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Age at Trauma Exposure and PTSD Risk in a Young Adult Female Sample

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Abstract

The aim of the current study was to test the independent and joint contributions of 8 different types of trauma to posttraumatic stress disorder (PTSD) risk using data from a young adult female cohort. Associations of traumatic events with PTSD onset were examined using Cox proportional hazards models. Differences in risk as a function of age at trauma were tested. Childhood sexual assault, physical abuse, and neglect were stronger predictors of PTSD onset than adolescent/early adult occurrence of these events in individual models. In a model including all traumatic events, differential risk by age remained for sexual assault and physical abuse. Early sexual assault was the strongest predictor of risk but additional traumatic events increased risk even in its presence.

Reasons posited for women's higher rates of posttraumatic stress disorder (PTSD) following trauma exposure compared to men's (Breslau, Chilcoat, Kessler, Peterson, & Lucia, 1999; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) include the types of trauma more commonly experienced by women (Cortina & Kubiak, 2006) and the age at which trauma occurs (for a review, see Olff, Langeland, Draijer, & Gersons, 2007). Evidence from population-based samples shows that women experience assaultive violence at younger ages than men and that earlier trauma exposure is associated with greater risk for psychiatric disorder (McCutcheon et al., 2009; Perkonig, Kessler, Storz, & Wittchen, 2000). The number and combination of types of traumatic experience also influence PTSD risk (Hedtke et al., 2008; Perkonig et al., 2000). Few studies have examined risk for PTSD in women as a function of both type of trauma and age. The current study examines the independent and joint contributions of eight different types of trauma to risk for a first onset of PTSD and tests variations in risk as a function of age at trauma exposure in a young adult female cohort.

Method

Participants

Data were from the Missouri Adolescent Female Twin Study, a longitudinal study of alcohol-related problems and associated psychopathology in female adolescents and young adults. Twins born in Missouri between July 1, 1975 and June 30, 1985 were identified through birth records and recruited from 1995 to 1999. A total of 2,369 twin families were initially targeted for inclusion in the study (see Heath et al., 2002, for further details on ascertainment). The current study uses data from 1,638 women (of 3,787 total respondents) who endorsed a traumatic event and were screened for PTSD during the wave 4 assessments conducted from 2002 – 2005. Mean age at the time of the interview was 21.9 years ($SD =$

2.7, range = 18 – 29 years). Eighty-one percent of the sample identified as White and 19% as African-American.

Measures—Data on trauma history and DSM-IV-defined PTSD (American Psychiatric Association, 1994) were collected with an interview modified for telephone administration from the Semi-Structured Assessment for the Genetics of Alcoholism (Hesselbrock et al., 1999), an instrument designed to assess alcohol use disorders and related psychiatric conditions. The PTSD assessment was based on the modified version of the Revised Diagnostic Interview Schedule (Robins et al., 1999) used in the National Comorbidity Survey which shows acceptable reliability when compared with clinician-administered interviews (Kessler et al., 1995). Respondent booklets were mailed prior to the interview and included a list of traumatic events.

Participants were asked whether they had experienced each of the traumatic events listed in the respondent booklet and were instructed not to report the same event twice. Age at first experience of each endorsed event was queried. Posttraumatic stress disorder was assessed based on the traumatic event respondents reported as most disturbing and which was followed by feelings of “intense fear, helplessness, or horror.” Individuals who reported no such feelings were coded as negative for PTSD. Age at onset of PTSD was defined as age at first symptom that lasted at least 1 month. Detailed questions about rape and molestation were not used in the trauma screen, thus we were unable to determine whether different types of sexual trauma were represented. For this reason we created a sexual assault variable comprising endorsement of rape and/or molestation, using the earliest age as age at onset. For descriptive purposes in text, traumatic events were classified as assaultive (sexual assault, physical abuse, neglect, being threatened with a weapon or kidnapped, severe physical assault) or nonassaultive (life-threatening accident, natural disaster, and witnessing someone being badly injured or killed).

Data Analysis—The association of first experience of each traumatic event with age at first onset of PTSD was examined using a Cox proportional hazards model with time-varying covariates, so that only traumatic events that preceded PTSD onset counted toward risk. When applied to discrete-time data such as age, Cox regression is essentially a series of conditional logistic regressions which occur at each “failure” time (Cox, 1972). In the current analysis, failure was defined as first PTSD onset. Models were first run for each event individually, then a model including all traumatic events was fitted to evaluate the joint contributions of events to PTSD risk. All regressions were adjusted for ethnicity due to the higher rates of trauma and PTSD in African-Americans (Table 1).

Differences in risk for PTSD onset by age were determined by testing the assumption of proportional hazards (Grambsch & Therneau, 1994). This assumption posits that individuals who experience sexual assault, for example, may have greater risk than those who do not, but distinctions in risk between the two groups are proportional over time. Proportional hazards violations were resolved through the addition of interactions with ages ≤ 11 and 12 and older, representing childhood and adolescent/early adulthood risk periods, respectively. Interactions are included in models shown in Table 2. All analyses were conducted with Stata, version 11 (StataCorp, 2009). Confidence intervals were adjusted for familial clustering using Huber-White robust standard errors.

Results

The lifetime prevalence of PTSD in this sample of trauma-exposed young women was 8.4% and was higher among Black (12.1%) than White women (7.5%, OR = 1.7, 95 % CI = 1.1 –

2.6, $p < .05$). Thirty-eight percent of women reported PTSD onset during childhood (before age 12), 39% during adolescence, and 23% reported PTSD onset at age 18 or older.

Endorsement frequencies for traumatic events, stratified by age at first occurrence, are displayed in Table 1. Approximately half of respondents (47.7%) experienced their first event before age 12, as seen in the “any event” row; proportions were similar by ethnicity. More than half of women who endorsed assaultive trauma reported their first experience during childhood (55.1%, “assaultive” row); 35.6 % of women who endorsed nonassaultive trauma reported first experience during childhood. The most frequent childhood events were sexual assault (27.5%), physical abuse (10.7%), and disaster (17.9%). Shown in the second column under each age category is the proportion of women endorsing 3 or more different traumatic events, conditional on trauma type. More than one-third of women who reported an assaultive event during childhood endorsed multiple events, with sexual assault having the lowest and neglect the highest proportions of multiple event endorsement. The highest prevalence of PTSD was among women who reported physical assault or being threatened with a weapon or kidnapped during childhood and among women reporting physical abuse, childhood neglect and physical assault during adolescence/early adulthood; at least half of women endorsing these events reported 3 or more separate traumatic events.

Displayed in Table 2 are results from models testing associations of traumatic events with risk for PTSD onset individually and jointly. In individual models, sexual assault, physical abuse, and neglect were strong predictors of childhood-onset PTSD ($\leq$ age 11); only sexual assault predicted risk for later onset. All other events except disaster were associated with increased risk that did not vary with increasing age. In the multivariate model, sexual assault and physical abuse retained a stronger association with risk for childhood than later-onset PTSD; childhood neglect lost its association with risk, and hazard ratios for other events were reduced. The hazard ratio for disaster was less than one, reflecting its lower risk for PTSD relative to other events.

Discussion

The current study used data from a young adult female cohort to examine the independent and joint contributions of eight different types of trauma to variations in PTSD risk as a function of age at trauma. Differential risk by age was observed for sexual assault and physical abuse both before and after other events were controlled, and for neglect before controlling for other events; all showed greater risk for childhood than later-onset PTSD. This study also extends evidence that sexual trauma is a strong predictor of risk in women by documenting the additional risk contributed by other events from a standard trauma checklist.

The diminution in risk from individual trauma after adjustment for additional events is consistent with findings that childhood adversities are highly correlated and that their individual associations with risk for psychiatric disorder, including PTSD, are reduced when additional adversities are controlled (Green et al., 2010). This tendency is particularly striking in the current study with regard to neglect, which had a strong association with childhood risk before controlling for other events but none in a multivariate model, reflecting the fact that nearly 75% of women who reported neglect endorsed at least 3 separate traumatic events, the risk from any one of which, or from their joint effects, outweighed risk from neglect.

Results from this study are consistent with previous evidence that sexual trauma carries the greatest PTSD risk for women and that earlier age at trauma is associated with additional risk. Similar to current findings, a study in a nationally-representative sample of women

showed that lifetime history of sexual and physical assault, individually and in combination, carried the highest risk for PTSD and that sexual assault was the strongest and most consistent predictor over time; age at trauma was not examined (Hedtke et al., 2008). Green and colleagues (2010) found that risk from sexual and physical abuse for a first-onset psychiatric disorder (a measure which included PTSD) was highest during childhood and declined significantly thereafter; a similar reduction was not observed for neglect or other measures of childhood adversity. Perkonig and colleagues (2000) found that sexual abuse and rape accounted for most of the trauma before age 15 in women and were the events most likely to lead to PTSD. In a model that included age at trauma ($\leq$ age 12 vs. older) and trauma type (sexual vs. non-sexual), only sexual trauma remained significant; age for specific traumatic events was not examined. Maercker and colleagues (2004) found no differential association with PTSD risk of trauma by age at occurrence (childhood or adolescence) in a sample of young women, however, their age categories were based on age at “worst” event and analyses consisted of group comparisons. The current study refines and extends this literature by testing differences in risk for PTSD onset by age, and by using time-varying trauma variables which permit a more fine-grained analysis of risk than do lifetime trauma measures. Current findings corroborate evidence that sexual trauma is the most potent predictor of risk for women and document increased risk with earlier age at sexual and physical assault. Additionally, by including all standard checklist items, this study documents risk due to events other than sexual and physical assault even when accounting for the clustering of events in a multivariate model.

Limitations of this work must be considered when interpreting results. Data on traumatic events, PTSD symptoms, and ages at occurrence were based on retrospective recall, and therefore liable to mistakes of memory; however, recall bias would be expected to be reduced in this young sample. Age at onset of PTSD was not based on the full clinical syndrome but on age at first symptom lasting at least one month. The screen for rape and sexual molestation was based on a single question referencing the terms “rape” and “molestation”, and this method of assessment likely underestimates the prevalence of these events relative to more detailed assessments for sexual trauma (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Nonetheless, sexual trauma was a strong predictor of risk, consistent with studies based on more detailed behaviorally-defined items (Hedtke et al., 2008).

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Table 1

Traumatic Event Endorsement by Age at First Exposure Among 1638 Young Adult Females, With Percent Endorsing 2 or More Additional Lifetime Events and Rates of Lifetime PTSD Conditional on Event Exposure.

Traumatic events	Childhood (Ages ≤ 11)			Adolescence/adulthood (Ages ≥ 12)		
	Endorsement	≥ 3 events ^a	PTSD ^b	Endorsement	≥ 3 events ^a	PTSD ^b
	<i>n</i>	%	%	<i>n</i>	%	%
Any event	781	24.8	10.8	857	7.7	6.3
Black	152	32.9	16.4	162	11.1	8.0
White	629	22.9	9.4	695	6.9	5.9
Assaultive, any	451	36.4	16.2	367	23.7	14.7
Sexual assault	305	36.7	21.0	214	29.4	19.6
Physical abuse	176	55.1	15.3	44	50.0	25.0
Childhood neglect	88	69.3	18.2	8	75.0	25.0
Physical assault	19	63.1	26.3	147	61.9	27.2
Weapon / kidnap	22	63.6	27.3	176	47.7	15.9
Nonassaultive, any	434	24.0	7.4	784	16.8	7.9
Accident	74	35.1	14.9	353	26.1	9.3
Disaster	294	19.4	3.7	277	24.2	8.3
Witness	98	44.9	17.3	409	26.6	9.0

^{a,b} percentage of women who endorsed the event or category in the row who:

^a endorsed a total of 3 or more events (including event in row);

^b met criteria for lifetime posttraumatic stress disorder (PTSD)

Table 2

Results From Cox Regressions of PTSD Onset on Individual Event Exposure and On All Events Jointly, Among 1638 Young Females with Histories of One or More Traumatic Events.

Traumatic events (interaction with age)	Individual events		Multivariate model	
	HR	(95% CI)	HR	(95% CI)
Sexual assault (≤ 11)	52.1	(18.0 – 151.3) ***	39.6	(12.4 – 126.1) ***
(≥ 12)	6.0	(3.9 – 9.4) ***	5.1	(3.2 – 8.3) ***
Physical abuse (≤ 11)	8.3	(4.0 – 17.3) ***	3.1	(1.4 – 7.1) **
(≥ 12)	1.6	(0.9 – 2.8)	0.8	(0.4 – 1.5)
Childhood neglect (≤ 11)	7.8	(3.5 – 17.3) ***	0.8	(0.4 – 1.6)
(≥ 12)	1.1	(0.5 – 2.6)	0.8	(0.4 – 1.6)
Physical assault	7.7	(4.5 – 13.1) ***	4.1	(2.2 – 7.7) ***
Weapon / kidnap	5.2	(3.1 – 8.9) ***	2.4	(1.3 – 4.5) **
Witness	2.3	(1.5 – 3.7) ***	1.8	(1.1 – 2.9) *
Accident	1.7	(1.0 – 2.8) *	1.5	(0.9 – 2.5)
Disaster	0.5	(0.3 – 0.8) **	0.5	(0.3 – 0.9) *

Note. HR = hazard ratio; All models adjusted for ethnicity.

*
 $p < .05$,

**
 $p < .01$,

 $p < .001$