A Twin-Family Study of Suicidality and Illicit Drug Use in Young People

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Introduction

- It is well known that illicit drug use is associated with increased risk for suicidality in adolescents and young adults.
  - In a co-twin control study, Lynskey et al. (2004) found that marijuana dependence had odds of suicidal ideation and suicide attempt that were 2.5 to 2.9 times higher than those of their non-marijuana-dependent co-twin. However, this association cannot be entirely explained by common predisposing genetic and/or shared environmental predispositions.
  - Freedenthal et al. (2007) reported that solvent use was a significant predictor for suicidal ideation and attempt in a sample of incarcerated youth (mean age=15 years)
- We examined the relationship of suicidality with marijuana and solvent consumption from the Twins as Parents (TAP) study.

Offspring of Twins Design

- Table 1. The offspring of twins design provides a unique way to assess varied levels of genetic and family environmental risk.

Group	Twin DD*	Zygosity	Co-twin DD	Offspring DD Risk	
				Genetic	Family Envt.
1	Yes	MZ/DZ	Yes/No	High	High
2	No	MZ	Yes	High	Low
3	No	DZ	Yes	Medium	Low
4	No	MZ/DZ	No	Low	Low

- Genetic risk would yield a risk pattern in which 2>3>4
- Family environmental risk would yield 1>2=3=4

* Drug Dependence

Sample Selection

- The Twins as Parents (TAP) study (wave I) was conducted from 2002 to 2004, which included the male twins (43-64 years old) selected from the Vietnam Era Twin Registry (VETR).
- Selection Criteria
  - All twins for which at least one member of a twin pair met lifetime DSM-III-R illicit drug dependence criteria that were evaluated in 1992.
  - A random sample of pairs in which neither member met lifetime DSM-III-R illicit drug dependence criteria in 1992.
  - At least one twin had 1+ children in the appropriate age range (12-32 years old in 2002-2004).

Twin Sample Selection

- Of the 1,054 twins (527 pairs) targeted for the study, 910 eligible twins released by the VETR for contact, and 725 (80%) completed a brief screening telephone interview.
- A total of 488 (out of the 725) who had 1 - 3 offspring completed a telephone diagnostic interview.
  - 157 pairs (314 twins)
  - 174 individual twins

Offspring Sample Selection

- Of 950 offspring who were given consent to contact by twins, 839 (88%) completed a telephone diagnostic interview.
  - 220 twins (or families) with 1 child
  - 185 twins (or families) with 2 children
  - 83 twins (or families) with 3 children

Spouse Sample Selection

- Of 604 female spouses identified by twins
  - 444 completed the eligibility screen
  - 427 biological mothers (71%) completed diagnostic interviews.

Twin Sample Profile

- Twins Ethnicity
  - 92% non-Hispanic white
  - 8% African American
  - <1% Other
- Education
  - 3% <High school
  - 25% High school graduates
  - 34% Some college
  - 17% Voc/Tech degree
  - 11% Bachelor′s degree
  - 10% Graduate school

Offspring Sample Profile

- Offspring's mean age at interview
  - 22.7 years (range 12-32 years)
- Ethnicity
  - 74% non-Hispanic white
  - 6% African American
  - 3% Hispanic
  - 14% Multi-racial
  - 3% Other
- Education
  - 33.3% high school graduates
  - 38.7% college graduates
- Sex
  - 48% female

Measures

- Dependent variable
  - Offspring suicidal ideation: Ever thought of suicide
  - Offspring suicide attempt: Ever tried to take own life
- Independent variables
  - Offspring ever used illicit drug
    - Marijuana
    - Solvents (butane, cleaning fluid, carbon tetrachloride, glue, paint thinner, gasoline, toluene, or others)

Measures

- Independent variables
  - Paternal genetic and family environmental transmission of illicit drug dependence
  - Maternal DSM-IV major depression
  - Maternal DSM-IV illicit drug dependence
  - Offspring DSM-IV major depression
  - Offspring DSM-IV conduct disorder
  - Offspring age
  - Offspring sex

Statistical Analysis

- Multinomial logistic regression
- Odds ratios (OR) and 95% confidence intervals (CI)
- The robust variance estimator implemented in Stata 9 used for cluster-correlated data

Results

Table 2. Frequency distributions of offspring suicidal outcomes and illicit drug use (N=839)

	N	%
Suicidal Ideation	200	23.8
Suicide Attempt	47	5.6
Marijuana	467	56
Any Solvents	30	3.6
Major Depression		
Conduct Disorder	70	8.3

Results

Table 3. Frequency distribution of offspring (N=839) in four groups according to the twin illicit drug dependence status

	Zygosity	Twin DD	Co-twin DD	N	%
1	MZ/DZ	Yes	Yes/No	520	62.4
2	MZ	No	Yes	70	8.4
3	DZ	No	Yes	75	9.0
4	MZ/DZ	No	No	168	20.2

Table 4. Adjusted odds ratios (OR) and 95% Confidence Intervals (CI) of risk factors for offspring suicidal thoughts

	OR	95%CI
Offspring Marijuana Use	1.81*	1.17, 2.79
Offspring Solvent Use	2.51*	1.01, 6.29
Father's Drug Dependence		
Group 1	0.66	0.42, 1.05
Group 2	0.75	0.33, 1.72
Group 3	0.67	0.29, 1.51
Mather's Drug Dependence	1.57	0.88, 2.80
Offspring CD	1.96*	1.09, 3.52
Offspring MD	5.16*	3.22, 8.60
Sex	1.34	0.94, 1.92
Age	1.01	0.96, 1.06

Table 5. Adjusted odds ratios (OR) and 95% Confidence Intervals (CI) of risk factors for offspring suicide attempt

	OR	95%CI
Offspring Marijuana Use	1.11	0.52, 2.37
Offspring Solvent Use	6.40*	1.66, 24.66
Father's Drug Dependence		
Group 1	1.84	0.70, 4.80
Group 2	1.30	0.29, 5.88
Group 3	2.02	0.55, 7.44
Mather's Drug Dependence	1.45	0.52, 4.06
Offspring CD	1.53	0.58, 4.05
Offspring MD	14.14*	7.11, 28.12
Sex	2.40*	1.20, 4.79
Age	1.02	0.93, 1.11

Conclusions

- The pathway from solvent use to elevated risk for suicidality and that from marijuana use to greater risk for suicidal ideation are likely to be environmentally-mediated.
- We did not find that genetic and family environmental influences of illicit drug dependence contribute to the association between suicide attempt and solvents use nor the linkage between suicidal ideation and marijuana use.
- These findings have implications for the interventions that attempt to reduce the risk for suicidality.