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Traumatic event exposure and alcohol-related outcomes

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SUMMARY

The relationships between traumatic event exposure and psychiatric and substance-related outcomes are complicated by their intergenerational nature, bilateral causality, and the clustering of trauma exposure in some individuals. We examined the relationship between traumatic event exposure and alcohol-related outcomes using data from a semi-structured, diagnostic telephone survey of 1224 adolescent female twins, mean age 18.3 years, from the Missouri Adolescent Female Twin Study. The interview included 9 questions assessing traumatic event exposure and a psychiatric diagnostic assessment that included questions on alcohol-related risky behavior.

Traumatic event exposure was fairly widespread, particularly given the sample's youth, with 42.2% of participants reporting having experienced at least one event. Evidence was seen for clustering of events. Among those who reported any trauma exposure, 21.5% experienced 2 events, 8.7% 3 events, and 3.7% 4 events, and 3.3% 5 or more events.

Logistic regression, used to determine the risks for alcohol-related outcomes associated with trauma exposure and found that risks for these outcomes increased incrementally with the number of event categories endorsed. Logistic regression models found evidence for association of specific trauma types and outcomes that persisted with control for the number of event categories experienced. For example, a history of rape was associated with significant risk (OR 4.44; 95%CI 2.44 - 8.09) for impulsive sexual behavior while drinking.

INTRODUCTION

Attempts to establish direct causal connections between trauma exposure and psychiatric and substance-related outcomes are complicated by their bi-directional nature, the contributions of underlying genetic and environmental liability, and the propensity for exposure to various traumatic events to be clustered in some individuals. Clustering of trauma exposure had been observed in general population samples[1,2] and prior trauma exposure has been reported to increase the risks for both subsequent trauma and for psychiatric outcomes associated with it.[3,4]

The current analyses were undertaken to examine the relationship between alcohol-related outcomes and exposure to traumatic events. Because traumatic events are known to cluster in some individuals, analyses reported here include both risk estimates that are unadjusted and those incorporating adjustment for the number of categories of additional traumatic events reported.

METHODS

PARTICIPANTS

The Missouri Adolescent Female Twin Study (MOAFTS) is an ongoing prospective study of alcohol problems in adolescent girls and young women. The study's methods have been described in detail elsewhere.[5,6] Initial contact was made via telephone with parents. After a brief explanation of the study was given (including its voluntary nature), a 5 minute initial contact interview was completed. Those who agreed were scheduled for a more extensive telephone diagnostic interview and mailed an information packet. Prior to beginning the interview, the consent form (approved by the Washington University School of Medicine Human Studies Committee) was reviewed with all interviewees and oral consent obtained. Parental consent was always obtained prior to scheduling interviews with minor twins. Interviews were attempted with twin pairs and at least one parent. Analyses presented here include only twins aged 16 and older at initial assessment who responded to each of the 9 traumatic event questions [mean age at assessment=18.3 years; (SD=1.2); final N=1224].

ASSESSMENT

Instruments included a zygosity assessment and parental and twin structured diagnostic interviews adapted for telephone administration from the DICA, SSAGA,[7] and C-SSAGA. Lay interviewers completed a two-week training course, including supervised interviews with community volunteers. Twins from the same pair were never assessed by the same interviewer. Interviewers were blind to the diagnostic status of family members. The respondent booklets, mailed before the interviews, enabled interviewees to respond to sensitive questions in a manner that would maintain confidentiality if overheard (e.g. with a "yes" or "no" or via a number from a list).

The adolescent interview included diagnostic assessments of DSM-IV alcohol dependence (including alcohol-related risky behaviors), major depressive disorder, conduct disorder, panic disorder, and illicit substance abuse. Non-diagnostic sections assessed suicidal thoughts and behavior. PTSD was not assessed, but a non-diagnostic assessment of traumatic event exposure derived from the NCS[1] was included.

ASSESSMENT- (cont.)

Traumatic event exposure questions referred to events by numbers from a list of traumatic events contained in the respondent booklet rather than by description. The trauma section was skipped if the twin did not have a copy of the respondent booklet. To avoid affirmative replies to multiple traumatic event questions on the basis of a single incident, questions assessing potentially overlapping areas included the instruction “aside from any event you have already mentioned.”

Impulsive sexual activity while drinking was assessed with a question about having engaged in sexual activity that the person otherwise would not have. Unprotected sex while drinking similarly refers to endorsement of having failed to protect oneself from pregnancy or STDs due to drinking-related carelessness. Injuring oneself while drinking was assessed by a question that asked about drinking-related accidents such as falls, burns, or getting hit by a car. Risky behaviors involving drinking and either driving, or riding with a drunk driver, were also assessed via self-report.

DATA ANALYSIS

Statistical analyses were performed using either SAS Version 6.12[8] or STATA.[9] All estimates of 95% confidence intervals (95%CI) were adjusted for the non-independence of observations on twin pairs via the use of robust variance estimators. Dummy variables were coded to represent the risks associated with having experienced traumatic events from 1, 2, 3, 4, or 5 or more categories with the comparison group being those who denied all of these traumatic events. Similar dummy variables were coded to reflect the number of other traumatic experienced for each index trauma.

Crude lifetime prevalence rates were calculated for each category of traumatic events and for the prevalence of the number of additional traumatic events found with each category. Logistic regression models were used to compute odds ratios (OR) and 95% confidence intervals (95%CIs) as measures of the risk for alcohol-related related outcomes associated with trauma exposure. Analyses examined the risks associated with: (1) the number of categories of traumatic events experienced; (2) each individual category of events; (3) each individual category of events controlling for the number of additional other event categories experienced.

RESULTS

Table 1. Prevalence and mean onset of assessed traumatic events

Traumatic Event	Mean Age at Onset (SD)	Prevalence Rate
Life-threatening accident	14.5 (4.3)	14.7%
Fire, flood, or natural disaster	11.5 (5.1)	12.4%
Witnessed injury or killing	14.4 (4.1)	13.2%
Rape	14.0 (4.1)	6.9%
Sexually molestation	8.7 (4.6)	8.1%
Attack or assault	14.3 (4.1)	4.4%
Physically abuse	7.3 (3.8)	4.3%
Seriously neglect	5.0 (3.9)	2.0%
Threatened with a weapon or held captive	14.2 (4.2)	4.0%
Any of the above	11.6 (5.3)	42.2%

The most commonly reported traumatic events involved either unintentional victimization (e.g. accident) or proximity to other s misfortune (e.g. witnessing an injury or killing). The mean ages at onset for serious neglect, physical abuse and sexual abuse all fell within the first decade of life.

Table 2. Prevalence of additional traumatic events by index trauma

Traumatic Event	Prevalence (%) for number of additional traumatic events among those with index trauma				
	0	1	2	3	≥4
Life-threatening accident	47.8	25.0	13.3	6.1	7.8
Fire, flood, or natural disaster	50.0	25.0	11.8	5.3	7.9
Witnessed injury or killing	42.0	29.6	14.8	4.9	8.6
Rape	31.0	23.8	21.4	11.9	11.9
Sexual molestation	29.3	30.3	20.2	12.1	8.1
Attack or assault	13.0	24.1	20.4	20.4	22.2
Physical abuse	22.6	28.3	17.0	13.2	18.9
Serious neglect	12.5	20.8	25.0	16.7	25.0
Threatened with weapon or held captive	36.7	16.3	10.2	10.2	26.5

The most-frequently endorsed events also were those that most commonly occurred in the absence of other trauma exposure. Early-onset events and those involving violence tended to occur in the context of more trauma-prone environments. Among those who reported any trauma exposure, 21.5% experienced 2 events, 8.7% 3 events, 3.7% 4 events, and 3.3% 5 or more events.

Table 3. Odds Ratios (ORs) and 95% Confidence Intervals (95%CIs) representing risk for alcohol-related outcomes associated with the total number of assessed traumatic events experienced

Alcohol-Related Outcome	Total Number of Assessed Traumatic Events Experienced					
	≥5 (N=17)	4 (N=19)	3 (N=45)	2 (N=111)	1 (N=325)	0 (N=707)
Riding with a Drunk Driver	**4.18** **1.57 - 11.12**	1.25 0.43 - 3.65	**2.85** **1.52 - 5.35**	1.37 0.82 - 2.27	1.39 0.99 - 1.95	1.00 ---
Drunk Driving	**4.75** **1.48 - 15.28**	**4.12** **1.38 - 12.29**	**3.86** **1.75 - 8.52**	**3.39** **1.86 - 6.19**	**2.11** **1.32 - 3.36**	1.00 ---
Damaged Vehicle due to Drinking	___ (no cases)	**10.00** **1.06 - 94.58**	**12.86** **2.78 - 59.56**	**6.73** **1.65 - 27.38**	**6.31** **1.94 - 20.52**	1.00 ---
Injured Oneself while Drinking	**17.38** **5.51 - 54.77**	___ (no cases)	**4.07** **1.07 - 15.43**	1.97 0.71 - 5.47	1.60 0.84 - 3.04	1.00 ---
Impulsive Sex while Drinking	**6.47** **2.29 - 18.29**	**5.47** **2.09 - 14.34**	**2.96** **1.28 - 6.84**	1.17 0.58 - 2.36	**1.62** **1.04 - 2.52**	1.00 ---
Unprotected Sex while Drinking	**11.86** **3.82 - 36.76**	**5.34** **1.42 - 19.98**	**4.38** **1.69 - 11.34**	**2.51** **1.13 - 5.60**	**2.07** **1.16 - 3.67**	1.00 ---
Alcohol Dependence	**8.14** **2.96 - 22.37**	1.37 0.30 - 6.16	**3.32** **1.59 - 6.95**	**2.40** **1.34 - 4.30**	**2.11** **1.39 - 3.22**	1.00 ---

Bolding indicates significance at a level of $p<0.05$

Table 4. ORs and 95%CIs representing the risk for alcohol-related outcomes associated with each event, unadjusted, and with control for the number of other events experienced

Traumatic Event	Riding with a Drunk Driver		Drunk driving		Damaged Vehicle - Drinking		Injured Self while Drinking	
	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled
Life-threatening accident	**1.89** **1.29 - 2.77**	**1.82** **1.23 - 2.68**	**2.63** **1.69 - 4.07**	**2.31** **1.46 - 3.66**	**4.67** **1.94 - 11.23**	**3.92** **1.53 - 10.06**	1.56 0.74 - 3.28	1.30 0.61 - 2.81
Fire, flood, or natural disaster	1.13 0.74 - 1.73	1.03 0.68 - 1.58	1.11 0.62 - 1.98	0.92 0.50 - 1.67	1.67 0.99 - 2.80	1.33 0.76 - 2.31	**3.04** **1.75 - 5.29**	**2.34** **1.28 - 4.27**
Witnessed injury or killing	1.37 0.91 - 2.05	1.21 0.80 - 1.84	1.67 0.99 - 2.80	1.33 0.76 - 2.31	2.36 0.84 - 6.64	1.75 0.59 - 5.24	**2.34** **1.13 - 4.87**	1.86 0.88 - 3.93
Rape	**2.43** **1.51 - 3.91**	**2.20** **1.32 - 3.66**	**3.04** **1.75 - 5.29**	**2.34** **1.28 - 4.27**	1.30 0.31 - 5.39	0.72 0.14 - 3.84	**3.90** **1.83 - 8.35**	**3.26** **1.49 - 7.13**
Sexual molestation	1.26 0.77 - 2.07	1.04 0.61 - 1.76	**2.43** **1.38 - 4.31**	1.81 0.97 - 3.35	2.45 0.84 - 7.14	1.56 0.46 - 5.34	1.52 0.59 - 3.91	1.18 0.38 - 3.65
Attack or assault	1.51 0.80 - 2.88	1.24 0.61 - 2.51	**3.18** **1.66 - 6.11**	**2.43** **1.12 - 5.28**	2.10 0.52 - 8.58	1.16 0.27 - 4.97	3.04 0.99 - 9.35	2.74 0.91 - 8.28
Physical abuse	1.14 0.60 - 2.17	0.96 0.48 - 1.92	1.70 0.80 - 3.61	1.23 0.52 - 2.90	2.15 0.48 - 9.68	1.31 0.22 - 7.28	3.11 0.99 - 9.72	2.80 0.95 - 8.26
Serious neglect	1.61 0.62 - 4.13	1.36 0.51 - 3.60	1.89 0.65 - 5.45	1.13 0.35 - 3.62	2.33 0.29 - 18.39	1.25 0.12 - 12.89	2.57 0.57 - 11.54	1.90 0.39 - 9.12
Threatened with a weapon or held captive	**2.56** **1.41 - 4.66**	**2.31** **1.25 - 4.25**	**2.86** **1.41 - 5.82**	**2.40** **1.10 - 5.25**	1.09 0.14 - 8.39	0.80 0.08 - 8.10	**6.36** **2.71 - 14.91**	**4.70** **2.00 - 11.01**

Bolding indicates significance at a level of $p<0.05$

Table 5. ORs and 95%CIs representing the risk for alcohol-related outcomes associated with each event, unadjusted, and with control for the number of other events experienced

Traumatic Event	Impulsive Sex while Drinking		Unprotected Sex while Drinking		Alcohol Dependence	
	Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled
Life-threatening accident	**1.80** **1.16 - 2.80**	**1.58** **1.01 - 2.48**	**3.18** **1.87 - 5.41**	**2.83** **1.62 - 4.92**	**2.69** **1.76 - 4.12**	**2.52** **1.62 - 3.92**
Fire, flood, or natural disaster	0.73 0.37 - 1.41	0.59 0.30 - 1.16	1.06 0.51 - 2.19	0.84 0.39 - 1.80	1.16 0.68 - 1.97	1.01 0.59 - 1.74
Witnessed injury or killing	1.46 0.87 - 2.46	1.22 0.71 - 2.10	1.73 0.94 - 3.20	1.38 0.72 - 2.68	**2.09** **1.37 - 3.18**	**1.85** **1.18 - 2.88**
Rape	**4.71** **2.78 - 7.98**	**4.44** **2.44 - 8.09**	**4.37** **2.38 - 8.02**	**3.80** **1.83 - 7.90**	1.70 0.95 - 3.05	1.35 0.71 - 2.54
Sexual molestation	**2.46** **1.44 - 4.20**	**2.12** **1.21 - 3.72**	**2.89** **1.56 - 5.35**	**2.20** **1.10 - 4.41**	1.63 0.92 - 2.89	1.30 0.69 - 2.44
Attack or assault	**2.67** **1.41 - 5.06**	**2.15** **1.07 - 4.29**	**4.90** **2.42 - 9.94**	**3.75** **1.73 - 8.16**	**2.51** **1.36 - 4.65**	**2.09** **1.08 - 4.04**
Physical abuse	**2.74** **1.38 - 5.44**	**2.13** **1.07 - 4.25**	**2.72** **1.17 - 6.36**	1.94 0.76 - 4.95	**2.30** **1.20 - 4.42**	1.94 0.95 - 3.93
Serious neglect	1.78 0.41 - 7.75	1.22 0.30 - 4.99	2.45 0.52 - 11.57	1.65 0.33 - 8.15	1.51 0.53 - 4.36	1.13 0.37 - 3.39
Threatened with weapon or held captive	1.76 0.80 - 3.89	1.32 0.57 - 3.06	**3.56** **1.59 - 8.00**	**2.92** **1.18 - 7.22**	**3.58** **1.88 - 6.80**	**3.39** **1.69 - 6.78**

Bolding indicates significance at a level of $p<0.05$

CONCLUSIONS

- Substantial traumatic event exposure was observed in this sample of older adolescent female twins that included some evidence of clustering within individuals
- Consistent patterns of increasing risks for alcohol-related outcomes were seen with greater doses of trauma exposure
- Our results offer support for specificity of associations between traumatic events and alcohol-related outcomes
- Data were suggestive of potential unilateral causality proceeding in either direction (sexual victimization => risky alcohol-related sexual behaviors; drunk driving => life-threatening accident)

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