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# The Influences of Parent, Sibling and Friend Behaviors on Smoking Initiation, Regular Smoking and Nicotine Dependence

Hong Xian, Jeffrey F. Scherrer, Hui Pan,  
Theodore Jacob, Kathleen K. Bucholz



# BACKGROUND

- Cigarette smoking is the leading cause of cancer mortality in the United States
  - Accounts for 30% of all cancer deaths
- Adolescents and young adults continue to start smoking and develop nicotine dependence (ND)
  - Daily 4,000 children between 12-17 try cigarettes
  - 22% of high school students are regular smokers and over half of smokers in their 20s are nicotine dependent in the United States

# BACKGROUND (Cont.)

- Genetic and environmental factors contribute to smoking initiation, regular smoking and ND
  - Genetic factors account for 46-84% of risk for initiation, 58-74% of the risk for regular smoking and between 33-70% of the risk of ND

# BACKGROUND (Cont.)

- Parents, siblings and friends influence smoking in young adults
  - Increased smoking shown to be associated with:
    - Greater parent-child conflict
    - Lower levels of attachment
    - Inconsistent parenting
    - Older sibling substance use
    - Friend and peer smoking

# OBJECTIVE

- Examine associations between parent, sibling and peer level variables and offspring smoking initiation, regular smoking, and ND in an offspring-of-twins design that accounts for familial vulnerability

# METHODS

## Sample and Data Derived from Twins as Parents (TAP) and Children of Alcoholics (COA) studies (1999-present):

- Fathers
  - 1,107 twin fathers sampled from the Vietnam Era Twin Registry
  - Twin pairs either concordant or discordant for alcohol dependence (AD) (COA) or illicit drug dependence (DD) (TAP). Controls were non-AD or DD twin pairs
- Mothers
  - 1,023 biological and/or rearing mothers
- Offspring
  - 1,919 offspring between 12-32 years of age

# Outcome Measures

- Smoking initiation: ever tried cigarettes
- Regular smoking: 21 cigarettes per day, smoking 3 or more times per week for a minimum of 3 weeks
- Fagerstrom Test for Nicotine Dependence (FTND)



# Predictor Variables

- Parents Report:
  - Twin ND 4 group design variable
  - Twin DD-AD 7 group design variable
  - Maternal and paternal substance use history

# Predictor Variables (cont.)

- Offspring report:
  - Mother-child / father-child closeness
  - Mother / father strictness
  - Mother / father consistency
  - Mother / father school pressure
  - Sibling alcohol and drug use
  - Friend smoking, alcohol and drug use
  - School smoking, alcohol and drug use
  - Sociodemographics

# 4 ND Group Design Variable

Group 1: Monozygotic (MZ) and Dizygotic (DZ) twins with ND:	High genetic-high environmental risk (HG-HE)
Group 2: Non-ND MZ twins with ND co-twins:	High genetic-low environmental risk (HG-LE)
Group 3: Non-ND DZ twins with ND co-twins:	Medium genetic-low environmental risk (MG-HE)
Group 1: non-ND MZ and DZ twins:	Low genetic-low environmental risk (LG-LE)

# 7 DD-AD Group Design Variable

Group 1: MZ and DZ twins with DD and with / without AD	Group 2: Non-DD twins with a MZ DD co-twin with / without AD
Group 3: Non-DD twins with a DZ DD co-twin with / without AD	Group 4: MZ and DZ twins with AD only
Group 5: Non-AD twins with a MZ AD co-twin	Group 6: Non-AD twins with a DZ AD co-twins
Group 7: non-DD and non-AD MZ and DZ twins	

# Analytic Approach

- Univariate multinomial logistic regression
- Multivariate multinomial logistic regression of significant univariate variables
- All analyses adjusted for sampling bias
- SAS surveylogistic used to account for clustered family data when computing 95% confidence intervals

# RESULTS

Table 1. Sociodemographics (n=1,919)

Mean age (range)	21.4 (12 – 32)
Gender: female	51%
Father's race	93.5% White
Parents' education:	
Father	64% ≥ h.s.
Mother	63% ≥ h.s.

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**Table 2. Smoking variables for all offspring respondents (N = 1919)**

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Never tried cigarettes	32.7%
Ever tried cigarettes	34.8%
Regular smoker	16.2%
FTND	16.4%

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**Table 3. Multinomial logistic regression modeling results showing association [Odds Ratios] between parent, sibling and peer behaviors and offspring smoking outcomes.**

Predictive Variable	Offspring smoking outcome variable		
	Ever Smoked	Regular smoker	FTND
DD & AD 7-Group:			
1: MZ & DZ twins w/ DD & w/w.o AD	1.036	1.207	1.125
2: non-DD twins w/ MZ DD cotwin w/w.o AD	1.064	1.398	1.668
3: non-DD twins w/ DZ DD cotwin w/w.o AD	0.756	1.433	0.790
4: MZ & DZ twins w/ AD only	1.366	1.041	1.477
5: non-AD twins w/ MZ AD cotwin	1.254	1.298	1.317
6: non-AD twins w/ DZ AD cotwin	1.645	1.262	1.560
7: non-DD & AD twins w/ non-DD & AD cotwins	1.00	1.00	1.00



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**Table 3 Continued.**

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Predictive Variable	Offspring smoking outcome variable		
	Ever Smoked	Regular Smoker	FTND
<hr/>			
Paternal ND 4-group:			
ND Group1 (HG-HE)	0.810	1.077	<b>2.095</b>
ND Group2 (HG-LE)	0.629	1.073	1.449
ND Group3 (MG-LE)	0.667	0.879	1.037
ND Group4 (LG-LE)	1.00	1.00	1.00
<hr/>			
Maternal heavy smoking index (HSI):			
Non-smoker	1.00	1.00	1.00
Low HSI	1.198	1.696	1.155
High HIS	1.094	1.185	<b>1.690</b>

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**Table 3 Continued.**

Predictive Variable	Offspring smoking outcome variable		
	Ever Smoked	Regular Smoker	FTND
Mom problem drinking	1.253	1.864	<b>2.490</b>
Dad problem drinking	1.194	1.152	1.235
Mom strictness: less strict	0.757	1.174	0.877
average	1.0	1.00	1.0
more strict	0.839	0.760	0.944
Dad strictness: less strict	1.050	0.834	0.913
average	1.0	1.0	1.0
more strict	<b>1.410</b>	1.499	1.053
Mom not consistent	1.108	1.395	1.648
Dad not consistent	1.533	1.166	1.368

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**Table 3 Continued.**

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Predictive Variable	Offspring smoking outcome variable		
	Ever Smoked	Regular Smoker	FTND
Mom closeness: very close	1.0	1.0	1.0
some what close	1.260	1.380	1.435
not close	1.199	1.566	0.952
DAD closeness: very close	1.0	1.0	1.0
some what close	1.075	1.112	1.195
not close	0.953	1.718	1.586
Mom school pressure: a lot	1.295	0.946	0.967
some	1.0	1.0	1.0
a little	0.819	<b>0.479</b>	1.200
none	1.177	1.406	1.398
Dad school pressure: a lot	0.951	0.875	0.892
some	1.0	1.0	1.0
a little	1.113	0.818	0.567
none	<b>0.357</b>	<b>0.146</b>	<b>0.187</b>

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**Table 3 Continued.**

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Predictive Variable	Offspring smoking outcome variable		
	Ever Smoked	Regular Smoker	FTND
Sib drug use: no any drug	1.0	1.0	1.0
mj only	<b>2.106</b>	<b>2.866</b>	<b>1.807</b>
mj + other drg / other drg	<b>1.576</b>	<b>2.869</b>	<b>2.087</b>
# Friends smoked: none	1.0	1.0	1.0
a few	<b>1.589</b>	<b>2.485</b>	<b>4.516</b>
a quarter or more	<b>2.178</b>	<b>7.730</b>	<b>22.397</b>
# Friends drank alc: none	1.0	1.0	1.0
a few	<b>1.780</b>	<b>1.687</b>	0.738
a quarter or more	<b>2.075</b>	1.199	0.855

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**Table 3 Continued.**

Predictive Variable	Offspring smoking outcome variable		
	Ever Smoked	Regular Smoker	FTND
# Friends used drug: none	1.0	1.0	1.0
a few	<b>1.818</b>	<b>3.008</b>	<b>2.308</b>
a quarter or more	<b>1.774</b>	<b>3.872</b>	<b>2.795</b>
# Students smoked: none or few	1.0	1.0	1.0
a quarter to half	1.078	1.179	1.203
a half or more	1.322	1.179	1.654
# Students drank alc: none or few	1.0	1.0	1.0
a quarter to half	1.096	1.465	0.950
a half or more	1.121	1.920	1.250
# Students used drug: none or few	1.0	1.0	1.0
a quarter to half	1.17	0.766	0.986
a half or more	1.261	1.261	1.503

**Table 3 Continued.**

Predictive Variable	Offspring smoking outcome variable		
	Ever Smoked	Regular Smoker	FTND
Kid age	<b>1.112</b>	<b>1.173</b>	<b>1.224</b>
Dad's race: non-white	<b>1.923</b>	<b>3.343</b>	1.987
Mom edu: < high sch	1.128	0.732	1.151
Dad not married	1.354	1.127	<b>2.091</b>

# CONCLUSIONS

- Genetic vulnerability and exposure to a family smoking environment contributes to FTND:
  - Paternal ND is significantly associated with offspring being FTND.
  - Maternal heaviness of smoking associated with offspring FTND.
- Family environmental factors contribute to offspring smoking:
  - Parental divorce associated with offspring FTND
  - Sibling and friends' substance use have robust impacts on smoking behaviors.

## CONCLUSIONS (Cont.)

- Parenting and parent-offspring relationship is a weak predictor of smoking after accounting for genetic risk, sibling and peer influences
- Public health efforts to prevent initiation and progression of smoking should target peer smoking



# STRENGTHS and LIMITATIONS

- Strengths:
  - Offspring-of-twins design
  - Non-clinical sample and structured method of data collection
  - Offspring age range
- Limitations:
  - Retrospective self-report
  - Limited variation in race
  - Sample size

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