

# A Behavioral Genetic Analysis of Adolescent Sensation Seeking and Resistance to Peer Influence

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# Adolescence: Development and Vulnerability

- Major psychological, social, and physical transitions
  - Cognitive development, secondary sex characteristics, social & emotional learning
- Middle adolescence (13-18 yrs)
  - Increase in risky behavior: substance use (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2015), desire for romantic love and initiation of sexual activity (Crone and Dahl, 2012)
  - Peak period of risk for antisocial behaviors (Frick and Viding, 2009) and delinquency (Moffitt, 1993)
- What makes adolescents so vulnerable?
  - Sensation seeking and resistance to peer influence (RPI)



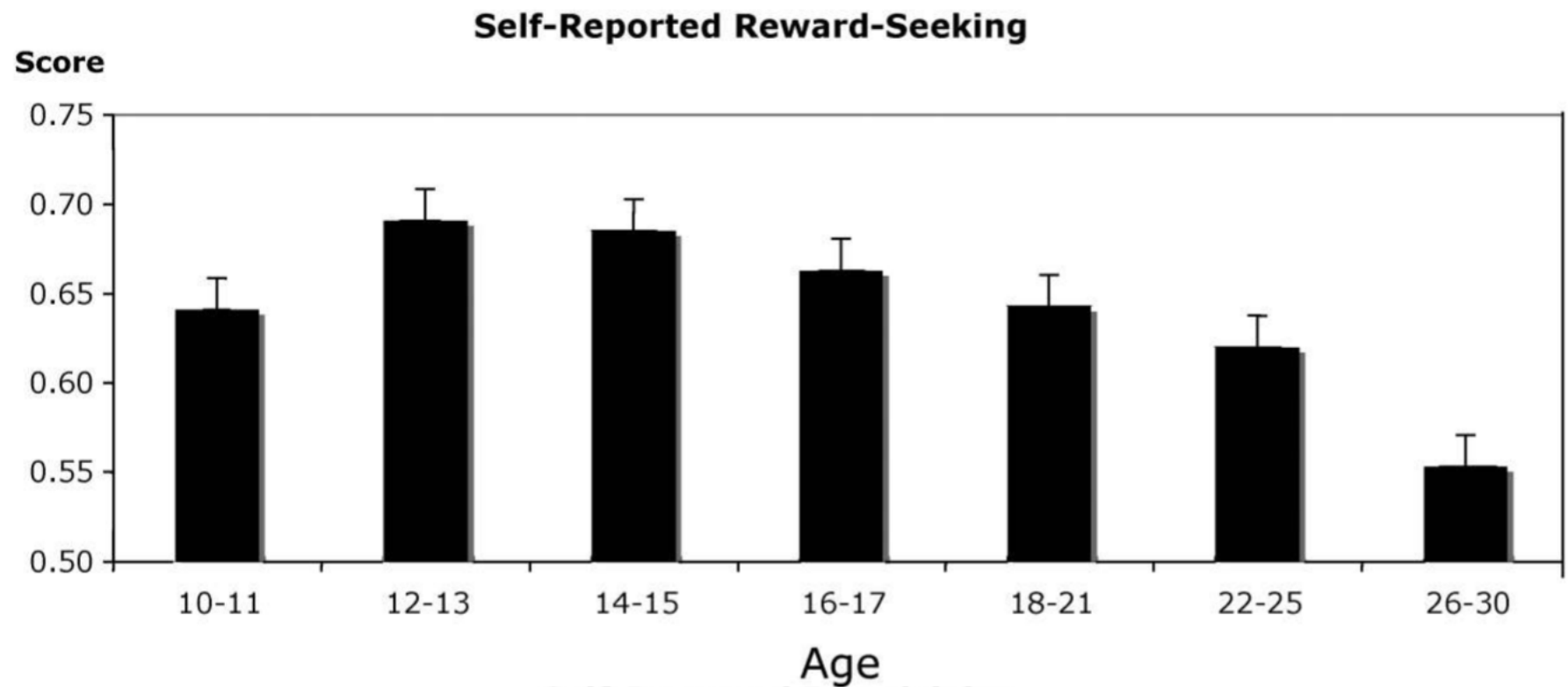
# Sensation Seeking



- Personality trait that captures an individual's drive to search for novel and intense experiences
- Characterized by a willingness to take risks in order to attain these experiences
- High levels of sensation seeking predict substance use, delinquent behavior, and sexual risk taking (Bidwell et al., 2015; Popham, Kennison, & Bradley, 2011; Hoyle et al., 2000)
- Four subscales

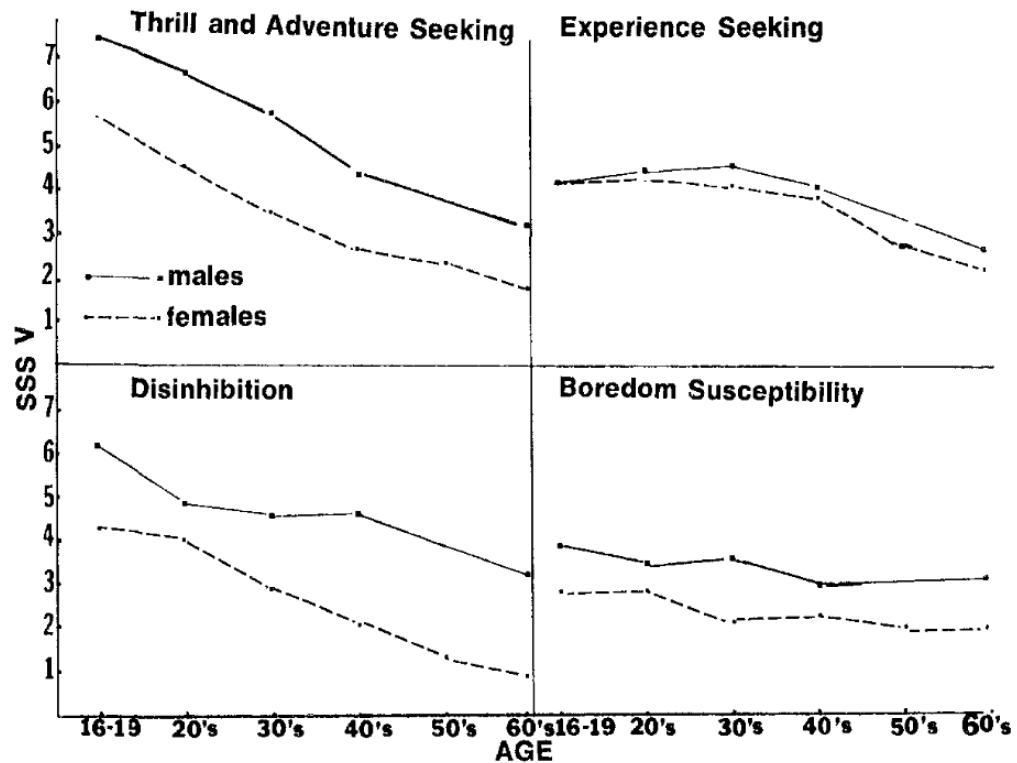


# Sensation Seeking



(Steinberg et al., 2008)

# Sensation Seeking



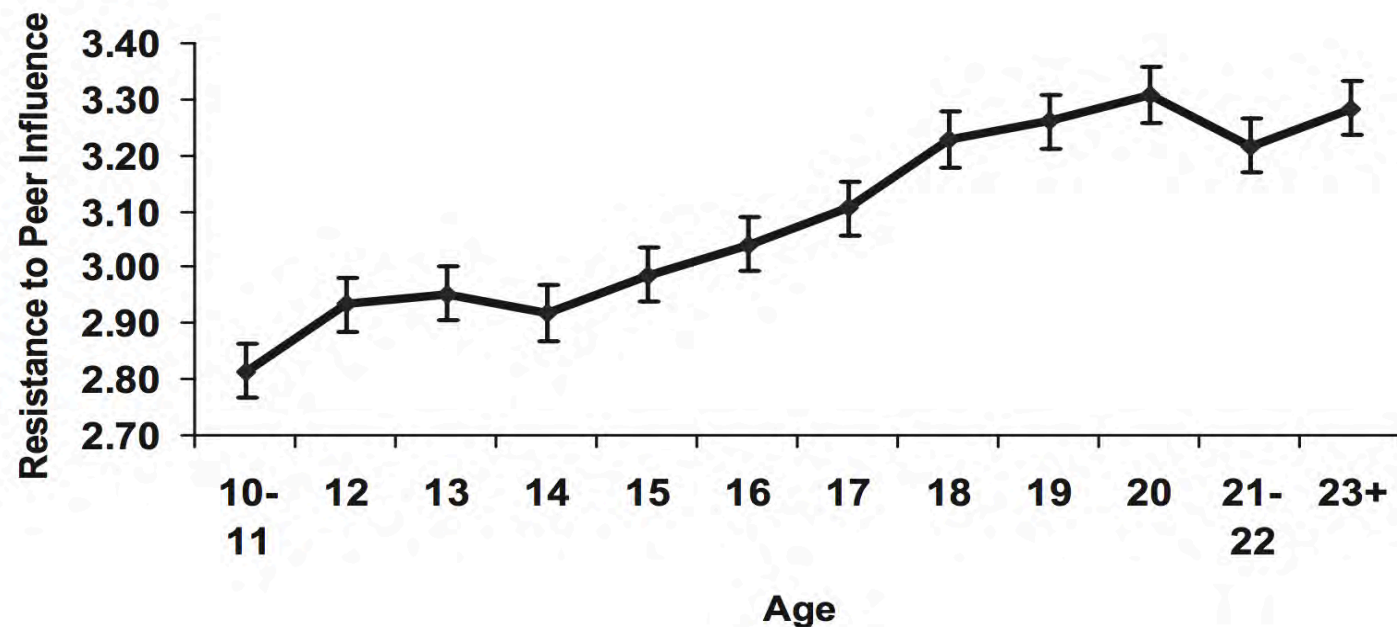
(Zuckerman, Eysenck, & Eysenck, 1978)

- Estimated heritability of sensation seeking ranges from 29% to 60%, depending on subscale and gender (Stoel, Geus, & Boomsma, 2006)

# Resistance to Peer Influence

- What it is not: **other** measures of peer influence
  - Affiliation with deviant peers: How many of your friends have sold drugs?
  - Close-friend matching: Has X friend sold drugs?
  - Peer pressure: How often have your friends asked you to sell drugs?
- How is it different?
  - Neutral situations (Steinberg & Monahan, 2007)
  - Diminished effect of social desirability (Steinberg & Monahan, 2007)
- Low levels of RPI predict substance use and increased risk-taking (Hendricks, Savahl, & Florence, 2015; Peake, Dishion, Stormshak, Moore, & Pfeifer, 2013)

# Resistance to Peer Influence



RPI increases linearly between ages 14-18, but not between 10 and 14 or 18 and 30 (Steinberg & Monahan, 2007)



# Previous Findings

- RPI's moderating effect on relationship between sensation seeking and substance use (Slater, 2003; (Donohew, Clayton, Skinner, & Colon, 1999)
  - Slater and Donohew et al.'s explanation: drug use and deviance are related because ↑ sensation seeking leads to ↓ RPI
  - **Individuals high in sensation seeking are more susceptible to peer influence because they are looking for strategies to attain high stimulation**
- Increased reward sensitivity to risky behavior when in the presence of peers (Chien, et al., 2011)



# Current Study: Research Questions

- What relationship, if any, exists between sensation seeking and RPI?
- How much of the variance in sensation seeking is explained by genetic, shared environmental, and non-shared environmental factors?
- How much of the variance in RPI is explained by genetic, shared environmental, and non-shared environmental factors?
- Any overlapping genetic or environmental influences?

# Current Study: Importance

- Middle Adolescence as vulnerable time/important developmental period
- Better understanding the relationship between RPI and SS can help explain risky behaviors in teens and inform intervention methods used to prevent adolescent substance abuse, dangerous sexual risk taking, and delinquency
- Replicating and extending previous findings concerning the heritability of SS and RPI with large and diverse sample

# Current Study: Hypotheses

- $\uparrow$  Sensation seeking =  $\downarrow$  RPI
  - Adolescents high in sensation seeking will be more susceptible to peer influences as they search for strategies to fulfill desire for stimulation
  - Increased social reward associated with group risk-taking will make individuals high in sensation more likely to go along with their peers
- Moderate genetic and shared environmental influences on SS and RPI independently
- Shared genetic influences on sensation seeking and RPI

# Design Overview: Twin Modeling

- Comparing variance in a particular trait across sibling pairs with varying genetic relatedness in order to predict heritability
- Identical (MZ) twins share 100% of their segregated DNA, while fraternal (DZ) share 50%
- If a trait is genetically influenced, MZ twin pairs should have more similar scores than DZ pairs
- Partitioning Variance:
  - A = Additive genetic influences
  - C= Shared environmental influences
  - E= Non-shared environmental influences

# Design Overview: Twin Modeling

- Similarities among identical (MZ) twins who are raised in the same home are explained by shared environment and shared genes
  - $r_{MZT} = A + C$
- Similarities among fraternal (DZ) twins who are raised in the same home are less driven by genetic influences
  - $r_{DZT} = .5A + C$

# Design Overview: Participants

- Identical (MZ) and fraternal (DZ) twin pairs raised in the same home that are enrolled in grades 9-12.
- 944 participants, 478 males and 466 females
- Age range: 13.57-20.11, mean age: 15.82
- 57% White, 20% Hispanic/Latino, 13% African American, 1% American Indian/Native American, 3% other

# Measures: Sensation Seeking

- Brief sensation seeking scale (BSSS) (Hoyle et al., 2000)
- 8 items, rated on a scale ranging from 1 (strongly disagree) to 5 (strongly agree).
- Higher score= higher sensation seeking
- High reliability and construct validity (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002)

1. I would like to explore strange places
2. I get restless when I spend too much time at home
3. I like to do frightening things
4. I like wild parties
5. I would like to take off on a trip with no pre-planned routes or timetables
6. I prefer friends who are excitingly unpredictable
7. I would like to try bungee jumping
8. I would love to have new and exciting experiences, even if they are illegal



# Measures: RPI

- Resistance to peer influence scale (RPI) (Steinberg & Monahan, 2007)
- Participants presented with 10 pairs of statements and asked to choose which best describes them
- 1= the first statement describes me, 2 = the first statement describes me better, 3= the second statement describes me better, 4= the second statement describes me
- Higher scores indicate greater resistance to peer influence

1	1-For some people, it's pretty easy for their friends to get them to change their mind.
2	2
3	3
4	4-For other people, it's pretty hard for their friends to get them to change their mind.

# Data Analysis Plan

- Preliminary (phenotypic) analysis: descriptive statistics and simple bivariate correlation for sensation seeking and RPI
  - Look at age and sex differences for sensation seeking and RPI across sample and compare to previous findings
- Behavioral genetic analysis: univariate twin modeling for sensation seeking and RPI independently
  - Estimate proportion of underlying genetic (A), shared environmental (C), and non-shared environmental (E) influences for each trait
- Bivariate Cholesky Decomposition to determine shared influences that are common to both sensation seeking and RPI
  - Only possible if moderate genetic and/or environmental factors are observed for both sensation seeking and RPI

# Alternative Outcomes

- Sensation seeking and RPI not negatively correlated
  - No relationship: individuals high in sensation seeking are no more likely to take cues from peers, provides evidence against idea that people with high desire for stimulation search for strategies from peers to fulfill these needs
  - Positive correlation: unlikely based on existing understanding of age trends, provide evidence against theory that those with high sensation seeking are motivated more by increased reward of peer-related risky decisions
- Low heritability for either sensation seeking or RPI ( $A = 0-.2$ )
- No overlapping genetic or environmental influences found for sensation seeking and RPI together

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