Descriptive Reality

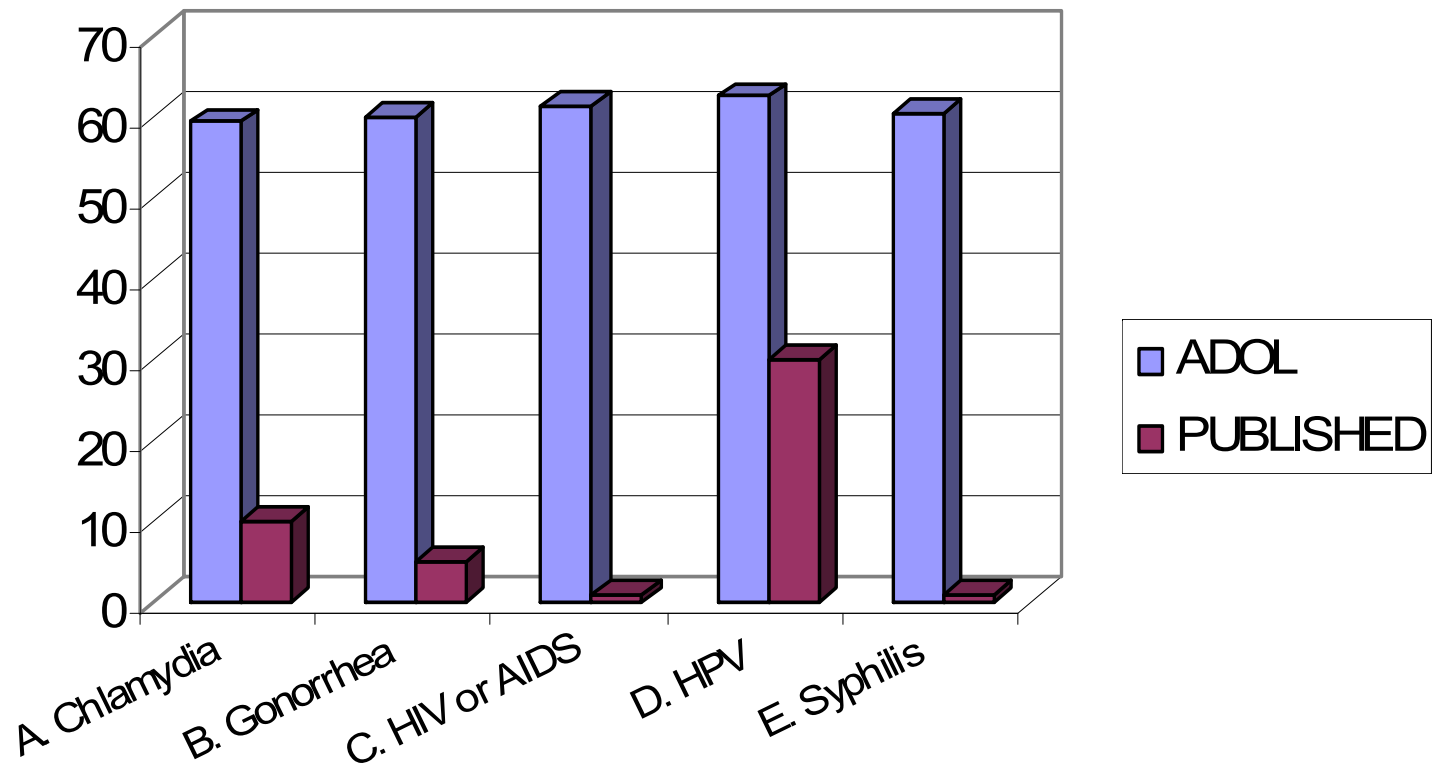
- In principle, capable of rational decision making.
- In practice...developmental differences.
 - Heat of passion
 - Presence of peers
 - Behavioral inhibition required (impulsivity)
 - Prefrontal cortex and connections to
 - Brain maturation *incomplete*
 - However, more *pruning* occurs and *less* logical thinking as the brain matures
 - Thinking process: Trading off vs. categorical gist

Decision Processes Develop

- Literature shows perceptions of risks and benefits predict risk taking in adolescence.
 - Rational calculation
- Do *not* believe that they are invulnerable!
- Overestimate key risks (lung cancer from smoking; HIV risk; death)
 - Fischhoff (2008)
 - Jamieson & Romer (2008)
- But nevertheless take risks because perceived benefits outweigh risks

STD/STI Risks *Overestimated*

Risk Estimates: STIs



Other Risks *Overestimated*

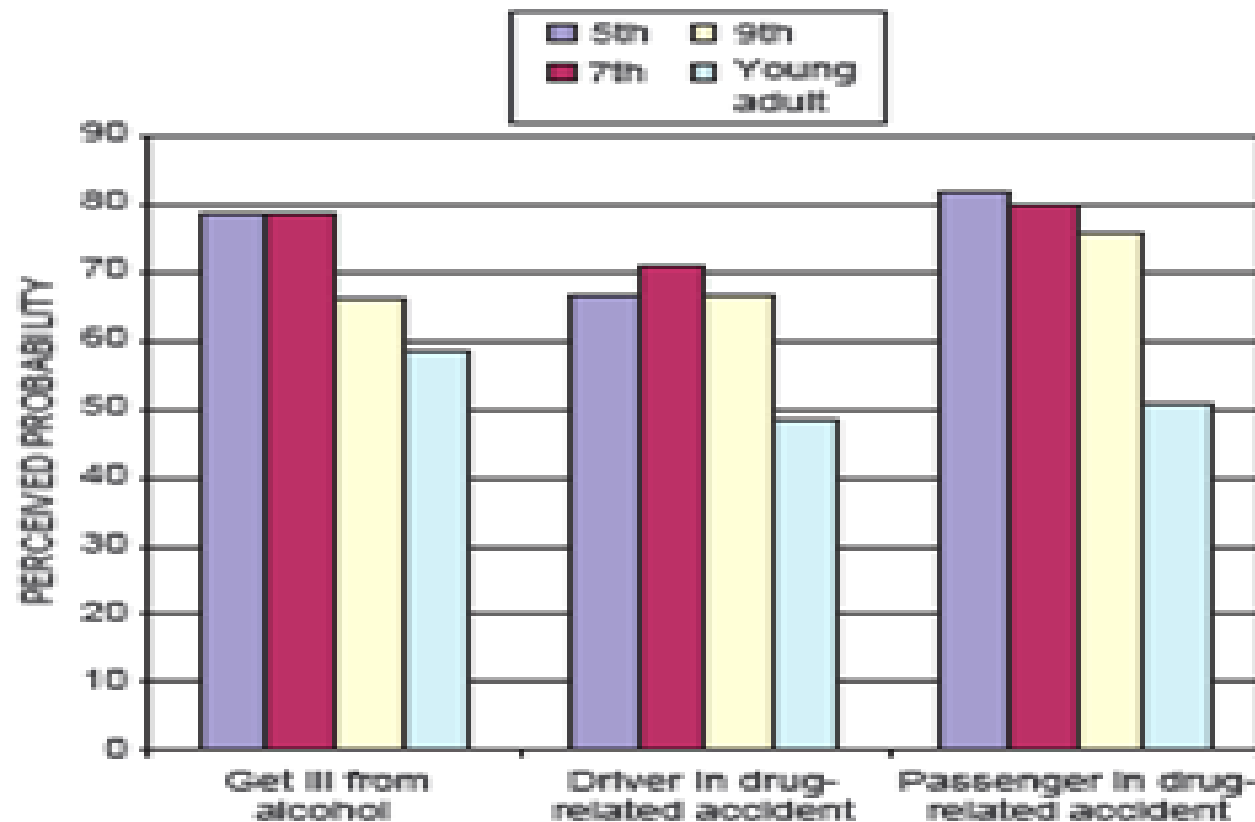
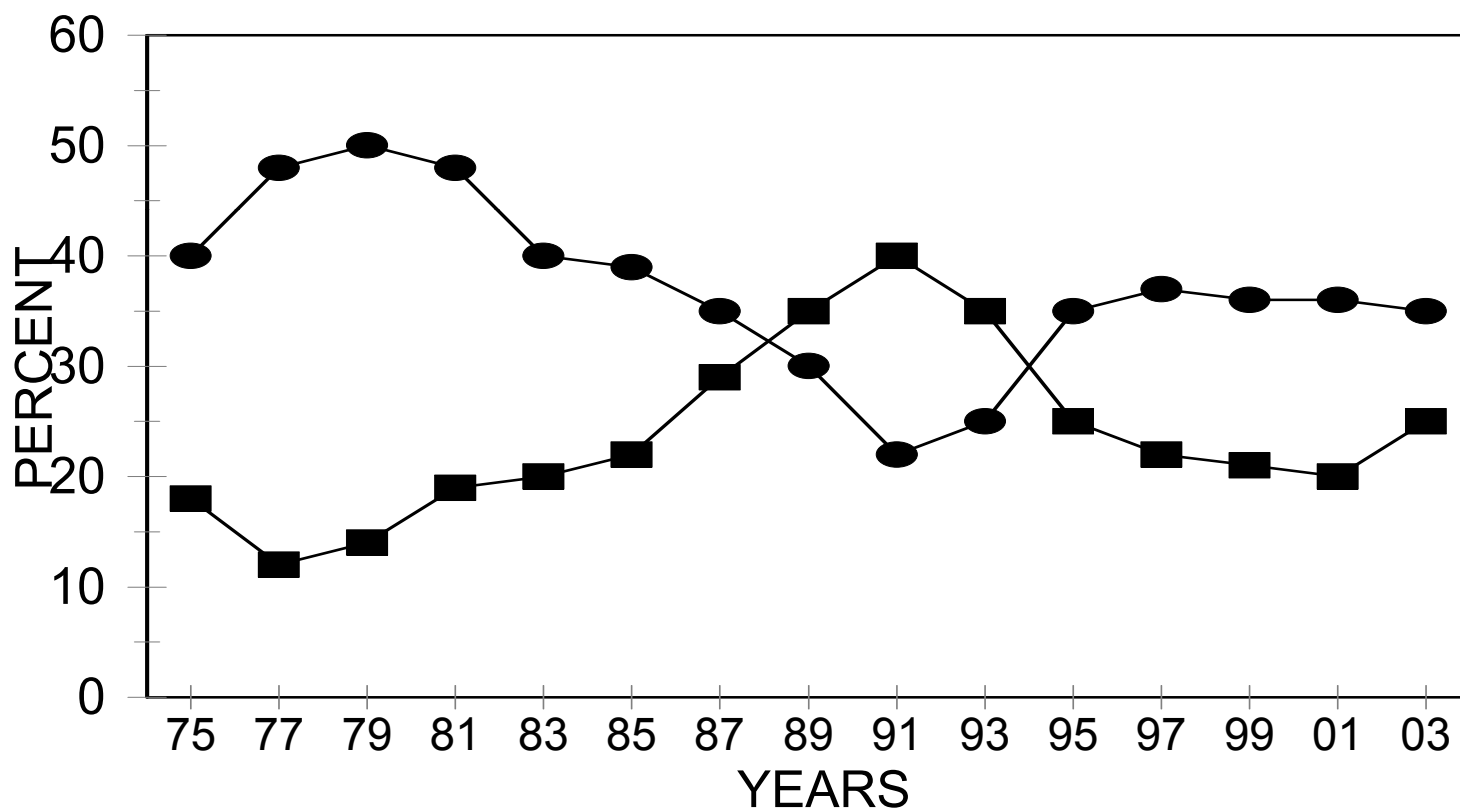


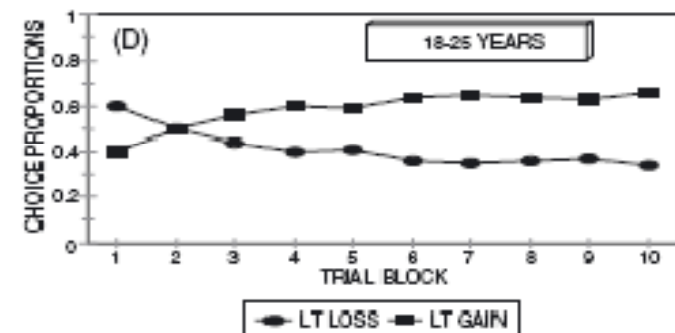
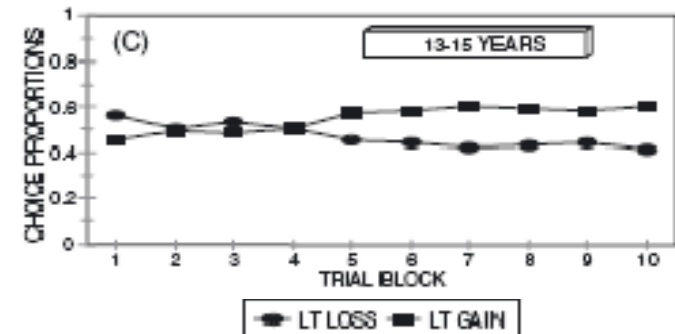
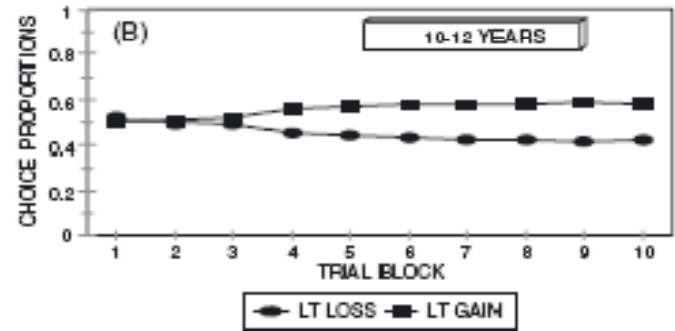
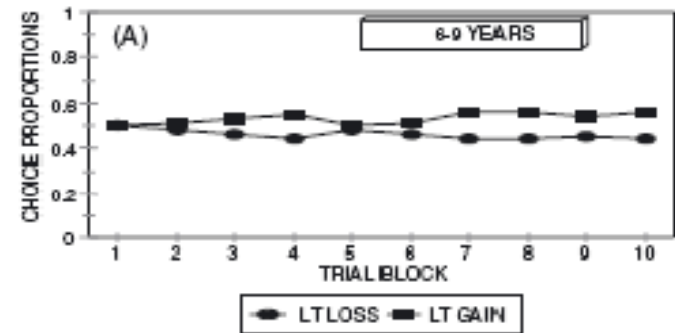
Fig. 11. Perceived probability of getting ill from alcohol, being the driver in a drug-related accident, and being the passenger in a drug-related accident for 5th, 7th, and 9th graders and a comparison group of young adults (based on Millstein & Halpern-Felsher, 2002a).

Perceived Risk Predicts Behavior: 12th graders Marijuana: MTF Study



● ACTUAL USE ■ PERCEIVED RISK

Learning from negative outcomes increases with age...the school of hard knocks packs a bigger punch



Conclusions: Reyna & Farley (2006) Review

- Risk taking predicted by adolescents' perceptions of risks and benefits
- Important risks (e.g., HIV from unprotected sex; lung cancer from smoking) are *overestimated*
 - Do not believe invulnerable: Myth
- Benefits loom larger than risks
- Learning from punishment slower



Why?

Fuzzy-Trace Theory

- Explains why adolescents perceive risks and benefits, and yet take more risks than adults
- Explains how risk-taking changes developmentally
 - From childhood to adolescence to adulthood
- Provides guidance about educational approaches that can reduce risk-taking and that endure over longer time periods

Example Scenario

Sonya is 17 and a junior in high school. She has been sexually active with many partners in her life and has never used condoms in any of her relationships. Sonya met Juan at Homecoming last fall and they have been a couple ever since. Juan has never had sex before. At a party on Saturday night...

Response Scales

Benefits of Having Sex

- None = 0; Small = 1; Medium = 2; Large = 3

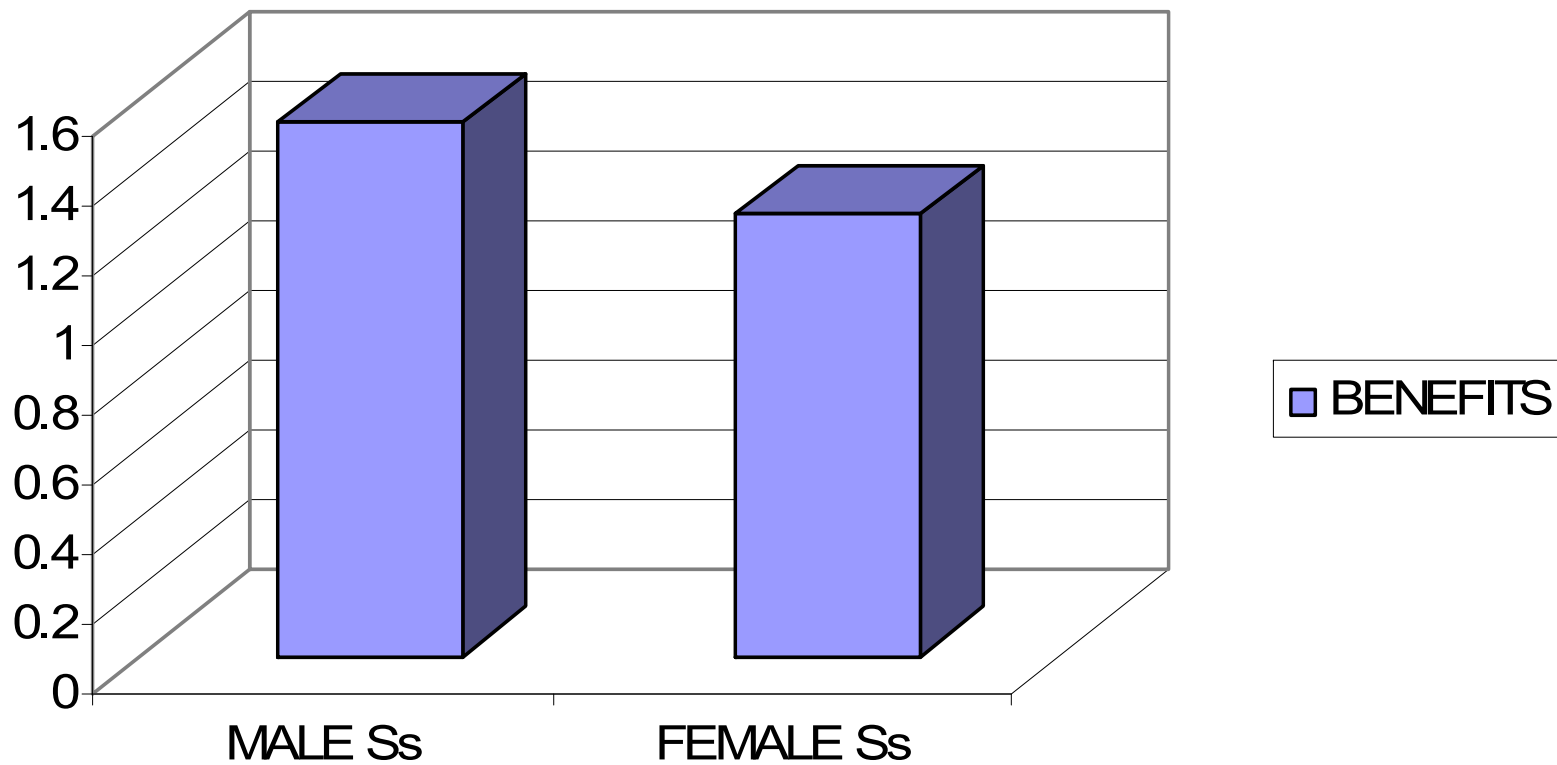
Risks of Having Sex

- None = 0; Low = 1; Medium = 2; High = 3

Subjects checked off verbal label, not numbers

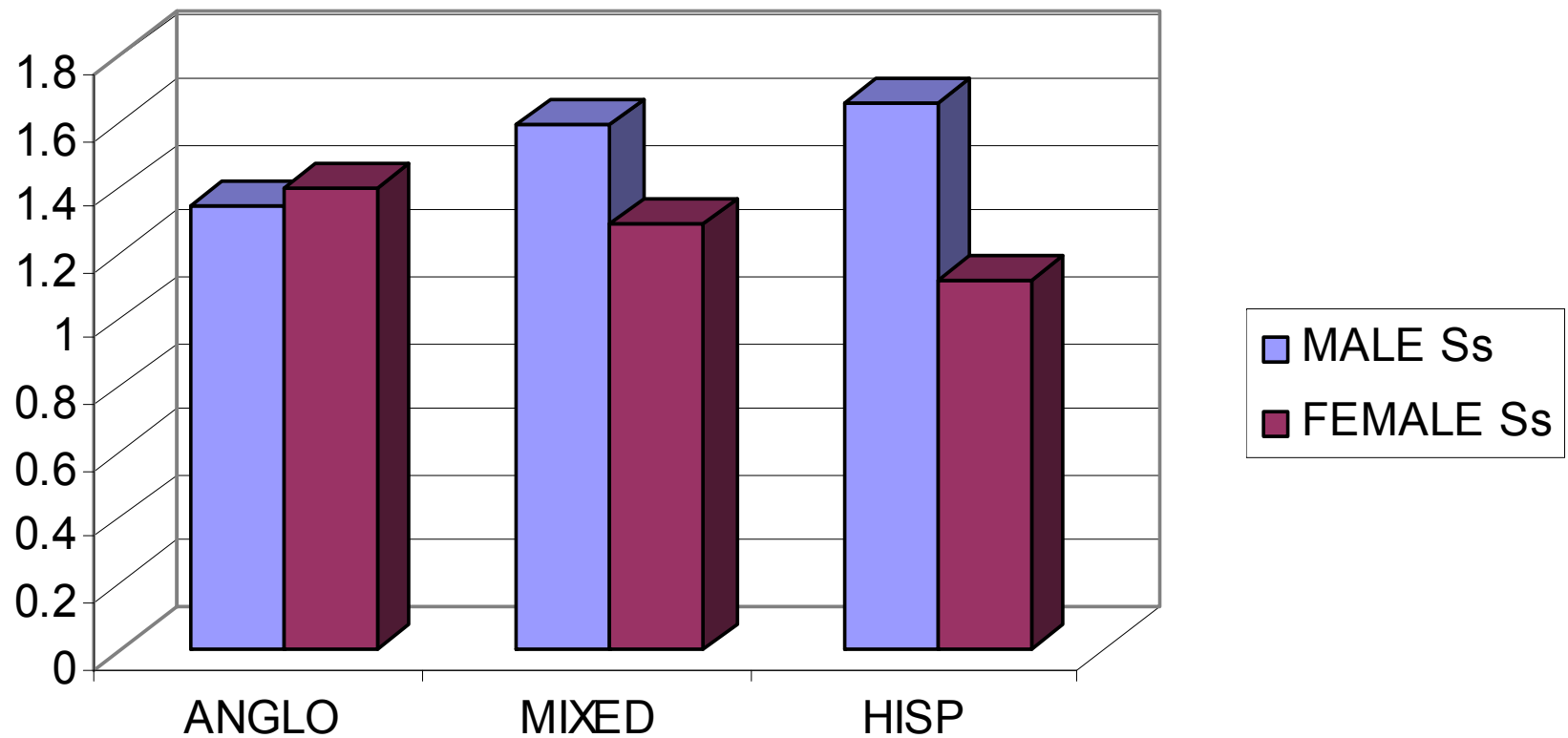
Gender Affects Gist: Perceived Benefits

CONTROL SCENARIO



Ethnicity Affects Gist: Perceived Benefits

ETHNICITY, GENDER, AND BENEFITS

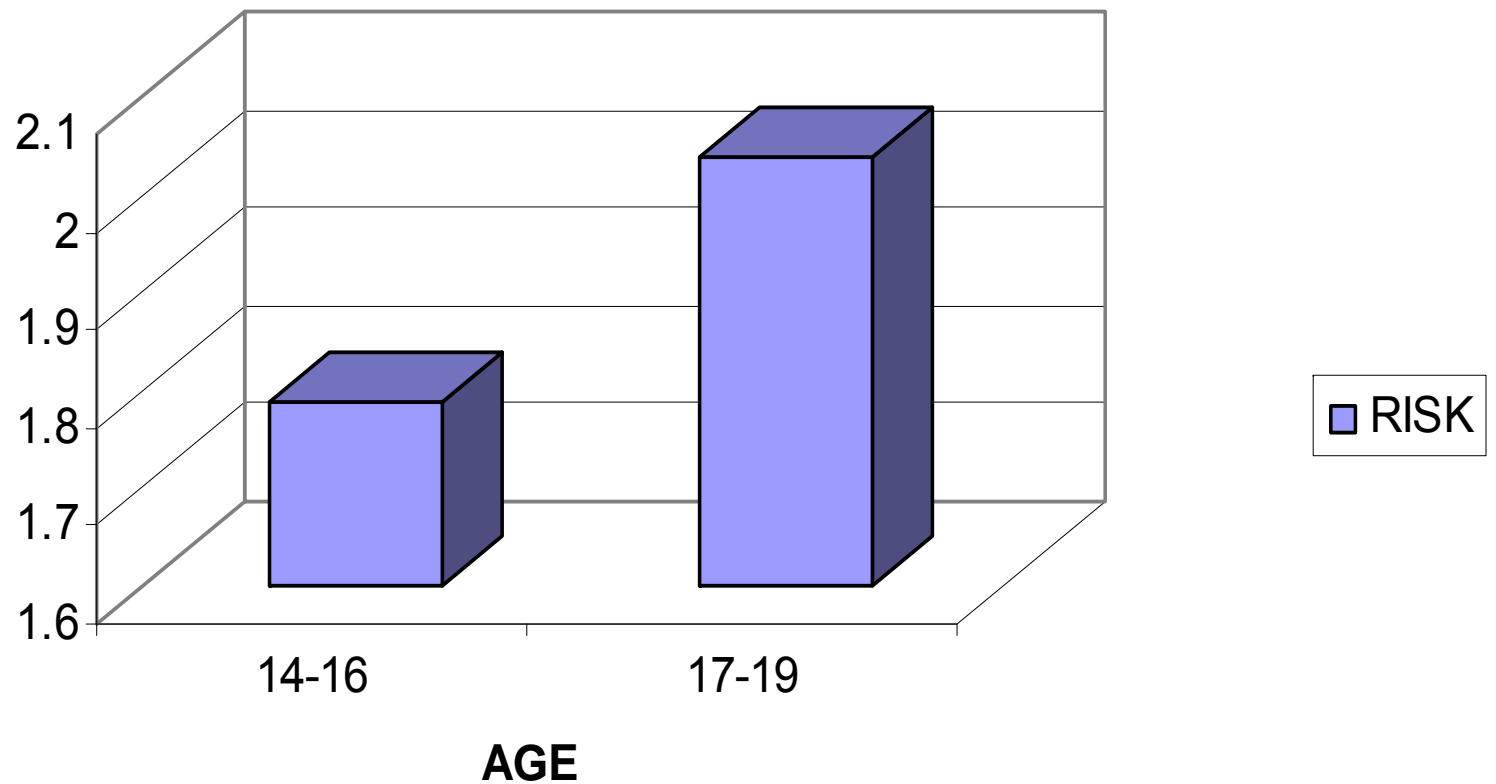


Perceptions Differ

- Same results for characters in scenario.
 - Male character (Juan) perceived as receiving more benefits than female (Sonya)
- Looking at same story, perceive different gist.

Risk Perception Increases With Age

CONTROL SCENARIO



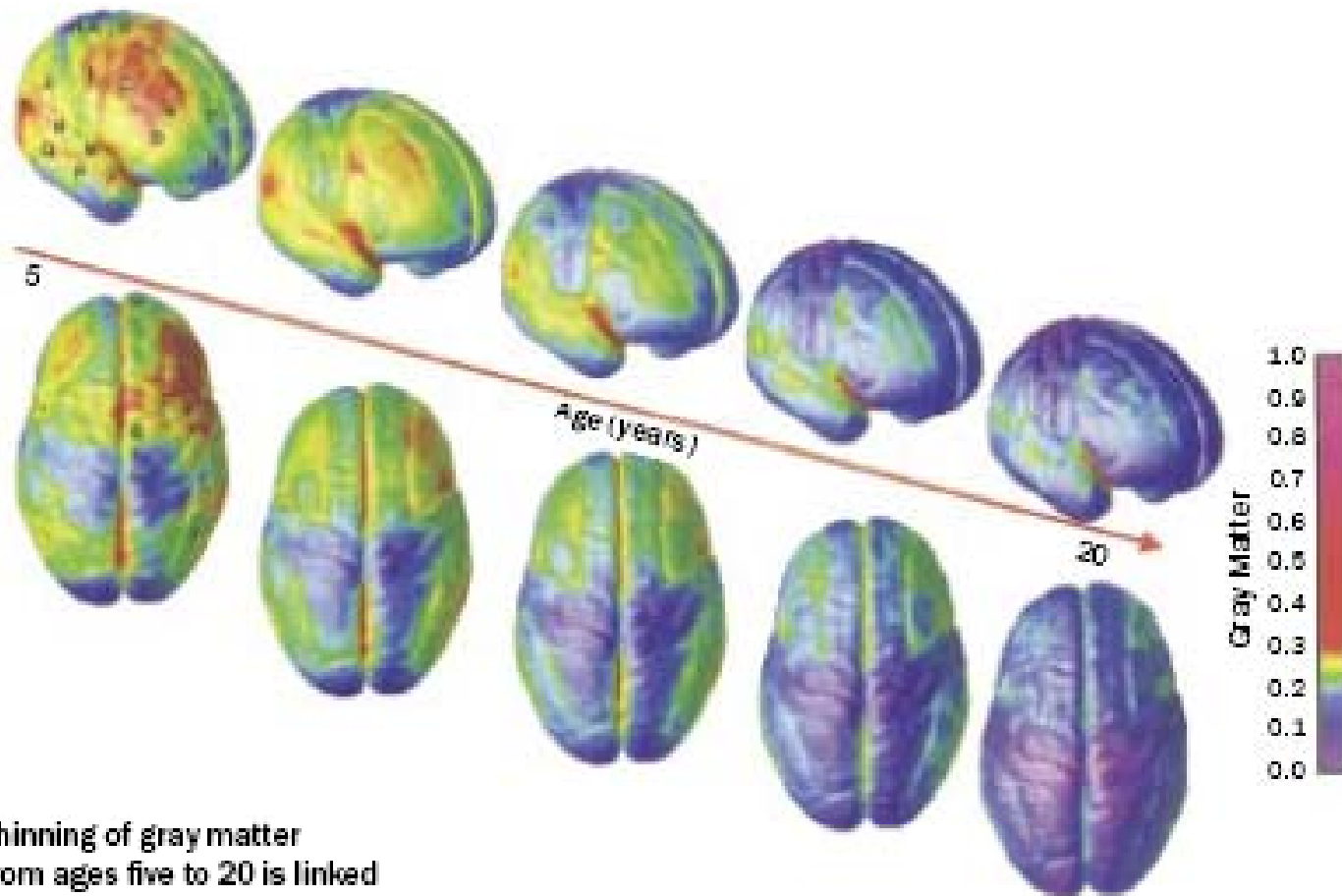
If Risk Preference Decreases and Risk Perception Increases...

- Why do teenagers take more risks than younger kids?
 - Greater access to risks:
Opportunity
- Supervision/monitoring is key, especially for younger teens



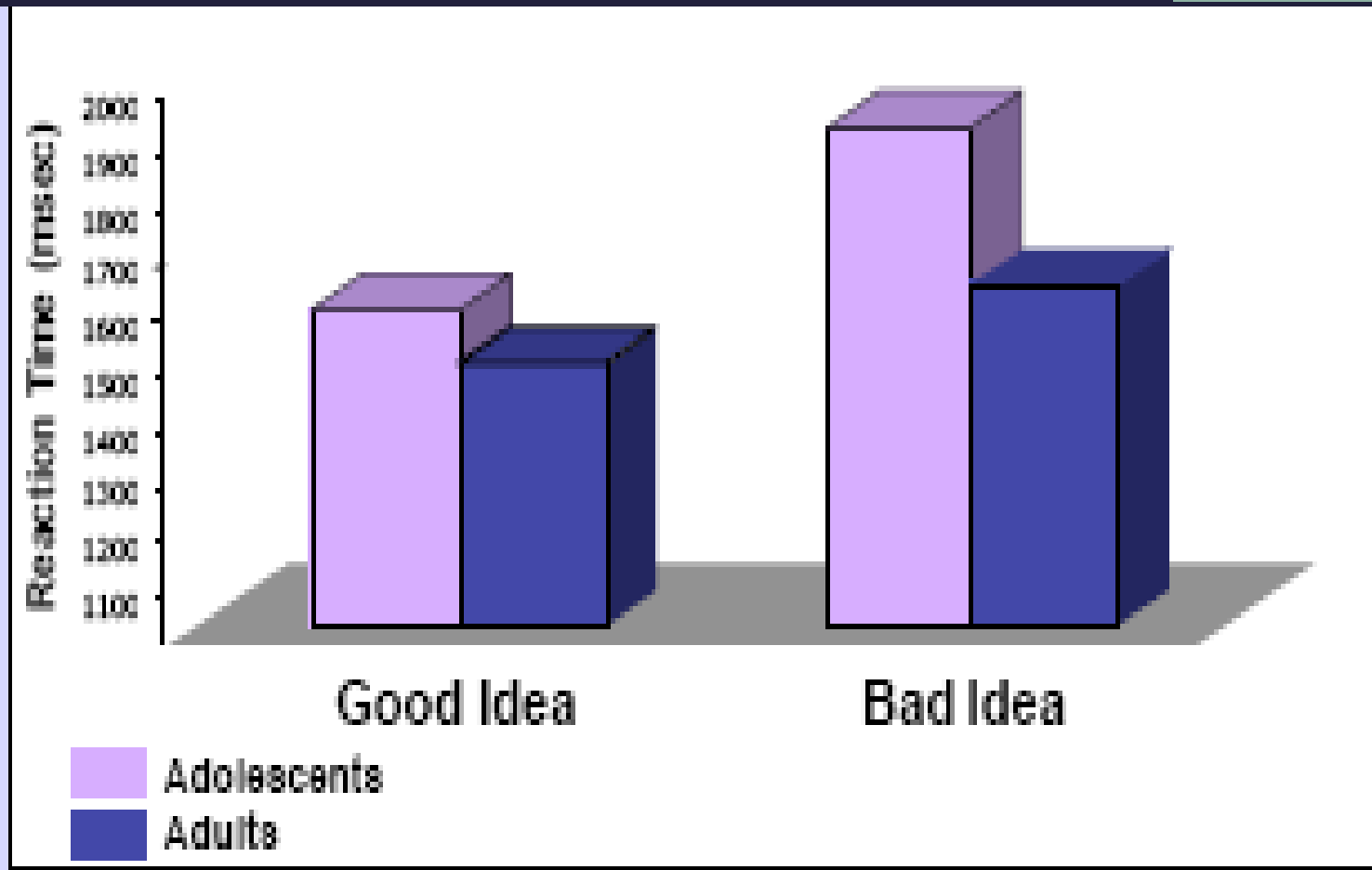
Does the brain change
in adolescence?

Thinning of Gray Matter: Less is More

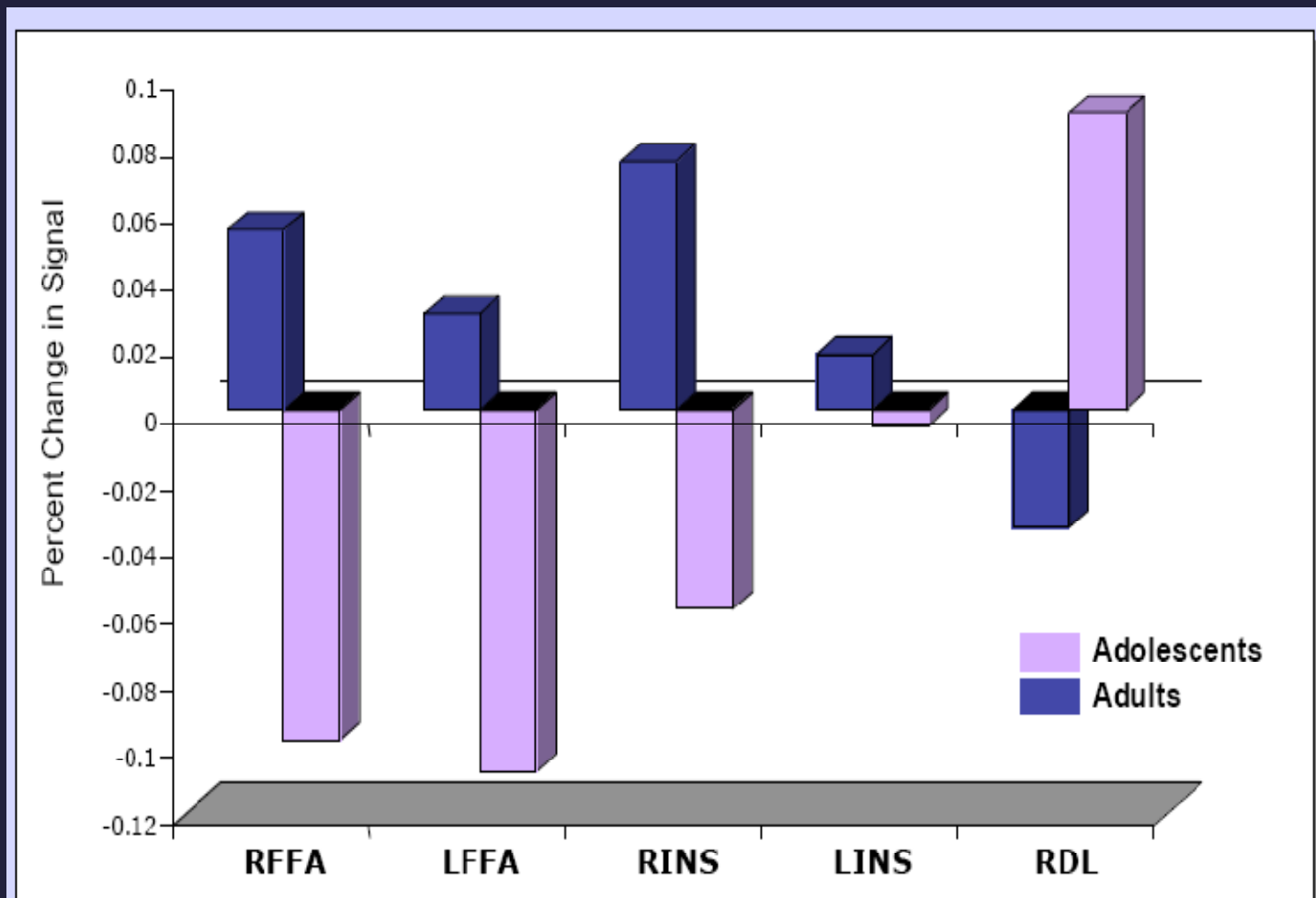


Thinning of gray matter from ages five to 20 is linked to brain maturation.

Images, Insula vs. Effortful Reasoning



Images, Insula vs. Effortful Reasoning



Brain Results

- Adult brain: *Pruning*, not more connections
- Adolescents: *More* deliberation, effortful reasoning about risky decisions (swim with sharks)
 - Baird & Fugelsang, 2004; Baird, Fugelsang, & Bennett, 2005)
- PFC also develops
 - Steinberg (2008)
 - Casey, Getz, & Galvan (2008)
- Prolonged development
 - Luna et al., 2004

Laboratory and Public Health Research: Converging Evidence

- Adolescents are *more* logical than adults.
 - Quantitatively trade off risks and benefits.
 - Example: Russian roulette is justified if payoff large enough.
- Adults avoid risks because of increase in *gist* processing.
 - Process risk information *qualitatively* (often categorically).
 - Even if benefits bigger than risks, don't take risks
- Adolescents who think like adults more likely to avoid risk

Mills, Reyna, & Estrada (2008): Method

- 596 students aged 14-17 years ($M = 15.5$, $SD = 1.0$) from high schools in Arizona, Texas, and New York
- 47% Caucasian, 17% Hispanic, 25% African American, and 11% “other”
- 57% female
- 41% sexually active

Asked Two Kinds of Questions About Risk

- Verbatim questions
 - Cued teens to remember actual behavior (specific experiences)
- Gist questions
 - Cued teens to think about their global attitudes and perceptions
- Opposite relationships between verbatim and gist measures (and risk taking)

Specific Risks Scale: Verbatim

- I am likely to have HIV/AIDS by age 25.
- I am likely to have HIV/AIDS in the next 6 months.
- I am likely to have a STD by age 25.
- I am likely to have a STD in the next 6 months.
- I am likely to get (a girl) pregnant in the next 6 months.
 - *Strongly disagree to strongly agree (5-point scales)*
 - $\alpha = .81$

STD Chances: Verbatim

- What are the chances that you have a sexually transmitted disease?
- On a 0-100 scale
 - 0 = no chance at all,
 - 50 = as likely as not,
 - 100 = absolutely sure

Categorical Thinking about Risk: Gist

- If you keep having unprotected sex, risks will add up, and you will get pregnant.
- Even low risks add up to 100% if you keep doing it.
- It only takes once to get pregnant or to get an STD.
- Once you have HIV/AIDS, there is no second chance.
 - *Plus 5 other items*
 - *Strongly disagree to strongly agree (5-point scales)*
 - $\alpha = .75$

Gist Principles Scale

- Avoid risk
- Better to be safe than sorry
- Better to focus on school than have sex
- Better to wait than to have sex when you are not ready
- Better to not have sex than hurt my parents/family
- I have a responsibility to my partner to not put him/her at risk
- I have a responsibility to God to wait to have sex
- Have fun (sex) while you can (reverse scored)
- Having sex is better than losing a relationship (reverse scored)
- Having sex is worth risking pregnancy (reverse scored)
 - *Plus 4 other items*
 - *Endorse or not (check all that apply)*
 - $\alpha = .82$

Global Risks: Gist

- Overall, for YOU which of the following best describes the RISKS of having sex?

Low, medium, or high

Risk Perception Variables: Summary

- Categorical Thinking about Risk: Gist
 - 9-item scale
- Gist Principles of Risk Avoidance
 - 15-item scale of gist-based values/principles related to sexual choice (number endorsed)
- Global Risk: Gist
 - 1 item: low, medium, high
- Specific Risks: Verbatim
 - 5-item scale
- Specific Risk of STDs: Verbatim
 - 1 item: 0-100 scale

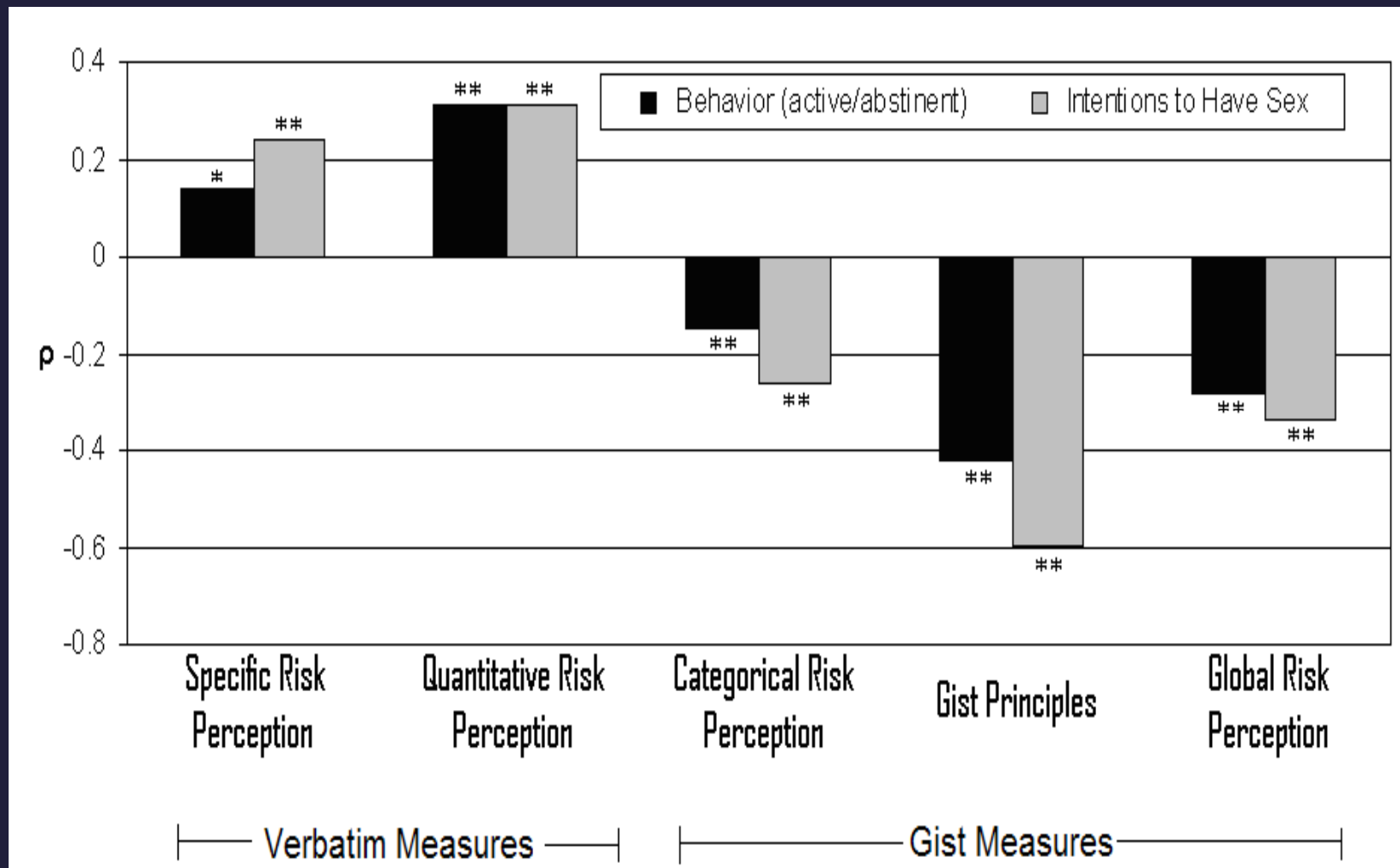
Risk Taking Measures

- Sexual Behavior (dichotomous)
 - Ever had sex: Yes or No
- Sexual Behavioral Intentions
 - 5-item scale ($\alpha = .91$)
 - Do you think you will have sex (or have sex again) before:
 - ...you turn 20?
 - ...you are in a serious relationship or in love?
 - ...you are finished with high school?
 - ...during the next year?
 - ...you are married?
 - *Strongly disagree to strongly agree (5-point scales)*

Predictions: Sexual Risk Taking

- Adolescents in transition: Verbatim analysis *and* gist-based processing of risk and reward
- If gist processing increases with maturity and experience and...
- If risk avoidance function of gist processing
 - Risk preference declines despite rewards (benefits)
 - As mature, avoid trading off risks and rewards when outcome catastrophic
 - Russian roulette seems crazy
- Then ***less risk taking*** for gist processors

Risk Perception and Risk Taking: Dual Processes



Verbatim vs. Gist Risk Perceptions

- Risk takers rated themselves as high for specific risks, perceived global risk as low
 - Realized at risk when specific cues to behavior
 - Denied at risk when cues tapped global attitudes
- Risk avoiders rated themselves as low for specific risks, perceived global risk as high
 - Older more likely to endorse simple gist

Two Types of Risk Takers

■ Risk Taker I

- Reasoned: Deliberate trading off of risks and benefits
 - Theory of reasoned action; theory of planned behavior; health belief model; behavioral decision making framework

■ Risk Taker II

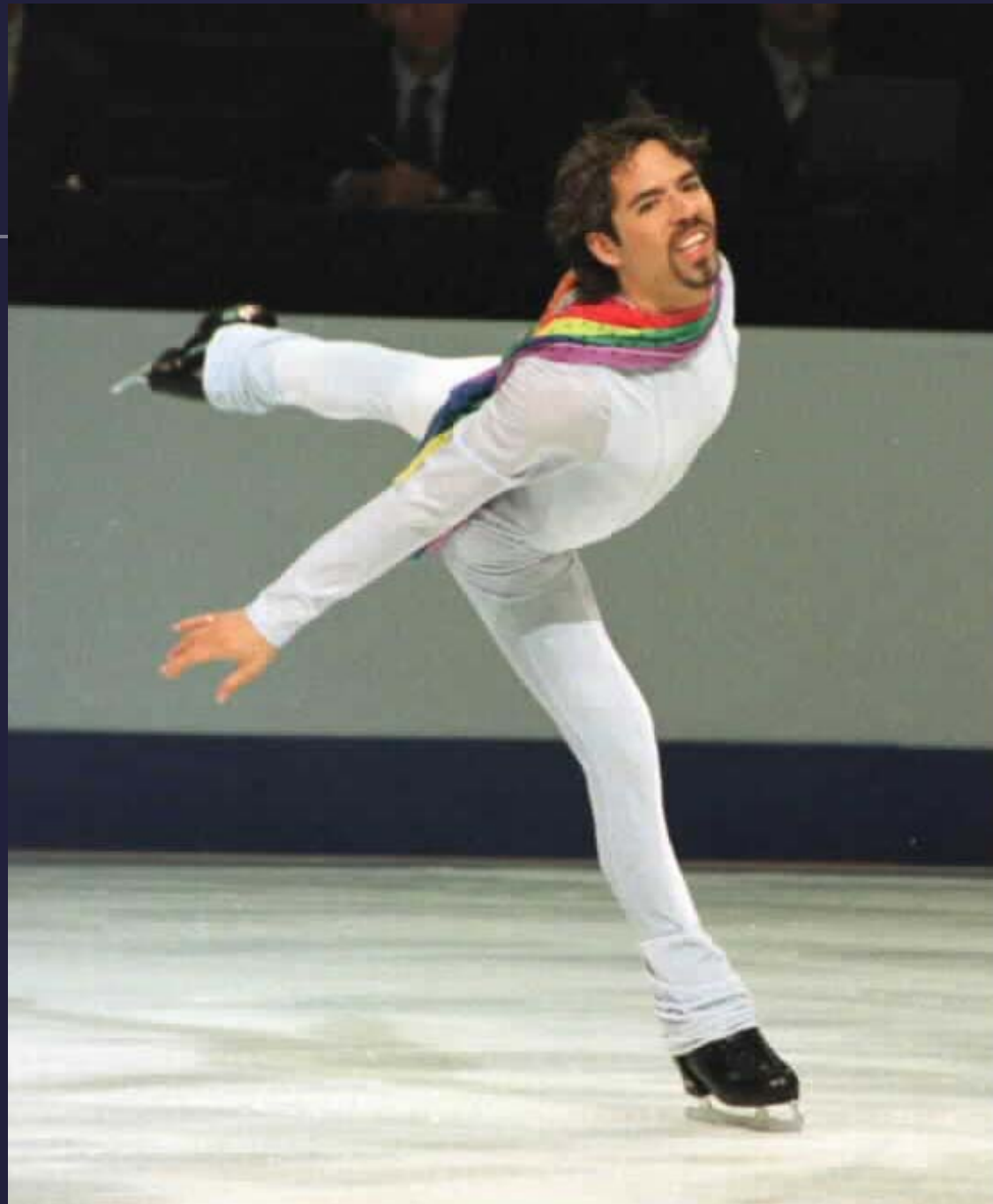
- Reactive: Non-deliberative reaction or impulse
- Risk avoiders: Rely on gist

Summary

- Many studies show adolescents' perceptions of risks and benefits predict risk-taking behavior and intentions.
- Take risks, despite risk overestimation, because perceived benefits outweigh risks

But Not All Risk Taking is Reasoned and Intentional

- Risky deliberator, but also...
- Risky reactor (emotion, impulse)
- Gist-based risk *avoider*
 - Less analysis, less risk taking



Conclusions

- Despite conventional wisdom, adolescents do not perceive themselves to be invulnerable, and perceived vulnerability declines with increasing age.
- Although the object of many interventions is to enhance the accuracy of risk perceptions, adolescents typically overestimate important risks, such as HIV and lung cancer.
- Experience is not a good teacher for younger adolescents, because they learn little from negative outcomes (favoring effective deterrents, such as monitoring and supervision).

Conclusions: Continued

- Reduce risk through higher drinking ages, eliminating or lowering the number of peers in automobiles, and avoiding exposure to potentially addictive substances (*not* exposing minors to alcohol to teach them to drink responsibly).
- For risky deliberators,
 - Reduce perceived benefits of risky behaviors (and increase benefits of alternative behaviors).
 - For younger adolescents, highlight short-term costs and benefits.
- Identify factors that move adolescents away from considering the degree of risk and the amount of benefit in risky behaviors toward categorical avoidance of major risks.
 - Expose teens to positive prototypes (gists) or images using visual depictions, films, novels, serial dramas and other emotionally evocative media

Implications

- Traditional interventions stressing accurate risk perceptions are apt to be ineffective or backfire because young people already feel vulnerable and overestimate their risk.
- Interventions that discourage deliberate weighing of risks and benefits by adolescents may ultimately prove more effective and enduring.
 - Mature adults intuitively grasp the gists of risky situations, retrieve appropriate risk-avoidant values, and never proceed down the slippery slope of contemplating tradeoffs between risks and benefits.
- Monitor and supervise younger adolescents.
 - Rather than rely on reasoned choices, remove opportunity (e.g., occupy time with positive activities).