Psychopathology, childhood sexual abuse and other childhood adversities: relative links to subsequent suicidal behaviour in the US

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ABSTRACT

Background. Research shows that psychopathology, child sexual abuse and other childhood adversities are risk factors for suicide. However, few have investigated their joint and independent roles in the pursuit of a reliable, predictive model of suicidal behaviour.

Methods. Data are from the National Comorbidity Survey ($N = 5877$), a nationally representative study of prevalence, risk factors, and social consequences of psychiatric disorders in the US. Discrete time survival analysis and population attributable risk methodologies were utilized.

Results. Among those sexually abused as children, odds of suicide attempts were 2–4 times higher among women and 4–11 times higher among men, compared with those not abused, controlling for other adversities. Odds ratios were reduced but most remained statistically significant after adjusting for lifetime psychiatric illnesses preceding suicide attempts. In the same predictive equation, 79% of serious suicide attempts among women could be attributed to psychiatric disorders while 12% was attributable to rape and 7% to molestation. The highest probability of a first attempt was during early adolescence for those who were sexually abused and had a lifetime disorder, but it was 8–12 years older for those sexually abused without any disorders.

Conclusions. In the US, a strong association exists between child sexual abuse and suicidal behaviour, mediated by psychopathology. There is a substantial proportion of suicide risk attributable to child sexual abuse beyond the presence of psychopathology and other adversities. From a clinical standpoint, abuse survivors represent a high-risk population for suicidal behaviour. Further research into this preventable antecedent of suicide attempts is necessary.

INTRODUCTION

From the time of the landmark studies by Durkheim (1951 (Orig. 1897)), social scientists and clinicians have sought explanations for suicide, describing its aetiology as a complex mix of social, cultural, and biological risk factors. Thus far, reliable predictive models of suicidal behaviour remain elusive, although psychopathology and adverse childhood experiences, especially child sexual abuse, are key elements.

As the eighth leading cause of death for all Americans, at a rate of 11·3 deaths per 100 000 in 1998, suicide is a pervasive and serious public health problem (Hoyert *et al.* 1999). Definitions of suicidal behaviours range in severity from suicidal ideation to a serious failed attempt with intent to die (Moscicki, 1995). The National Comorbidity Survey (NCS) estimated the lifetime prevalence of suicide attempts in the US at 6·3% for women and 3·0% for men (Kessler *et al.* 1999). Surveys across nine countries using similar instruments estimated prevalence of suicide attempts from 0·72 (Beirut, Lebanon) to 5·93 (Puerto Rico) (Weissman *et al.* 1999). In the 1997 Youth Risk Behavior Survey of US high school students (age range approximately 12–18 years), nearly 12% of girls and 4·5% of boys

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reported suicide attempts (Center for Disease Control & Prevention, 1998).

Psychiatric disorders, especially depression and post-traumatic stress disorder (PTSD), are associated with suicidal behaviours (Rudd *et al.* 1993; Beautrais *et al.* 1996; Kessler *et al.* 1999; Mann *et al.* 1999). Psychological autopsy studies (which interview families, friends and therapists of people who complete suicide) have estimated that as many as 90 % of completed suicides were among people who had a psychiatric disorder. However, as most psychiatric patients do not commit suicide, the presence of a psychiatric disorder is most likely a potent, but not sufficient condition for suicidal behaviour (Mann *et al.* 1999).

Child sexual abuse (CSA) is an important risk factor for both psychopathology and suicidal behaviour (Browne & Finkelhor, 1986; Beitchman *et al.* 1992). A review of 29 studies conducted between 1988–1998 estimated the odds of suicide attempts among adults sexually abused in childhood to be 1·3 to 25·6 higher than for those not sexually abused (Santa Mina & Gallop, 1998). Most major psychiatric disorders have been linked to CSA (Molnar *et al.* 2001), especially depression (Boudewyn & Liem, 1995; Fergusson *et al.* 1996*a*; McCauley *et al.* 1997; Cheasty *et al.* 1998; Levitan *et al.* 1998), post-traumatic stress disorder (PTSD) (Winfield *et al.* 1990; Resnick *et al.* 1993; Wolfe *et al.* 1994; Giaconia *et al.* 1995; Briggs & Joyce, 1997; Widom, 1999) and substance problems and dependence (Silverman *et al.* 1996; Stewart, 1996; Fendrich *et al.* 1997; Kilpatrick *et al.* 1997; Wilsnack *et al.* 1997).

Studies have shown that CSA typically occurs amid other interpersonal difficulties (Mullen *et al.* 1993) such as parental psychopathology, violence perpetrated toward children (Fergusson *et al.* 1996*b*; Fleming *et al.* 1997) and physical violence between parents (Paveza, 1988; Mullen *et al.* 1996). Suicidal behaviour is more common among relatives of those who commit suicide or make serious attempts (Jamison, 1999).

In this investigation we have attempted to clarify further the complex relationship between child sexual abuse, other childhood adversities, psychopathology and suicidal behaviour using a nationally representative sample of the US. We have compared several models of increasing complexity to test the relative con-

tributions of each type of risk factor, and to determine whether psychopathology mediates, or explains, the relationship between CSA and suicidal behaviour (Baron & Kenny, 1986). We also used estimations of population attributable risk to quantify the impact of exposure to these risk factors on suicidal behaviour. Using the theoretical framework of Fergusson *et al.* (2000*b*) regarding life course risk factors, we tested the following hypotheses: after controlling for other childhood adversities, (1) psychopathology will be independently associated with subsequent suicidal behaviour; (2) respondents who report CSA and no diagnosable psychiatric disorders will also be at higher risk for subsequent suicidal behaviour than those without CSA; and (3) psychopathology will mediate the association between CSA and subsequent suicidal behaviour. To our knowledge, this is the first study to disentangle these potential risk factors for suicide using population attributable risk methodology, DSM-III-R psychiatric disorders, and a nationally representative household sample of the US.

METHOD

Data come from the National Comorbidity Survey (NCS), fielded between 1990–1992 with a population-based, multi-stage, stratified random sample of 8098 respondents. Data are representative of the household population of the 48 coterminous United States (US), ages 15–54 years. Interviews were conducted face-to-face in respondents' homes with a response rate of 82·4 %. Informed consent was obtained from all participants and from parents of minors. Psychiatric disorders were assessed first, then a second survey portion was administered to respondents who met diagnostic criteria, all respondents 15–24 years of age, and a random sample of the remaining respondents. This subsample of 5877 was asked about risk factors including sexual abuse, suicidal behaviours and family history, and is used in the current study. Detailed methods for the NCS are published elsewhere (Kessler, 1994; Kessler *et al.* 1994).

Measures

Non-clinician interviewers administered a modified version of the World Health Organization's Composite International Diagnostic Interview

(CIDI), yielding 14 psychiatric diagnoses. International field trials of the CIDI (Kessler *et al.* 1998) showed good inter-rater and test–retest reliability, and good validity except for mania and non-affective psychosis.

Sexual abuse history and suicidal behaviour were asked about in the PTSD module of the survey, adapted from the Diagnostic Interview Schedule (Robins *et al.* 1988). Respondents were shown a list of traumatic events and asked each question by event number, for example, 'Did Event #5 happen to you?'. The rape item read 'You were raped (Someone had sexual intercourse with you when you did not want to by threatening you or using some degree of force.)'. The item for molestation read 'You were sexually molested (Someone touched or felt your genitals when you did not want them to.)'. Rape and molestation events reported as first occurring before the age of 18 were considered child sexual abuse.

Similarly, suicidal behaviours were presented as a list. The text for suicidal ideation read 'You seriously thought about committing suicide'; for suicide plans, 'You made a plan for committing suicide'; and for suicide attempts 'You attempted suicide'. An additional suicidal behaviour outcome, serious attempts, was constructed for those who attempted suicide and described the attempt as: (A) 'I made a serious attempt to kill myself and it was only luck that I did not succeed'. Their other two choices were: (B) 'I tried to kill myself, but I knew the method was not foolproof'; and (C) 'My attempt was a cry for help, I did not want to die'.

Measurement of parental psychopathology and parental suicide attempts and completions came from The Family History Research Diagnostic Criteria Interview (Endicott *et al.* 1978) except for generalized anxiety disorder (GAD) which came from a similar instrument (Kendler *et al.* 1991). Measures of verbal and physical violence came from the Conflict Tactics Scales (Straus, 1979).

Statistical analyses

All data analyses were conducted using Statistical Analysis Software (SAS) for UNIX (SAS Institute, 1990). Results are presented separately for women and men. Because research suggests that there are sex differences in vulnerability to negative life events (Kessler & McLeod, 1984;

Finkelhor, 1994) it was expected that results warranted separate models. Indeed, when models were attempted with data from both sexes, multiple interaction terms were significant between sex and the predictors and control variables under study. Such results would have been much more difficult to describe and interpret than separate results for women and men. For stratified analyses, contingency table analysis and the chi-square statistic were used. Life table methods were used to examine differences in ages of onset and cumulative probabilities of suicide attempts between strata defined by CSA and disorders. We predicted only suicidal behaviours that occurred subsequent to first instances of child sexual abuse or subsequent to the onset of psychiatric disorders. This was accomplished by using discrete time survival analysis (Willett & Singer, 1993; Singer & Willett, 1993), where person years at risk of each suicidal behaviour were the unit of analysis. Data were rearranged into a format that assigns individuals an observation (a 'person year') for each year they were at risk of the outcome. For those respondents who never had each outcome, the data set includes observations for years from birth through their age at the time of interview. Respondents who did have an outcome have person years for every year up to and including the year that the outcome began, after which all remaining person years are dropped, or censored. Dummy variables were used to model the underlying baseline hazard function; each represents the log-odds that a person will develop the outcome in that time period, given that he/she 'survived' the previous time periods without it. Time-varying predictor variables were created as well. Using these new person year data sets, logistic regression (Hosmer & Lemeshow, 1989) was employed. Odds ratios were obtained that are equivalent to exponentiated discrete time survival coefficients. These parameters estimate the relationship between child sexual abuse, psychiatric disorders, and suicidal behaviour, only if the abuse and disorders were experienced prior to the suicidal behaviours.

Control variables for childhood adversities other than sexual abuse were created using the SAS VARCLUS procedure, a variable-reduction method that reduces the number of variables by grouping them based on a covariance matrix

Table 1. *Prevalence of suicidal behaviours in the US, among persons both reporting and not reporting child sexual abuse, and the general population*

Females (N = 2921)	N	Serious suicidal ideation (N = 487)		Made a plan to commit suicide (N = 143)		Attempted suicide (N = 183)		Attempted suicide, serious about dying (N = 69)	
		%	(S.E.)	%	(S.E.)	%	(S.E.)	%	(S.E.)
General population	2922	16·7	(0·9)	4·9	(0·7)	6·3	(0·6)	2·4	(0·3)
Child rape	145	48·2	(4·7)	24·6	(3·8)	26·8	(4·8)	10·0	(2·4)
No child rape	2776	15·0	(0·9)	3·9	(0·6)	5·2	(0·6)	2·0	(0·2)
Child molestation	308	35·2	(3·3)	14·8	(2·6)	16·2	(2·0)	6·2	(1·3)
No child molestation	2610	14·5	(0·9)	3·7	(0·6)	5·1	(0·6)	1·9	(0·3)
Either rape or molestation	393	35·6	(3·3)	14·9	(2·5)	16·7	(2·3)	5·8	(1·1)
Neither rape nor molestation	2528	13·7	(1·0)	3·3	(0·6)	4·6	(0·6)	1·8	(0·3)

Males (N = 2945)	N	Serious suicidal ideation (N = 307)		Made a plan to commit suicide (N = 86)		Attempted suicide (N = 89)		Attempted suicide, serious about dying (N = 41)	
		%	(S.E.)	%	(S.E.)	%	(S.E.)	%	(S.E.)
General population	2945	10·4	(0·8)	2·9	(0·4)	3·0	(0·3)	1·4	(0·2)
Child rape	17	36·8	(18·0)	15·4	(8·6)	30·9	(15·4)	26·5	(14·4)
No child rape	2928	10·3	(0·8)	2·9	(0·4)	2·9	(0·3)	1·2	(0·2)
Child molestation	69	29·4	(7·7)	12·0	(5·2)	15·7	(6·7)	11·5	(5·0)
No child molestation	2875	10·0	(0·8)	2·7	(0·3)	2·7	(0·3)	1·1	(0·2)
Either rape or molestation	75	29·7	(7·5)	13·2	(5·0)	16·6	(6·4)	11·8	(4·8)
Neither rape nor molestation	2869	9·9	(0·8)	2·7	(0·3)	2·7	(0·3)	1·1	(0·2)

χ^2_1 values indicated that all stratified 2-by-2 tables (e.g. rape *v.* no rape) had significantly different cell counts at $P < 0.05$; all frequencies are weighted estimates; standard errors were calculated using jackknife repeated replication methods.

into non-overlapping clusters that can be interpreted as unidimensional (SAS Institute, 1990). A total of 23 adversities yielded the following clusters that were used as eight indicator variables of other childhood adversities: (1) mother's verbal or physical abuse toward the respondent; (2) father's verbal or physical abuse toward the respondent; (3) parents' verbal or physical abuse of each other; (4) mother's psychopathology (depression, anxiety disorder); (5) father's psychopathology; (6) mother's substance abuse problems and antisocial behaviour; (7) father's substance abuse problems and antisocial behaviour; and (8) attempts or completed suicides by parents. To test for effect modification, two-way interaction terms were created between child rape and child molestation and each of the indicator variables for race, gender, childhood adversities and psychiatric disorders.

To estimate the population attributable risk proportions (PAR %) for child sexual abuse, a person–year data set with all observations up until a person's age at interview was compared with the person–year data set created as described above. Two sets of predictive probabilities were calculated, one with the independent, mediating, interaction, and control variables, and the second with only the mediating and control variables. The PAR % represents the difference between these two cumulative predictive probabilities of suicide behaviours and estimates the proportion of risk that CSA conveys independent of the effects of psychiatric disorders and confounding variables. This statistic is predicated on the assumption that the relationship between CSA and suicidal behaviour is causal.

All analyses were weighted: (1) to be representative of the population described by the 1989 US National Health Interview Survey (US Department of Health and Human Services, 1992); (2) to account for systematic nonresponse bias; and (3) to account for variations in probability of selection both between and within households. The method of jackknife

repeated replications (Kish & Frankel, 1970) was used to calculate standard errors and 95% confidence intervals, to account for the complex sampling design.

RESULTS

The prevalence of suicidal behaviours among those who experienced CSA was significantly higher than the prevalence among those not reporting CSA as indicated by chi-square statistics (Table 1). The prevalence was highest among those who reported child rape. Among women, 27% of those reporting child rape had attempted suicide compared with 5% who did not report child rape. Similarly, among men reporting child rape, 31% reported suicide attempts, compared with 3%. The overall prevalence of child rape in this study was estimated at 5·0% (standard error (s.e.) = 0·4) for women and 0·6% (s.e. = 0·2) for men; the prevalence of molestation was estimated at 10·5% (s.e. = 0·8) for women and 2·3% (s.e. = 0·4) for men. Among women, 13·5% (s.e. = 0·9) reported either child rape or molestation and among men, 2·5% (s.e. = 0·4) reported either.

Figs. 1 and 2 compare survival curves and hazard rates for the cumulative probabilities of lifetime suicide attempts for four groups: (1) those who met criteria for any lifetime disorder and reported either child rape or molestation (CSA); (2) those who met criteria for a lifetime disorder and did not report CSA; (3) those who reported CSA but did not meet criteria for any of the disorders measured; and (4) those who did not meet criteria for lifetime disorders and also did not report CSA. Wald χ^2 tests revealed significant differences among the four groups (females, $\chi^2_3 = 65\cdot5$, $P < 0\cdot0001$; males, $\chi^2_3 = 39\cdot2$, $P < 0\cdot0001$). For both genders, the slope of the curve for Group 1 was steepest, and this group had the highest cumulative probability of attempting suicide. The highest probability of first attempts occurred between ages 14–19 for females in the group with both disorders and CSA, and at age 27 for the group with no disorders and CSA (Figs. 1 and 2). For males, the highest probability of first suicide attempts occurred at ages 12, 15, and 21–24 for the group reporting disorders and CSA. At age 20 there was an increased probability of suicide attempts for the no disorder/CSA group of males.

Almost every family adversity assessed was associated with suicide attempts in bivariate models. Among respondents who attempted suicide, 45% reported that their mother had major depression, and 24% said that their father had major depression, compared with 25% of mothers and 16% of fathers among those who did not attempt suicide. Sixteen per cent of those who attempted suicide reported that either their mother or their father attempted or completed suicide, compared with 4% among those who did not attempt suicide. There is also evidence that cumulative adversities affect suicidal behaviour. Over half (53%) of those who attempted suicide reported five or more adversities, compared with 24% among those who did not attempt suicide.

Using multivariate discrete time event survival analysis, three sets of models were evaluated. The first set of models determined the extent to which 14 individual psychiatric disorders and four summary disorders were related to subsequent suicidal behaviour, independent of demographics and childhood adversities other than child sexual abuse. All disorders were significantly associated with both suicide attempts and serious suicide attempts. The highest population attributable risks of suicide attempts for single disorders were depression (40% among both men and women), and alcohol problems among men (46%). The risks attributable to PTSD and summary disorders were the highest (see Table 2). Sixty-five per cent of suicide attempts among women and 73% among men were attributable to having any lifetime psychiatric disorder.

Table 3 shows results of the second set of models, analysing whether child rape and molestation are independently related to the onset of suicide behaviours, controlling for demographics and other childhood adversities. For both genders, child rape and molestation were significantly associated with the onset of suicide attempts and serious attempts. The number of cases of child rape among men was small; thus the standard errors for the estimates were large. However, the findings were still statistically significant, indicating that child rape is associated with suicidal behaviours among both men and women, independent of the effects of other childhood adversities. The population attributable risk of suicidal behaviours that could be
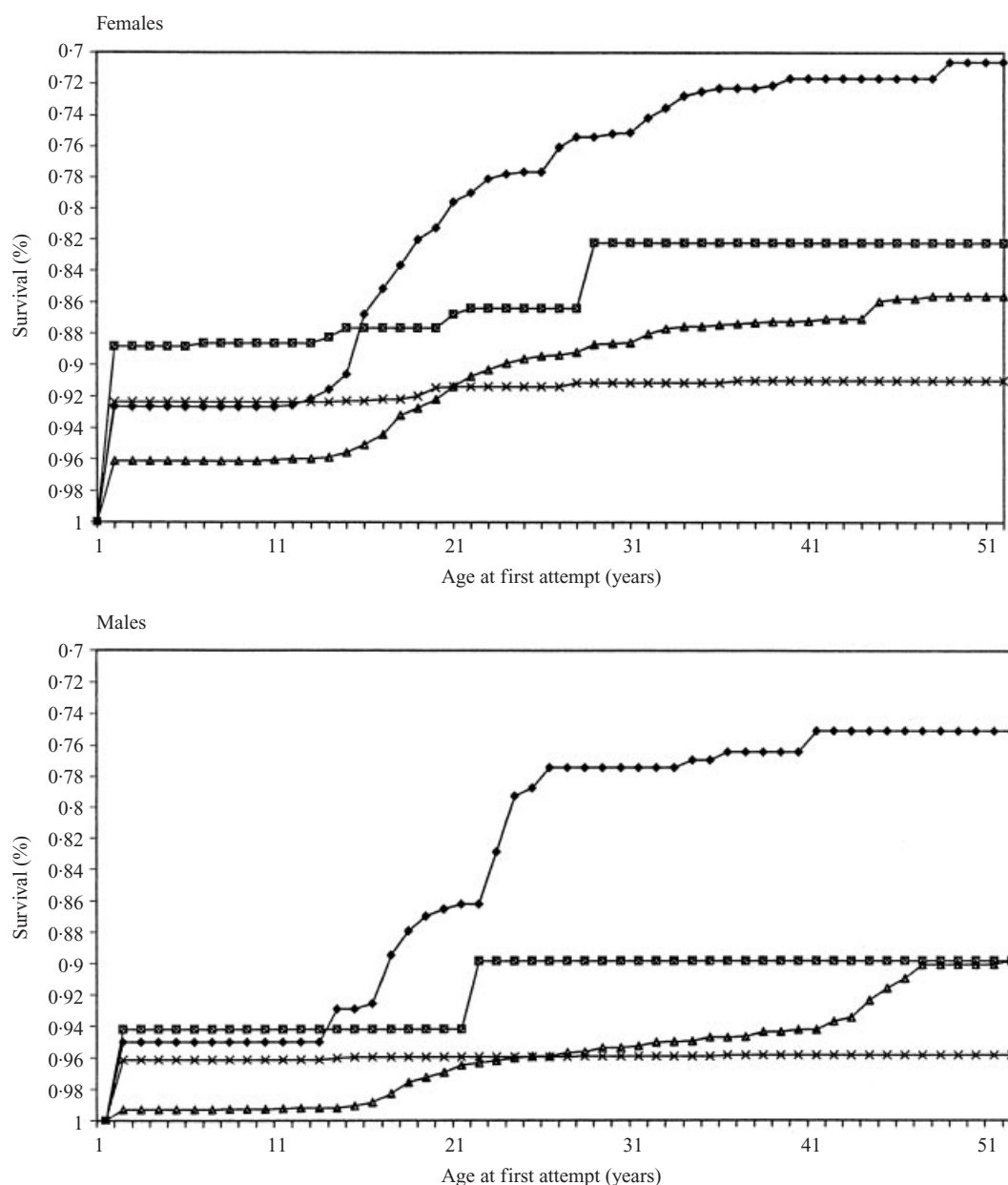
Females

Males

Fig. 1. Survival curves comparing the cumulative probability of suicide attempts among four groups of females and four groups of males (◆, any disorder/CSA; ⊠, no disorder/CSA; △, any disorder/no CSA; ×, no disorder/no CSA) stratified by psychiatric disorders and child sexual abuse.

prevented by eliminating CSA, holding the effects of other adversities constant, ranged from 11–14·5% for suicide attempts among women and from 3·6–15% among men.

Five models tested whether the relationship between child rape and molestation and suicidal behaviours was mediated by the presence of lifetime psychiatric disorders. Each model contained indicator variables for rape and molestation, one summary psychiatric disorder variable or PTSD, and control variables for other childhood adversities and demographics
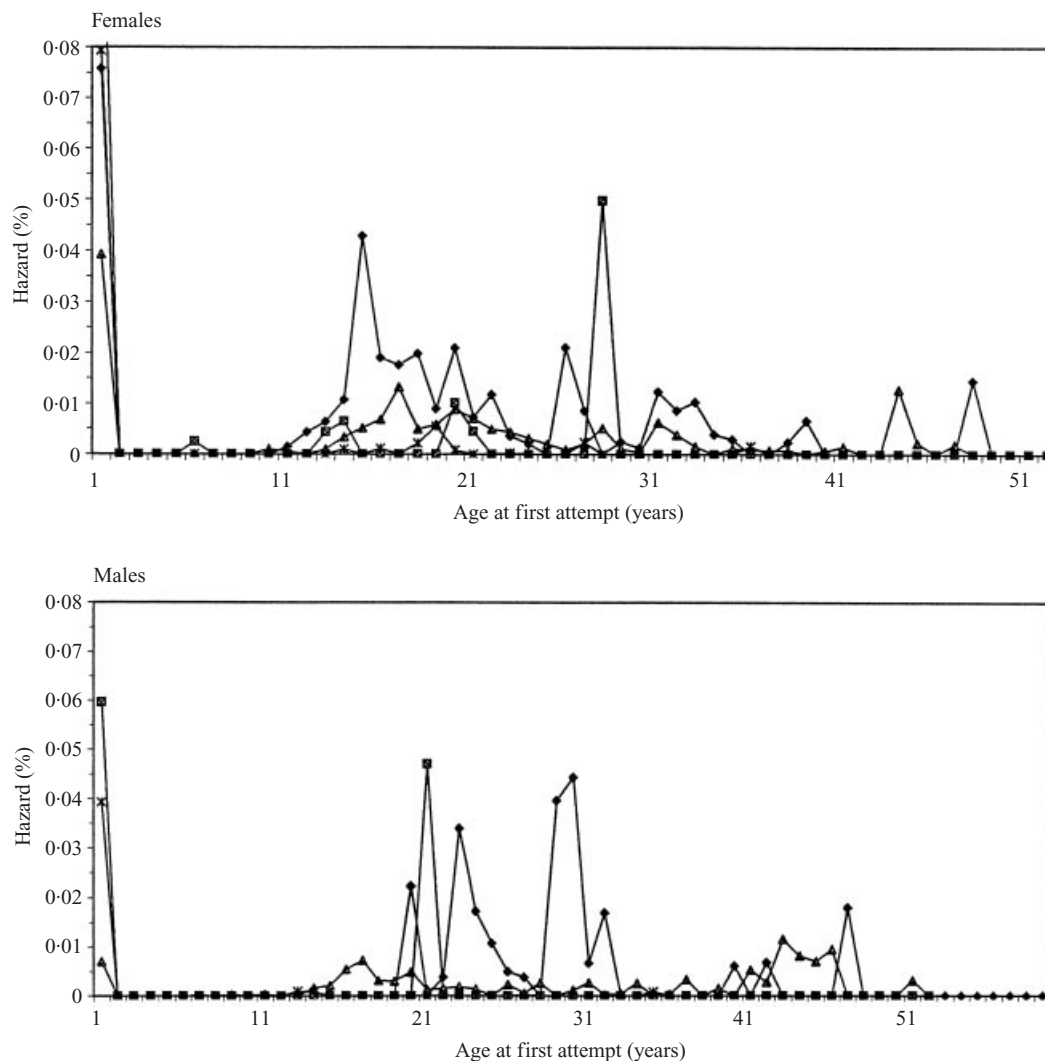
Females

Males

FIG. 2. Hazard rates of suicide attempts by age among four groups of females and four groups of males (◆, any disorder/CSA; ⊠, no disorder/CSA; △, any disorder/no CSA; *, no disorder/no CSA) stratified by psychiatric disorders and child sexual abuse.

(Table 4). Time-varying indicator variables were used for psychiatric disorders and CSA; thus we can assume that these preceded the suicidal behaviour outcomes, but not whether CSA or the psychiatric disorder came first. However, the mean age of first instances of CSA (9 years for females and 11 years for males) is younger than the mean ages of onset of any of the disorders (16·5 years for females and 17·1 years for males). After inclusion of a summary psychiatric disorder or PTSD in each model, the estimates of the relative risk of rape always remained

significant. Seven of 20 parameter estimates for molestation were no longer significant, though all remained in the expected direction. Some of the psychiatric disorder-adjusted parameter estimates for rape and molestation are lower than the estimates from models without disorders, though some are actually higher. Considering the 95% confidence intervals around these estimates however, only some of these differences are significantly different. Odds ratios for psychiatric disorders remained significant, except for PTSD predicting serious attempts among

Table 2. *Multivariate associations indicated by odds ratios (OR) and population attributable risk (PAR%) for psychiatric disorders*[a] *and subsequent onset of suicidal behaviours, controlling for other childhood adversities*[b]

Disorder	%	Suicide attempt			Serious suicide attempt		
		OR	(95% CI)[c]	PAR%	OR	(95% CI)[c]	PAR%
Females (N = 2921)							
Any mood disorder[d]	24·5	9·9*	(6·9, 14·2)	45·2	11·8*	(6·1, 22·7)	50·2
Post-traumatic stress disorder (PTSD)	10·2	3·8*	(2·3, 6·2)	18·9	2·2*	(1·1, 4·1)	10·5
Any anxiety disorder[e] (except PTSD)	32·5	2·4*	(1·7, 3·4)	26·2	4·8*	(3·1, 7·5)	49·4
Any substance disorder[f]	24·3	4·6*	(3·2, 6·5)	30·2	4·4*	(2·7, 7·3)	31·2
Any disorder	52·8	6·0*	(3·8, 9·7)	64·9	11·8*	(6·2, 22·6)	79·8
Males (N = 2945)							
Any mood disorder[d]	13·7	12·3	(7·3, 20·8)	46·0	13·5*	(5·6, 32·4)	50·1
Post-traumatic stress disorder	4·5	5·4*	(2·7, 10·7)	16·3	6·9*	(2·4, 20·4)	21·2
Any anxiety disorder[e] (except PTSD)	20·5	3·6*	(2·3, 5·7)	32·7	2·4*	(1·2, 4·8)	22·2
Any substance disorder[f]	40·6	5·3*	(2·6, 11·1)	52·9	6·2*	(2·7, 14·6)	61·4
Any disorder	52·0	8·1	(3·8, 17·5)	73·3	7·8*	(3·0, 20·5)	74·4

[a] Each disorder was entered into a separate model, then PAR% was calculated for each individual disorder.
[b] Models also included underlying baseline hazard rate, race/ethnicity and age cohort.
[c] 95% Confidence intervals were computed using jackknife repeated replication method.
[d] Includes depression, dysthymia or mania.
[e] Includes agoraphobia, generalized anxiety disorder, panic attacks, panic disorder, simple phobia, or social phobia.
[f] Includes alcohol problems or dependence, drug problems or dependence.
*$P < 0.05$.

Table 3. *Multivariate associations between child sexual abuse and subsequent onset of suicidal behaviours, controlling for other childhood adversities*[a]

Abuse prior to age 18	%	(S.E.)	Suicide attempt			Serious suicide attempt		
			OR	(95% CI)	PAR%	OR	(95% CI)	PAR%
Females (N = 2921)								
Raped	5·0	(0·4)	3·3*	(2·3, 4·8)	11·6	3·8*	(2·4, 6·1)	14·5
Molested	10·5	(0·8)	2·0*	(1·5, 2·8)	12·3	1·7*	(1·1, 2·8)	11·1
Males (N = 2945)								
Raped	0·6	(0·2)	4·2*	(1·2, 14·5)	3·6	11·3*	(1·8, 68·7)	9·6
Molested	2·3	(0·4)	3·3*	(1·3, 8·4)	7·9	5·0*	(2·0, 12·7)	15·1

[a] Models also control for underlying baseline hazard rate, race/ethnicity and age cohort.
* $P < 0.05$.

women. These findings suggest that psychiatric disorders mediate the relationship between child sexual abuse and suicidal behaviours, but do not completely explain the relationship. Looking at the model that includes any psychiatric disorder (Model 5, Table 4), the proportion of serious suicide attempts attributable to child rape independent of the effects of any psychiatric disorders and other childhood adversities was 12% for women and 9% for men. For serious attempts attributable to molestation the PAR% was 7% for women and 14% for men. In the same predictive equation, psychiatric disorders

accounted for 79% of serious attempts among women and 72% among men.

DISCUSSION

Adopting a life course perspective on the aetiology of suicidal behaviour, we found evidence of a relationship between child sexual abuse and suicidal behaviour, partially but not wholly mediated by psychiatric disorders. We used a large, nationally representative sample of the US, took into account other childhood adversities, modelled the timing of outcomes,

Table 4. *Multivariate associations (odds ratios, OR) between child sexual abuse, psychiatric disorders, and subsequent onset of suicidal behaviours, accounting for the effects of other childhood adversities*[a]; *population attributable risk per cent (PAR), independent of all other factors*

Model	Suicide attempt			Serious suicide attempt		
	OR	(95% CI)	PAR%	OR	(95% CI)	PAR%
Females						
1						
Rape	2·7*	(1·6, 4·3)	9·3	2·9*	(1·7, 4·9)	12·1
Molestation	1·5	(1·0, 2·2)	7·2	1·2	(0·7, 2·0)	4·0
Any mood disorder	8·5*	(5·8, 12·5)	43·6	10·1*	(5·1, 20·2)	49·1
2						
Rape	3·1*	(2·1, 4·7)	11·1	3·3*	(2·0, 5·4)	13·3
Molestation	1·9*	(1·4, 2·7)	11·7	1·6*	(1·0, 2·6)	9·8
Any anxiety disorder (except PTSD)	2·2*	(1·5, 3·2)	23·9	4·4*	(2·8, 7·0)	47·9
3						
Rape	5·7*[b]	(3·5, 9·4)	7·8	3·7*	(1·9, 7·2)	14·3
Molestation	1·5	(1·0, 2·3)	8·0	1·7*	(1·0, 3·0)	10·9
Post-traumatic stress disorder	3·6*	(2·1, 6·0)	8·8	1·1	(0·4, 2·7)	1·0
4						
Rape	2·9*	(1·9, 4·3)	10·5	3·3*	(1·9, 5·7)	13·7
Molestation	1·8*	(1·2, 2·5)	9·8	1·5	(0·9, 2·5)	8·0
Any substance disorder	4·0*	(2·8, 5·7)	28·4	3·9*	(2·3, 6·6)	29·6
5						
Rape	2·5*	(1·7, 3·6)	9·6	2·6*	(1·6, 4·0)	11·8
Molestation	1·6*	(1·2, 2·3)	9·2	1·4	(0·9, 2·1)	6·8
Any disorder	5·2*	(3·2, 8·6)	62·4	10·4*	(5·2, 20·7)	78·6
Males						
1						
Rape	3·4*	(1·0, 11·6)	3·4	11·2*	(2·2, 57·3)	9·4
Molestation	2·1	(0·8, 5·7)	5·2	2·6*	(1·0, 6·9)	9·4
Any mood disorder	11·3*	(6·8, 18·9)	45·4	11·2*	(4·7, 26·6)	48·4
2						
Rape	5·4*	(1·5, 19·5)	3·7	13·0*	(2·1, 81·1)	9·6
Molestation	2·9*	(1·0, 8·0)	7·1	4·4*	(1·6, 12·0)	14·0
Any anxiety disorder (except PTSD)	3·7*	(2·3, 5·8)	32·5	2·3*	(1·2, 4·6)	20·7
3						
Rape	3·2*	(1·0, 10·5)	3·0	8·0*	(1·5, 43·5)	8·7
Molestation	1·9	(0·7, 5·5)	4·7	3·4*	(1·2, 9·4)	12·3
Post-traumatic stress disorder	4·0*	(1·8, 8·9)	14·2	3·8*	(1·1, 12·7)	16·9
4						
Rape	3·8*	(1·0, 15·4)	3·2	12·5*	(2·0, 78·9)	9·1
Molestation	3·2*	(1·3, 8·0)	7·8	4·8*	(2·0, 11·8)	14·9
Any substance disorder	5·2*	(2·5, 10·8)	52·0	6·2*	(2·7, 14·1)	60·3
5						
Rape	3·7*	(1·1, 12·7)	3·2	11·2*	(2·2, 57·3)	9·4
Molestation	2·5*	(1·0, 6·2)	6·6	4·0*	(1·6, 10·0)	13·9
Any disorder	7·7*	(3·5, 16·8)	72·3	7·0*	(2·6, 19·2)	72·5

[a] Models also control for underlying baseline hazard rate, race/ethnicity and age cohort.
[b] Taking into account the significant interaction between rape and lifetime PTSD, the odds ratio shown in the table is for those raped but not meeting PTSD lifetime criteria while the odds ratio for rape among those reporting PTSD is 1·1.
* $P < 0.05$.

and calculated the relative contributions of psychiatric disorders and CSA. We summarize the key findings below and discuss their implications.

Prevalence

The prevalence of suicidal behaviour was higher for women than men, and was much higher among those reporting child rape or molestation, and several other child adversities. These findings are consistent with a growing body of evidence that suicidal behaviour is related to adverse childhood experiences (Santa Mina & Gallop, 1998; Fergusson *et al.* 2000 *b*).

Psychiatric disorders

In our study, the majority of suicidal behaviour can be attributed to prior psychiatric disorders,

especially mood disorders. Having any disorder accounted for almost 80 % of subsequent serious suicide attempts among women and over 70 % among men, controlling for childhood adversities. This finding is also consistent with other studies of psychopathology and suicidal behaviour (Rudd *et al.* 1993; Beautrais *et al.* 1996; Kessler *et al.* 1999; Mann *et al.* 1999).

Child sexual abuse

However, we also found that a sizeable proportion of subsequent serious suicide attempts (8–12 %) could be attributed to child sexual abuse independent of psychiatric disorders and other adversities. The odds of suicide attempts were three to 11 times higher if respondents had experienced child rape or molestation. This risk of suicide associated with CSA was reduced but did not disappear after psychiatric disorders were included, which is evidence that psychiatric disorders only partially mediate the relationship between CSA and suicidal behaviour. This is somewhat different from findings reported by Fergusson *et al.* in a recent study of relationships between adversities, psychopathology, and suicidal behaviour in a longitudinal cohort study of adolescents in New Zealand. They found that controlling for psychiatric disorders and stressful life events removed the association between childhood factors (including CSA) and suicidal behaviours, and led them to conclude that mental illness and stressful life events fully mediate the relationship (Fergusson *et al.* 2000*b*). It is difficult to say what led to a discrepancy between their findings and those being reported here, as their study population and the adversities and life events they measured were somewhat different than ours. Our findings indicate that we should target prevention efforts to CSA survivors whether or not they have diagnosable psychiatric disorders.

Future research should explore other potential pathways between CSA and suicidal behaviours to further explain those underlying mechanisms that do not involve psychiatric disorders. We should also study what factors promote resiliency and resistance to suicidal behaviour among those who are abused. From a developmental psychopathology perspective (Cicchetti and Toth, 1995), it is likely that there are diverse social and psychological pathways to suicidal behaviours across the life course, especially since not everybody who is raped or molested as a child goes on to develop psychiatric disorders and/or commit suicide. Neither does everybody with a diagnosable psychiatric disorder attempt or commit suicide. It has been suggested that an impaired model of self may result in self-destructive reactions to highly stressful events such as CSA, and an inability to separate self from others, increased suggestibility, and an inadequate sense of self-protectiveness (Price, 1993), even if there are no diagnosable psychiatric disorders. Studies have shown that CSA survivors often have myriad relationship problems as adults (Finkelhor *et al.* 1989; Gibson & Hartshorne, 1996), feelings of isolation and stigma (Coffey *et al.* 1996), poor self-esteem and difficulty trusting others (Cole & Putnam, 1992). Other studies have shown that attachment style, emotional support and positive relationships may play positive roles in recovery from CSA (Romans *et al.* 1995; Shapiro & Levendosky, 1999).

Strengths and limitations

Our use of discrete-time survival analysis methodology allows us to challenge a recent criticism that the field does not usually take into account whether risk factors precede development of suicidal behaviour (Wagner, 1997). Population attributable risk (PAR %) methodology, a powerful technique employed by epidemiologists to set priorities for health policies (Walter, 1976), allowed us to quantify and compare the effects of psychiatric disorders and CSA on development of suicidal behaviours, assuming that a causal relationship exists. Many previous studies have independently examined the effects of either CSA or certain psychiatric disorders, but few have compared the effects in the same analysis.

A recent review of studies of child abuse and suicidal behaviour pointed out that the majority were clinical studies of traumatized people who had already presented for care (Santa Mina & Gallop, 1998). A bias inherent in this methodology is exclusion of those in the general population who experienced CSA but whose lives are relatively stable. By using a nationally representative household population sample we minimized this source of bias. People at the highest risk of mortality are those who complete suicide, and thus do not make it into a household

sample. Since women complete suicide less frequently than men (Petronis *et al.* 1990; Moscicki, 1995), this potential selection bias may be greater among men than women in our study. However, overall the number of completed suicides per year in the US is relatively small (age-adjusted rate of 11·3/100 000 in 1998) (Murphy, 2000) and probably did not affect our results. To our knowledge there are no published studies using the psychological autopsy method that studied CSA as a risk factor for completed suicide. Because of its clandestine nature, it will be challenging to collect accurate data on CSA from family, friends, therapists, etc. of the deceased, but the role of CSA in completed suicides could be even stronger than the results we are reporting for serious attempts.

We relied on retrospective reporting of events, including experiences that are very difficult to report. Memory studies among survivors of sexual abuse show that as many as 38 % do not recall the abuse when interviewed as adults (Williams, 1994; Widom & Morris, 1997). A longitudinal study of adolescents found that subjects provided false negative reports at different interviews, calling into question the reliability of CSA reports (Fergusson *et al.* 2000 *a*). Memory problems combined with the traumatic and stigmatizing nature of both suicidal behaviour and CSA make it likely that there was underreporting in this study of both exposures and outcomes. This could result in either an over- or underestimate of associations.

Our investigation focused on first instances of CSA and suicidal behaviours. However, there is evidence from longitudinal studies that sexual abuse may affect on-going suicidal behaviour in addition to first instances. For example, in a longitudinal study of women who had attempted suicide, women survivors of CSA were more likely to repeat suicidal behaviours than women not sexually abused (van Egmond *et al.* 1993). To understand fully the consequences of sexual abuse across a person's lifetime, longitudinal studies are necessary to follow people from childhood into adulthood.

Study implications

Our study shows that screening for psychiatric symptoms is critical for prevention of suicide, but that psychiatric screening should not be relied upon alone. We should target prevention efforts to CSA survivors whether or not they have diagnosable psychiatric disorders. Our findings also place additional importance on identification of pathways from CSA to psychiatric disorders, to effectively prevent both psychopathology and suicide. We should note that the magnitude of the PAR % depends on both the strength of an association as well as on prevalence. If we use the PAR % to set public health priorities, we should keep in mind that eliminating risk factors with both high prevalences and strong associations prevents the most suicide attempts. However, despite the relatively low prevalence of rape among men in this study (0·6 %), the magnitude of the associations with serious suicide attempts was high (odds ratios from 8–13) and the population attributable risk was 9–10 %, after accounting for psychiatric disorders and other childhood adversities. Child rape appears to be a particularly potent risk factor for suicidal behaviour in our study.

We also showed that in the group with both disorders and CSA experiences, the highest risk of a first suicide attempt was during adolescence. However, the highest risk of a suicide attempt in the group who did not develop a lifetime psychiatric disorder was not until age 27 for females and at both ages 20 and 39 for males. These findings may be useful for developing prevention efforts targeted at different age groups, including those beyond adolescence.

The evidence we present here has important treatment and prevention implications. We need both comprehensive public health approaches to prevent CSA, and effective treatments to recover from the traumatic effects of CSA. By doing primary prevention work to eliminate child sexual abuse, we can simultaneously prevent some psychopathology. Our study suggests that this may be an effective strategy to prevent a significant proportion of suicides in individuals both with and without psychiatric illness.

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