

# Association of Smoking and Nicotine Dependence With Trauma and Posttraumatic Stress Disorder in a General Population Sample

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**Abstract:** This study is aimed at investigating the association between trauma, posttraumatic stress disorder (PTSD), smoking, and nicotine dependence. Data were collected in a representative population sample of 4075 adults aged 18 to 64 with the Composite International Diagnostic Interview. Findings show increased odds ratios (ORs) for smoking (OR: 1.28; 95% CI: 1.09–1.51) and nicotine dependence (OR: 1.52; 95% CI: 1.26–1.82) in traumatized persons, independent of PTSD. Persons with PTSD tended to have higher odds for smoking (OR: 2.12; 95% CI: 1.16–3.90) and nicotine dependence (OR: 2.70; 95% CI: 1.57–4.65), but also had lower rates for quitting smoking (OR: 0.38; 95% CI: 0.17–0.84) and for remission from nicotine dependence (OR: 0.18; CI: 0.05–0.63). We conclude that persons suffering from PTSD might need comprehensive aid in smoking cessation.

**Key Words:** Smoking, trauma, nicotine dependence, PTSD.

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Trauma and posttraumatic stress disorder (PTSD) are associated with substance use and substance use disorders (Kessler et al., 1995; Perkonig et al., 2000). The majority of published data support a sequential pathway whereby PTSD precedes substance abuse or dependence. Most of these data stem from clinical samples or selected samples of subjects exposed to specific traumatic events (Jacobsen et al., 2001). One survey study showed that exposure to trauma predicted subsequent onset of nicotine dependence, and it was more

likely in the presence of PTSD than in the absence of PTSD (Breslau et al., 2003). Although data showed an increased risk for the onset of smoking and nicotine dependence in consequence of trauma and PTSD, it has to be taken into account that lower quit and remission rates might play an additional role to explain the association between smoking and trauma.

Our investigation is aimed at (1) assessing smoking, quit rates, nicotine dependence, and remission rates in persons who have experienced trauma, with or without subsequent PTSD, compared with persons with no exposure to trauma; (2) analyzing the association of different types of trauma to smoking and nicotine dependence; and (3) assessing to what extent a lower proportion of subjects who quit smoking plays a part in the association among trauma, PTSD, smoking, and nicotine dependence.

## METHODS

The sample was defined as individuals aged 18 to 64 years, not living in institutions, with residence in the northern German city of Luebeck or one of 46 surrounding communities. The study followed the ethical principles of the American Psychological Association (1992). A random sample of 5829 individuals was drawn from the registration office files. Reasons for nonparticipation were refusal, no contact to the individual, or severe disease. A total of 4093 (70.2%) completed the interview. Eighteen interviews could not be analyzed due to technical reasons occurring after the administration of the interview. Data of 4075 subjects were available for analyses, 806 had experienced a trauma fulfilling the stressor criterion according to DSM-IV, and 56 had subsequently developed PTSD. More details are described elsewhere (Meyer et al., 2000, 2001).

Diagnostic assessments were administered in a computer-assisted personal interview. Case identification was done by the Munich Composite International Diagnostic Interview (M-CIDI; Wittchen et al., 1995), a German modified, extended, and DSM-IV adapted version of the WHO CIDI (Robins et al., 1988). The CIDI is recommended for conducting general population-based assessment of PTSD (Breslau, 2002). The assessment of trauma was supported by a list of typical events to minimize respondent's shame during the exploration by avoiding direct articulation. The list in-

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**TABLE 1.** Ever-Smoking, Current Smoking, Quit Rates, Nicotine Dependence, and Remission From Nicotine Dependence in Subjects Not Exposed to Trauma and Exposed to Trauma With and Without PTSD<sup>a</sup>

	N	Ever-Smokers		Current Smokers		Quit rates	
		% <sup>b</sup> (SE)	OR (95% CI)	% <sup>b</sup> (SE)	OR (95% CI)	% <sup>c</sup> (SE)	OR (95% CI)
Total	4075	59.9 (0.8)		37.3 (0.8)		37.6 (1.0)	
No traumatic event	3269	58.6 (0.9)	Reference	36.4 (0.8)	Reference	37.9 (1.1)	Reference
Exposed to trauma and no PTSD	750	64.4 (1.8)	<b>1.28 (1.09–1.51)</b>	39.7 (1.8)	<b>1.20 (1.02–1.42)</b>	38.3 (2.2)	0.97 (0.78–1.20)
Exposed to trauma and PTSD	56	75.0 (5.8)	<b>2.12 (1.16–3.90)</b>	60.7 (6.6)	<b>2.76 (1.60–4.77)</b>	19.0 (6.1)	<b>0.38 (0.17–0.84)</b>
Females	2030	53.2 (1.1)		35.3 (1.1)		33.5 (1.4)	
No traumatic event	1634	51.7 (1.2)	Reference	33.9 (1.2)	Reference	34.4 (1.6)	Reference
Exposed to trauma and no PTSD	352	57.4 (2.6)	<b>1.32 (1.04–1.67)</b>	38.6 (2.6)	<b>1.32 (1.03–1.68)</b>	32.7 (3.3)	0.88 (0.63–1.22)
Exposed to trauma and PTSD	44	75.0 (6.6)	<b>2.79 (1.40–5.58)</b>	61.4 (7.4)	<b>3.10 (1.67–5.77)</b>	18.2 (6.8)	0.43 (0.17–1.05)
Males	2045	66.5 (1.0)		39.3 (1.1)		40.9 (1.3)	
No traumatic event	1635	65.4 (1.2)	Reference	38.8 (1.2)	Reference	40.6 (1.5)	Reference
Exposed to trauma and no PTSD	398	70.6 (2.3)	1.25 (0.99–1.59)	40.7 (2.5)	1.11 (0.88–1.38)	42.3 (3.0)	1.05 (0.79–1.39)
Exposed to trauma and PTSD	12	75.0 (13.1)	1.49 (0.40–5.60)	58.3 (14.8)	2.42 (0.75–7.74)	22.2 (14.7)	0.33 (0.07–1.70)

(continued)

<sup>a</sup>OR adjusted for age. Significant ORs are printed in bold.<sup>b</sup>Percentage of N.<sup>c</sup>Percentage of ever-smokers who quit smoking, i.e., did not smoke daily within the last 4 weeks. Two cases were excluded due to missing values.<sup>d</sup>Percentage of ever nicotine dependent subjects. Five cases were excluded due to missing values.

cluded the following items: 1. "You've had a terrible experience during a war." 2. "You were seriously physically threatened (for example, with a weapon), attacked, injured or tortured." 3. "You were the victim of a rape attack." 4. "You were sexually abused as a child (that is, before the age of 14), that is, someone forced you to commit sexual acts against your will or such acts were done to you." 5. "You were the victim of a natural catastrophe." 6. "You had a serious accident." 7. You were imprisoned, were taken hostage or were the victim of kidnapping. 8. "You witnessed one of the events above happen to another person. Whom: . . . Which of the events listed above? . . ." 9. "Was there another terrible event or catastrophe that hasn't been mentioned? Which? . . ."

The current study incorporated the DSM-IV diagnosis nicotine dependence, including the option to split this diagnosis into current nicotine dependence and remitted nicotine dependence. Ever-smokers were defined as individuals who

had smoked at least one cigarette per day for more than 4 weeks at some point in their life. Current smokers were defined as individuals who had continued this smoking behavior within the 4 weeks prior to the interview. Quit rates were calculated as the percentage of ever-smokers who did not continue smoking in the last 4 weeks.

All analyses employed the SPSS program package Version 12.0. Analyses included descriptive statistics and logistic regressions. Adjusted odds ratios were calculated in logistic regression models with age as well as age and gender controlled (Brewin et al., 2000; Hosmer and Lemeshow, 1989). Infrequent traumas, reported by less than 30 subjects, were excluded from the analysis of specific traumas to avoid small group sizes.

## RESULTS

The association of smoking status with trauma and PTSD is summarized in Table 1. The prevalence of ever-

**TABLE 2.** Percentages and Adjusted OR<sup>a</sup> of Smoking Status for Different Types of Traumas

	N	Ever-Smokers		Current Smokers		Nicotine Dependence		Current Nicotine Dependence	
		% <sup>b</sup> (SE)	OR (95% CI)	% <sup>b</sup> (SE)	OR (95% CI)	% <sup>b</sup> (SE)	OR (95% CI)	% <sup>b</sup> (SE)	OR (95% CI)
No traumatic event	3269	58.6 (0.9)	Reference	36.4 (0.8)	Reference	19.3 (0.7)	Reference	10.4 (0.5)	Reference
Experience during a war	109	59.6 (4.7)	1.06 (.071–1.59)	24.8 (4.1)	0.83 (0.53–1.30)	22.0 (4.0)	1.22 (0.76–1.96)	11.0 (3.0)	1.50 (0.80–2.81)
Seriously physically threatened	244	68.9 (3.0)	<b>1.52 (1.14–2.01)</b>	46.3 (3.2)	<b>1.44 (1.11–1.88)</b>	35.2 (3.1)	<b>2.21 (1.68–2.92)</b>	21.7 (2.7)	<b>2.32 (1.67–3.22)</b>
Rape attack	53	79.2 (5.6)	<b>3.52 (1.80–6.89)</b>	66.0 (6.5)	<b>3.40 (1.90–6.09)</b>	47.2 (6.9)	<b>4.66 (2.67–8.12)</b>	37.7 (6.7)	<b>5.10 (2.85–9.11)</b>
Sexually abused	60	76.7 (5.5)	<b>2.91 (1.59–5.33)</b>	56.7 (6.5)	<b>2.34 (1.39–3.94)</b>	43.3 (6.5)	<b>3.82 (2.26–6.46)</b>	28.3 (5.9)	<b>3.38 (1.89–6.05)</b>
Serious accident	300	66.7 (2.7)	<b>1.32 (1.03–1.98)</b>	41.7 (2.9)	<b>1.28 (1.00–1.63)</b>	27.3 (2.6)	<b>1.49 (1.14–1.96)</b>	14.4 (2.0)	<b>1.50 (1.06–2.12)</b>
Witnessed	131	67.2 (4.1)	1.38 (0.95–2.01)	42.0 (4.3)	1.23 (0.86–1.76)	26.7 (3.9)	<b>1.46 (0.98–2.18)</b>	13.7 (3.0)	1.35 (0.81–2.26)

<sup>a</sup>OR adjusted for age and gender. Significant ORs are printed in bold.<sup>b</sup>Percentage of N.

TABLE 1. (Continued)

Nicotine Dependence		Current Nicotine Dependence		Remission Rates <sup>b</sup>	
% <sup>b</sup> (SE)	OR (95% CI)	% <sup>b</sup> (SE)	OR (95% CI)	% <sup>d</sup> (SE)	OR (95% CI)
20.9 (0.6)		11.4 (0.5)		45.3 (1.7)	
19.3 (0.7)	Reference	10.4 (0.5)	Reference	46.2 (2.0)	Reference
26.5 (1.6)	<b>1.52 (1.26–1.82)</b>	14.3 (1.3)	<b>1.50 (1.19–1.90)</b>	46.0 (3.6)	1.01 (0.73–1.41)
39.3 (6.5)	<b>2.70 (1.57–4.65)</b>	33.9 (6.4)	<b>4.52 (2.56–7.98)</b>	13.6 (7.5)	<b>0.18 (0.05–0.63)</b>
17.7 (0.8)		11.1 (0.7)		37.0 (2.6)	
15.5 (0.9)	Reference	9.8 (0.7)	Reference	37.7 (3.0)	Reference
23.3 (2.3)	<b>1.73 (1.30–2.30)</b>	14.2 (1.9)	<b>1.65 (1.17–2.33)</b>	39.0 (5.4)	1.06 (0.63–1.77)
40.9 (7.5)	<b>3.68 (1.98–6.85)</b>	34.1 (7.2)	<b>4.81 (2.50–9.25)</b>	16.7 (9.0)	0.33 (0.09–1.17)
24.2 (0.9)		11.7 (0.7)		51.3 (2.3)	
22.8 (1.0)	Reference	10.9 (0.8)	Reference	52.0 (2.6)	Reference
29.4 (2.3)	<b>1.39 (1.09–1.78)</b>	14.4 (1.8)	<b>1.39 (1.01–1.92)</b>	50.9 (4.7)	0.98 (0.64–1.52)
33.3 (14.2)	1.61 (0.48–5.40)	33.3 (14.2)	<b>4.26 (1.26–14.33)</b>	No remitters	

smoking and current smoking was elevated in subjects who had experienced trauma with and without subsequent PTSD. Age-adjusted ORs were higher in persons exposed to trauma without PTSD as well as in those persons with trauma and subsequent PTSD, compared with persons not exposed to trauma. Gender-stratified analyses showed that these associations were significant in females, but not in males. Quit rates from smoking were decreased in subjects suffering from PTSD. In the case of nicotine dependence, the results had the same direction, but in this regard, the gender-stratified analyses showed that the risk of nicotine dependence was also significantly elevated in traumatized men without subsequent PTSD. Additionally, current nicotine dependence was significantly elevated in men with and without PTSD. The OR for current nicotine dependence was higher in subjects with PTSD compared with persons exposed to trauma without subsequent PTSD. Remission rates from nicotine dependence were lower in persons with PTSD compared with subjects without exposure to trauma. Additionally, the OR of remission from nicotine dependence was lower in subjects with PTSD compared with subjects exposed to trauma without subsequent PTSD. Rates of remission from nicotine dependence of persons exposed to trauma without subsequent PTSD did not differ from the rates of persons without exposure to trauma.

Percentages and ORs of smoking status for subjects with different types of traumas are shown in Table 2. Adjusted for age and gender, the highest OR for smoking and nicotine dependence was found in persons who had been exposed to a rape attack, followed by those who had been sexually abused, seriously physically threatened, and exposed to a serious accident. Traumatic experience during war and having witnessed a traumatic situation were not significantly associated with smoking and nicotine dependence.

## DISCUSSION

There are three major new findings in this study. (1) The higher prevalence of smoking and nicotine dependence in subjects with PTSD results from a higher risk for onset of smoking and nicotine dependence and from lower quit and

remission rates. This finding reveals that PTSD is associated with a high risk of a chronic course of smoking and nicotine dependence. (2) Exposure to trauma per se increases the risk of smoking and nicotine dependence, but has no influence on the quit and remission rates. (3) The observed associations of smoking and nicotine dependence with trauma and PTSD were more distinct in women than in men.

Our findings support the hypothesis that smoking and nicotine dependence are associated with trauma and PTSD. Consistent with previous findings, the risk of smoking and nicotine dependence is elevated in subjects exposed to trauma, and the risk is even somewhat higher in subjects suffering from PTSD. Sexually motivated violence is most strongly associated with smoking and nicotine dependence. This finding is in line with previous studies showing that rape, sexual abuse, and other personal assaults were associated with a higher risk of sequela (Breslau, 2002; Breslau et al., 1997; Kessler et al., 1995).

Limitations are given by the cross-sectional design of the study. However, it has been shown that the results of a prospective design do not differ substantially from the retrospective view (Breslau et al., 2003). One further limitation is given by the small subsample of males suffering from PTSD in the gender-stratified analysis.

## CONCLUSION

We conclude that persons suffering from PTSD might need comprehensive aid in smoking cessation. One kind of support might be pharmaceutical support (Hertzberg et al., 2001). Our results do not recommend such a specific support for persons exposed to trauma without suffering from subsequent PTSD.

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