Relationships Between Risky Sexual Behavior and Neural Activity During Intertemporal Monetary Choices

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Nearly half (46.8%) of American high school students have had intercourse\(^1\)

Only 59.1% of sexually active adolescents report using a condom at their last intercourse\(^1\)

Half of new cases of sexually transmitted infections occur in individuals aged 15-24\(^2\)

One quarter of new HIV cases occur in individuals aged 13-24\(^2\)

\(^1\)CDC, 2014; \(^2\)Satterwhite et al., 2008; \(^3\)CDC, 2014
Intertemporal Monetary Choices

 Choices between smaller, immediate rewards and larger, delayed rewards
Intertemporal Monetary Choices

- Choices between smaller, immediate rewards and larger, delayed rewards
- Greater rates of delay discounting associated with health behaviors & status
  - Cigarette smoking\(^1\), obesity\(^2\)
- Neural activity during intertemporal monetary choices associated with health metrics & outcomes
  - Alcohol dependence severity\(^3\), weight\(^4\)

\(^1\)Bickel et al., 1999; \(^2\)Weller et al., 2008; \(^3\)Claus et al., 2011; \(^4\)Kishinevsky et al., 2012
Project SHARP

Goal: examine how genetic and neurocognitive factors are associated with response to risky sex interventions

Participants: high risk adolescents from juvenile justice system
  - Higher rates of risky sexual behavior than general population\(^1,2\)

fMRI scanning as part of baseline battery

\(^1\)Barthlow et al., 1995; \(^2\)Teplin et al., 2003
Participant Demographic Characteristics

- Ages 14-18, mean = 16.21 (sd = 1.11)
- 73.2% male, 26.8% female
- 62.5% Hispanic/Latino, 19.6% Non-Hispanic White, 8.0% Multiracial, 4.5% Native American, 3.6% African American, .9% Asian/Pacific Islander
Participant Risky Sex Characteristics

- 78.6% have had intercourse
- Median age of first intercourse: 13
- Median number of lifetime sexual partners: 5
- Average intercourse frequency: monthly
- Average condom use: “sometimes”
- 8% report a prior STI diagnosis
- 17.9% have been pregnant or gotten someone pregnant; 8.9% have children
Our Intertemporal Choice Task

- Pre-scan estimates of discounting parameter
- Individualized trials during scan
  - Biased toward now or later
  - Hard or easy

Claus et al., 2011
Our Intertemporal Choice Task

Would you prefer
$75 today OR $100 in 1 month

Would you prefer
$75 today OR $100 in 1 month

+Claus et al., 2011
Hard > Easy & Baseline Risky Sex

% Signal Change, Hard > Easy

Risky Sex Score, Baseline (Prior 3 Months)

L: $r = -0.262, p = 0.009$
R: $r = -0.226, p = 0.025$
L: $r = -0.235, p = 0.020$
R: $r = -0.204, p = 0.044$
L: $r = -0.232, p = 0.022$
R: $r = -0.206, p = 0.042$
L: $r = -0.248, p = 0.014$

Insula - L
Insula - R
Putamen - L
Putamen - R
dACC - L
dACC - R
IFG - L
Later > Now & 6-Month Risky Sex

% Signal Change, Later > Now

Risky Sex Score, 6-Month Follow Up (Prior 3 Months)

B: $r = -0.260, p = 0.008$
R: $r = -0.267, p = 0.012$

- Insula - L
- Insula - R
- Putamen - R
Conclusions

- Strength *and* limitation: high-risk sample
- Neural activation during intertemporal monetary choices is associated with patterns of risky sexual behavior in adolescents
- Regions implicated in reward and emotional processing show strongest associations
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