

Childhood adversities and risk for suicidal ideation and attempts: a longitudinal population-based study

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ABSTRACT

Background. Developmental adversities may be risk factors for adult suicidal behavior, but this relationship has rarely been studied prospectively. The present study examined the association between childhood adversities and new onset suicidal ideation and attempts in an adult population-based sample.

Method. The study used a large community mental health survey (the Netherlands Mental Health Survey and Incidence Study; $n=7076$, age range 18–64 years). Logistic regression analyses were used to evaluate the relationship between childhood adversities and new onset of suicidal ideation and attempts over 3 years of longitudinal follow-up.

Results. During the study period 85 new cases of suicidal ideation and 39 new onset suicide attempts were observed. The incidence rate for new suicide ideation was 0.67% per year and the incidence rate for new suicide attempts was 0.28% per year. Childhood neglect, psychological abuse and physical abuse were strongly associated with new onset suicidal ideation and suicide attempts. Odds ratios (ORs) ranged from 2.80 to 4.66 for new onset suicidal ideation and from 3.60 to 5.43 for new onset suicide attempts. The total number of adversities reported had a strong graded relationship to new onset suicidal ideation and attempts. These associations remained significant after controlling for the effects of mental disorders.

Conclusions. Childhood abuse and multiple adversities are strongly associated with future suicidal behavior and the mental disorders assessed in the present study do not fully account for this effect. A comprehensive understanding of suicidal behavior must take childhood adversities into account.

INTRODUCTION

Numerous studies have confirmed a strong association between mental disorders and suicidal behavior, particularly for mood disorders, substance use disorders and schizophrenia (Henriksson *et al.* 1993; Kessler *et al.* 1999; Phillips *et al.* 2004). Co-morbidity of mental disorders has been found to markedly increase the risk of suicidal behavior (Henriksson *et al.* 1993; Kessler *et al.* 1999). Developmental adversities are an important group of risk factors for adult mental disorders. Childhood sexual

abuse, physical abuse, emotional abuse, parental lack of care and parental mental disorders have all been associated with an increased prevalence of adult mental illnesses (Kessler *et al.* 1997; MacMillan *et al.* 2001; Enns *et al.* 2002; Edwards *et al.* 2003). Childhood adversities commonly co-occur and several studies provide evidence for a ‘dose–response’ relationship between the number of childhood adversities experienced and the likelihood of later psychopathology (Williams *et al.* 1990; Kessler *et al.* 1997; Edwards *et al.* 2003; Appleyard *et al.* 2005).

Studies in community and clinical samples have suggested that developmental adversities may also be risk factors for adult suicidal

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behavior. Childhood sexual abuse (Romans *et al.* 1995; Beautrais *et al.* 1996; Fergusson *et al.* 2000; Molnar *et al.* 2001), physical abuse (Brodsky *et al.* 2001; Dube *et al.* 2001; Johnson *et al.* 2002; McHolm *et al.* 2003), a disturbed relationship with parents (Tousignant *et al.* 1993; Fergusson *et al.* 2000; Yamaguchi *et al.* 2000; Johnson *et al.* 2002) and parental mental illness (Dube *et al.* 2001; Agerbo *et al.* 2002; Brent *et al.* 2002) have been associated with suicidal behavior in adulthood. A graded relationship between the number of childhood adversities and lifetime risk of attempted suicide has also been reported (Dube *et al.* 2001). Many of the published studies of this issue have methodological limitations including the use of select clinical samples (e.g. adolescents, psychiatric in-patients, female patients), single diagnostic groups (e.g. depression, eating disorder) or a focus on a single form of childhood adversity (e.g. sexual abuse). With few exceptions (Fergusson *et al.* 2000; Johnson *et al.* 2002), studies of this important issue have used cross-sectional survey designs or retrospective case/control methods that are open to a number of biases including recall biases. The identified risk factors for suicidal behavior overlap to a large extent with the risk factors for adult mental disorders. Few studies have examined the effect of mental disorders on the association between early adversities and suicidal behavior. As such it is not clear whether the impact of early adversities is explained by the occurrence of mental disorders or whether early adversities represent an independent risk factor for future suicidal behavior.

The present study sought to evaluate the relationship between childhood adversities (childhood abuse, disturbed parental bonding and parental psychopathology) and suicidal behavior (suicidal ideation and attempts) in a community sample using the Netherlands Mental Health Survey and Incidence Study (NEMESIS) (Bijl *et al.* 1998; de Graaf *et al.* 2002). The NEMESIS included a baseline assessment and two longitudinal follow-up assessments over 3 years. Logistic regression analyses were used to evaluate the association between childhood adversities (assessed at baseline) and new onset suicidal ideation and attempts (at the follow-up assessments). In keeping with previous studies (Williams *et al.*

1990; Dube *et al.* 2001; Appleyard *et al.* 2005), the effects of childhood adversities were considered individually and also as an adversity score reflecting the total number of adversities experienced. In each case, additional regression analyses were conducted to determine whether associations between childhood adversities and suicidal behavior remained significant after controlling for the occurrence of mental disorders and co-morbidity of mental disorders. To our knowledge, this study represents the first longitudinal study of a nationally representative sample to evaluate the association between a broad range of childhood adversities and new onset of suicidal behavior.

METHOD

Participants

The NEMESIS (Bijl *et al.* 1998; de Graaf *et al.* 2002) is a population-based study involving repeated measurements among the same respondents. The study was conducted using a multi-stage, stratified random sampling procedure. A sample of municipalities was drawn, stratified on the basis of urbanicity and with adequate representation of the 12 provinces of the Netherlands. Next, post office registers were used to draw a sample of private households. The number of households selected in each municipality was based on the size of its population. One respondent between the ages of 18 and 64 years was selected from each household based on the most recent birthday. The NEMESIS was conducted with the approval of the ethics committee of the Netherlands Institute of Mental Health and Addiction, Utrecht, the Netherlands. All respondents gave verbal informed consent to participate in the study.

The initial data collection phase was between February and December 1996. A total of 7076 people were interviewed during this phase, and these people constituted the baseline sample for the present study. The response rate was 69.7%. Survey participants were very similar to the Dutch population with regard to gender, marital status and urbanicity (Bijl *et al.* 1998). Two follow-up assessments were conducted at 1 and 3 years after the baseline assessment. A total of 5618 respondents (79.4% of the baseline sample) were reinterviewed at the first

follow-up assessment and 4848 respondents (68.5% of the baseline sample) were reinterviewed at the second follow-up assessment. The overall response rate, including participation in the baseline and second follow-up assessments, was 47.8%. Psychopathology was only modestly predictive of attrition in the follow-up phases of the study (de Graaf *et al.* 2000). Suicidal ideation and attempts at the baseline assessment were not predictive of attrition.

Composite International Diagnostic Interview

Lifetime psychiatric diagnoses were based on DSM-III-R Axis I criteria. A computerized version of the Composite International Diagnostic Interview (CIDI), version 1.1, was used to determine diagnoses (Smeets & Dingemans, 1993). The CIDI is a structured diagnostic interview for use by trained non-clinician interviewers that was developed by the World Health Organization (WHO) and is based on the National Institute of Mental Health Diagnostic Interview Schedule and the Present State Examination. WHO field trials have documented acceptable reliability and validity for CIDI-based diagnoses (Wittchen, 1994; Kessler *et al.* 1998). DSM-III-R diagnoses recorded in the NEMESIS included mood disorders (major depression, dysthymia, bipolar disorder), anxiety disorders (panic disorder, agoraphobia, simple phobia, social phobia, generalized anxiety disorder, obsessive-compulsive disorder), substance use disorders (alcohol or drug abuse and dependence), eating disorders and schizophrenia. Lifetime DSM-III-R diagnoses were assessed at the baseline interview.

Dependent variables

Suicidal ideation and suicide attempts were measured using items from the CIDI identical to those used in the Epidemiologic Catchment Area Survey (Weissman *et al.* 1989) and to a subset of the suicide questions used in the US National Comorbidity Survey (Kessler *et al.* 1999). To assess lifetime suicidal ideation respondents were asked: 'Have you ever felt so low you thought about committing suicide?' To assess lifetime suicide attempts respondents were asked: 'Have you ever attempted suicide?' The prevalence of lifetime suicidal ideation and attempts at the baseline assessment ($n=7076$) was 11.1% and 2.7% respectively. At the

follow-up assessments, the same questions were repeated but the time-frame was limited to the intervening period between assessments.

New cases of suicidal ideation were defined when a respondent did not report suicidal ideation or attempts at baseline but endorsed suicidal ideation at either follow-up assessment. There were 41 new onsets of suicidal ideation at the first follow-up and 44 new onsets of suicidal ideation at the second follow-up assessment. Accordingly, there was a total of 85 new cases of suicidal ideation at the follow-up assessments, representing approximately 2% of the sample at risk ($n=4246$). The incidence rate for new suicide ideation was 0.67% of the sample at risk per year.

New cases of suicide attempt were defined when a respondent did not report suicide attempts at baseline but endorsed making a suicide attempt at either follow-up period. Individuals endorsing suicide ideation at baseline were included in the sample at risk for suicide attempts. At the first and second follow-up assessment there were 24 and 15 new onset suicide attempts respectively. The total number of new cases of suicide attempt at the follow-up assessments was therefore 39, representing 0.8% of the sample at risk ($n=4670$). The incidence rate for new suicide attempts was 0.28% of the sample at risk per year.

Independent variables

Childhood adversities assessed in the present study included childhood abuse, parental psychopathology and deficient parental bonding.

To assess childhood abuse, respondents were asked whether they had experienced, before the age of 16, emotional neglect, psychological abuse, physical abuse or sexual abuse. Respondents were prompted to report each of these adversities with questions such as 'Before you reached the age of 16, were you ever psychologically abused? – physically abused? – sexually abused?' Responses to these enquiries were recorded as: never, one time, sometimes, regularly, often, or very often. For the present study, these responses were dichotomized to reflect the occurrence (coded '1') or absence (coded '0') of each form of abuse. Emotional neglect was described to participants as follows: 'People at home didn't listen to you, your problems were ignored, you had the feeling of

not being able to find any attention or support from the people in your house.’ Psychological abuse was described to participants as follows: ‘You were cursed, unjustly punished, your brothers and sisters were favored – but no bodily harm was done.’ Physical abuse was defined as follows: ‘You were kicked, hit with or without an object, or you were physically maltreated in any other way.’ Sexual abuse was defined as follows: ‘You were touched sexually by anyone against your will, or you were forced to touch anyone sexually, or pressured into sexual contact against your will.’

Parental mental illness was assessed by asking respondents whether their biological parents (mother, father or both) had ever been treated by a psychiatrist, hospitalized in a mental institution, or exhibited one of the following problems: depression, delusions or hallucinations, anxiety disorders or phobias, alcohol abuse, or suicide (de Graaf *et al.* 2002). For the present analyses, dichotomous variables reflecting a mental illness in mother, father or both parents were used.

Parental relationships were assessed using the Parental Bonding Instrument (PBI; Parker *et al.* 1979). The PBI is a valid and reliable measure of fundamental parenting dimensions of care and overprotection (Wilhelm *et al.* 2005). The PBI consists of 25 statements describing the behaviors and attitudes of parents during one’s first 16 years. Responses are recorded on a four-point scale ranging from ‘very like’ to ‘very unlike.’ Sample items are: ‘was affectionate to me’ (care); ‘tried to control everything I did’ (overprotection). Respondents completed two versions of the PBI, one for their mother and one for their father. Scores on the PBI dimensions were dichotomized to reflect maternal and paternal lack of care (cut point at the mean – 1 s.d. on the care scale) and maternal and paternal overprotection (cut point at the mean + 1 s.d. on the protection scale). ‘Affectionless control’ (the combination of lack of care and overprotection) has been proposed as a particularly maladaptive form of parenting resulting in vulnerability to psychopathology (Parker, 1983). In the present study the combination of a below median score on the care scale and an above median score on the overprotection scale was considered affectionless control.

In light of evidence of a graded relationship between the number of childhood adversities experienced and risk of adverse mental health outcomes, including suicide attempts (Williams *et al.* 1990; Dube *et al.* 2001; Edwards *et al.* 2003; Appleyard *et al.* 2005), an additional adversity variable reflecting the total number of childhood adversities reported (from the list above, range 0–5+) was also evaluated.

Sociodemographic variables in the analyses included gender, age, educational attainment, urbanicity (municipalities with 500 or more addresses per square kilometer were considered urban, and smaller municipalities were considered rural), marital status (never married, married or common-law, widowed, separated or divorced), and employment status (paid employment or unemployed).

Statistical analyses

In all analyses, the appropriate statistical weight was used to ensure that the data were representative of the national population. Standard errors were computed using the Taylor Series Linearization method on the SUDAAN program (Shah *et al.* 1995) to compensate for the complex, stratified sampling design of the study.

Logistic regression analyses were used to evaluate the association between each of the childhood adversities (information gathered at baseline) and new cases of suicidal ideation or suicide attempts (as defined above). Odds ratios (ORs) were calculated controlling for the effect of sociodemographic variables [adjusted OR (AOR¹)], then controlling for the effect of sociodemographic variables and lifetime Axis I mental disorders (AOR²), and then controlling for sociodemographic variables, Axis I mental disorders *and* other categories of childhood adversity (AOR³). A stringent approach was taken when controlling for Axis I mental disorders. The presence or absence of each disorder (major depression, dysthymia, bipolar disorder, panic disorder, agoraphobia, simple phobia, social phobia, generalized anxiety disorder, obsessive-compulsive disorder, alcohol or drug abuse and dependence, eating disorders and schizophrenia) was simultaneously entered in the same regression analysis. In light of evidence of a strong association between psychiatric co-morbidity and suicidal behavior (Henriksson *et al.* 1993; Kessler *et al.* 1999), two additional

Table 1. Prevalence of childhood adversities in the NEMESIS

Childhood adversity	Baseline		Follow-up	
	<i>n</i>	% (95% CI)	<i>n</i>	% (95% CI)
Parental bonding				
Father lack of care	857	15.7 (14.7–16.8)	673	15.4 (14.3–16.6)
Mother lack of care	888	12.5 (11.7–13.3)	681	11.9 (11.1–12.8)
Father overprotection	680	12.8 (11.9–13.9)	537	12.4 (11.4–13.5)
Mother overprotection	994	14.2 (13.4–15.1)	796	14.2 (13.2–15.2)
Father affectionless control	940	18.2 (17.1–19.3)	759	18.0 (16.8–19.2)
Mother affectionless control	1557	23.1 (22.0–24.2)	1266	23.1 (22.0–24.4)
Childhood abuse				
Neglect	1802	24.8 (23.8–25.9)	1470	25.2 (24.0–26.4)
Psychological abuse	952	12.9 (12.1–13.7)	767	12.9 (12.0–13.8)
Physical abuse	637	8.9 (8.2–9.6)	497	8.7 (7.9–9.5)
Sexual abuse	512	6.9 (6.3–7.5)	422	7.0 (6.4–7.7)
Parental mental illness				
Mother mental illness	1414	20.3 (19.3–21.3)	1166	20.9 (19.8–22.0)
Father mental illness	1031	14.8 (13.9–15.7)	851	15.1 (14.2–16.2)
Both parents mental illness	304	4.5 (4.0–5.0)	249	4.5 (4.0–5.1)
Multiple adversities				
None	2410	35.1 (33.9–36.3)	1908	34.6 (33.3–35.9)
One adversity	2013	29.1 (27.9–30.2)	1630	29.6 (28.3–30.9)
Two adversities	1258	17.6 (16.7–18.5)	1011	17.5 (16.5–18.6)
Three adversities	678	9.4 (8.7–10.2)	552	9.4 (8.6–10.2)
Four adversities	344	4.6 (4.1–5.1)	273	4.6 (4.1–5.2)
Five or more adversities	316	4.3 (3.8–4.8)	257	4.3 (3.8–4.9)

NEMESIS, Netherlands Mental Health Survey and Incidence Study; CI, confidence interval.

n is not weighted. Percentages are weighted.

n at baseline = 7076; *n* at either follow-up = 5670.

variables reflecting the occurrence of two Axis I diagnoses and three or more Axis I diagnoses were also included in these regression analyses. The analyses controlling for Axis I mental disorders (AOR²) represent an important test of the incremental predictive value of childhood adversities for new suicidal behavior because of the well-established relationship between mental disorders and suicidal behavior.

RESULTS

Prevalence of adversities

The prevalence of childhood adversities is reported in Table 1. The prevalence figures are, in general, comparable to those found in other studies using similar methodologies (Kessler *et al.* 1997; MacMillan *et al.* 2001). The relatively high prevalence of 'neglect' reflects the broad definition used in the present study.

Primary analyses

The results of logistic regression analyses evaluating the association between childhood adversities and new cases of suicidal ideation

and attempts during the subsequent 3 years are shown in Tables 2 and 3. The largest ORs were consistently found for the abuse variables. None of the parental bonding variables showed a significant association with new cases of suicidal ideation or attempts. Increasing numbers of adversities were associated with progressively higher ORs for suicidal ideation and attempts. Entering lifetime psychiatric diagnoses in the regression analyses (AOR²) resulted in a substantial reduction in the magnitude of ORs but most of the ORs for the childhood abuse variables remained statistically significant. The analyses controlling for effects of other categories of adversity (AOR³) show a further decline in the magnitude of the ORs, although a few significant associations remained for childhood abuse.

Supplementary analyses

Unexpectedly, sexual abuse and parental bonding measures showed non-significant associations with new onset suicide ideation and attempts. The possibility that these factors may be associated with early, but not later, onset

Table 2. Association of childhood adversities with new cases of suicide ideation at follow-up

	AOR ¹ (95% CI)	AOR ² (95% CI)	AOR ³ (95% CI)
Parental bonding			
Father lack of care	1.07 (0.51–2.24)	1.01 (0.48–2.13)	0.97 (0.45–2.10)
Mother lack of care	1.47 (0.75–2.89)	1.37 (0.66–2.83)	1.17 (0.56–2.43)
Father overprotection	1.21 (0.56–2.63)	1.26 (0.57–2.74)	1.03 (0.48–2.24)
Mother overprotection	1.06 (0.56–2.00)	1.16 (0.61–2.21)	0.96 (0.50–1.84)
Father affectionless control	0.96 (0.47–1.98)	1.03 (0.50–2.15)	N.A.
Mother affectionless control	0.73 (0.40–1.32)	0.80 (0.44–1.49)	N.A.
Childhood abuse			
Neglect	3.78 (2.37–6.04)***	2.87 (1.74–4.73)***	2.40 (1.24–4.64)*
Psychological abuse	2.80 (1.60–4.91)***	1.90 (1.06–3.40)*	0.84 (0.35–1.99)
Physical abuse	4.66 (2.62–8.28)***	3.35 (1.81–6.20)***	2.82 (1.11–7.16)*
Sexual abuse	1.45 (0.70–3.00)	1.03 (0.45–2.37)	0.70 (0.16–2.98)
Parental mental illness			
Mother mental illness	1.24 (0.71–2.17)	1.00 (0.57–1.74)	0.85 (0.39–1.81)
Father mental illness	1.60 (0.93–2.74)	1.25 (0.69–2.27)	1.57 (0.71–3.45)
Both parents mental illness	1.85 (0.75–4.59)	1.44 (0.56–3.70)	N.A.
Multiple adversities			
One adversity	1.04 (0.50–2.16)	0.95 (0.45–2.01)	N.A.
Two adversities	2.68 (1.39–5.14)**	2.23 (1.13–4.38)*	N.A.
Three adversities	3.23 (1.53–6.81)**	2.70 (1.28–5.71)**	N.A.
Four adversities	5.42 (1.99–14.76)**	3.46 (1.28–9.30)*	N.A.
Five or more adversities	3.87 (1.57–9.51)**	2.02 (0.69–5.94)	N.A.

AOR, Adjusted odds ratio; CI, confidence interval; N.A., not applicable.

AOR¹, Odds ratios adjusted for sociodemographics (age, gender, marital status, education, work status and urbanicity).

AOR², Odds ratios adjusted for sociodemographics, Axis I mental disorders (depression, dysthymia, generalized anxiety disorder, obsessive-compulsive disorder, bipolar disorder, schizophrenia, social phobia, simple phobia, panic disorder, agoraphobia, eating disorders, alcohol abuse/dependence, drug abuse/dependence) and co-morbidity (exactly two disorders and three or more disorders).

AOR³, Odds ratios adjusted for sociodemographics, Axis I mental disorders, co-morbidity and other categories of adversities.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

suicidal behavior, was therefore considered. A significant proportion of study subjects who reported different forms of childhood adversity were excluded from the primary analyses in the present study because they reported a history of suicidal behavior at baseline (suicidal ideation excluded 10.7–35.5% of the individual adversity groups; suicide attempts excluded 2.8–11.7% of the individual adversity groups). For example, 35.5% of 422 subjects reporting sexual abuse and 16.2% of 681 respondents reporting lack of maternal care were excluded from the longitudinal analyses because of lifetime suicidal ideation at baseline. Accordingly, we considered the possibility that the exclusion of these individuals (many of whom could have had early onset suicidal behavior) may have accounted for the unexpected negative findings. Analyses were repeated without filtering subjects with baseline suicidal behavior. In regression analyses controlling for sociodemographic factors (AOR¹), two variables, sexual abuse and lack of care by mother, showed significant associations with future suicide ideation and attempts. ORs were as follows: sexual abuse

and suicide ideation 2.33 [95% confidence interval (CI) 1.58–3.43]; sexual abuse and suicide attempts 2.62 (1.36–5.03); lack of care by mother and suicide ideation 2.32 (1.60–3.36); lack of care by mother and suicide attempts 2.71 (1.46–5.02).

Finally, several possible interaction effects were evaluated in three separate series of logistic regression analyses controlling for sociodemographic factors. We considered whether the associations between each of the childhood adversities and new onset suicidal behavior was moderated by gender (gender \times childhood adversity interaction) or participant age (age \times childhood adversity interaction) or the presence versus absence of an Axis I disorder at baseline (Axis I disorder \times childhood adversity interaction). No statistically significant interactions were identified.

DISCUSSION

Main findings

The results of the present study indicate that there is a substantial and statistically significant

Table 3. Association of childhood adversities with new cases of suicide attempts at follow-up

	AOR ¹ (95% CI)	AOR ² (95% CI)	AOR ³ (95% CI)
Parental bonding			
Father lack of care	0.80 (0.21–3.08)	0.70 (0.16–3.05)	0.78 (0.19–3.25)
Mother lack of care	2.16 (0.97–4.83)	1.38 (0.60–3.19)	1.20 (0.48–2.99)
Father overprotection	2.14 (0.89–5.13)	2.13 (0.85–5.31)	1.67 (0.76–3.69)
Mother overprotection	1.23 (0.52–2.91)	1.32 (0.54–3.22)	1.22 (0.49–3.01)
Father affectionless control	0.46 (0.13–1.56)	0.50 (0.13–1.85)	N.A.
Mother affectionless control	0.71 (0.30–1.68)	0.73 (0.28–1.91)	N.A.
Childhood abuse			
Neglect	3.60 (1.79–7.25)***	2.18 (1.03–4.62)*	1.53 (0.55–4.22)
Psychological abuse	4.00 (1.88–8.51)***	2.39 (1.17–4.85)*	1.41 (0.57–3.50)
Physical abuse	5.43 (2.57–11.48)***	3.24 (1.54–6.81)**	3.06 (1.37–6.86)**
Sexual abuse	1.93 (0.74–5.05)	0.96 (0.30–3.07)	0.32 (0.03–3.01)
Parental mental illness			
Mother mental illness	2.91 (1.46–5.80)**	2.15 (1.08–4.28)*	1.32 (0.44–3.96)
Father mental illness	1.23 (0.53–2.84)	0.73 (0.28–1.89)	0.94 (0.23–3.86)
Both parents mental illness	4.02 (1.62–10.00)**	2.26 (0.74–6.93)	N.A.
Multiple adversities			
One adversity	0.84 (0.30–2.38)	0.73 (0.25–2.12)	N.A.
Two adversities	1.02 (0.30–3.47)	0.77 (0.22–2.71)	N.A.
Three adversities	2.58 (0.80–8.30)	1.65 (0.53–5.18)	N.A.
Four adversities	5.34 (1.50–19.08)*	2.96 (0.92–9.56)	N.A.
Five or more adversities	9.93 (3.73–26.44)***	4.03 (1.24–13.09)*	N.A.

AOR, Adjusted odds ratio; CI, confidence interval; N.A., not applicable.

AOR¹, Odds ratios adjusted for sociodemographics (age, gender, marital status, education, work status and urbanicity).

AOR², Odds ratios adjusted for sociodemographics, Axis I mental disorders (depression, dysthymia, generalized anxiety disorder, obsessive-compulsive disorder, bipolar disorder, schizophrenia, social phobia, simple phobia, panic disorder, agoraphobia, eating disorders, alcohol abuse/dependence, drug abuse/dependence) and co-morbidity (exactly two disorders and three or more disorders).

AOR³, Odds ratios adjusted for sociodemographics, Axis I mental disorders, co-morbidity, and other categories of adversities.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

association between childhood adversities, particularly childhood abuse, and future suicidal ideation and attempts. The total number of childhood adversities had a strong graded relationship to new onset suicide ideation and attempts. The ORs reflecting increased risk for suicidal behavior in individuals with a history of childhood abuse (AOR¹) were substantially reduced but remained statistically significant when the 13 DSM-III-R Axis I mental disorders and co-morbidity were entered in the regression analyses (AOR²). This indicates that part of the association between childhood adversity and new onset adult suicidal ideation and attempts is explained by the development of mental disorders. However, the mental disorders assessed in the study did not fully account for the relationship between childhood adversities and suicidal behavior. The findings in the study are particularly noteworthy because they demonstrate that broadly defined childhood abuse (neglect, psychological abuse, and physical abuse) and total number of adversities pro-

spectively predict suicidal behavior in a large nationally representative sample.

Childhood abuse

Various forms of childhood abuse emerged as stronger predictors of suicidal behavior than either parental bonding or parental psychopathology. Importantly, several different forms of childhood abuse, including physical abuse, psychological maltreatment and neglect, were each significantly associated with new onset suicidal ideation and attempts even when controlling for the effects of 13 Axis I disorders and co-morbidity. This is a novel finding of the present study. One somewhat surprising observation was the non-significant association between childhood sexual abuse and both suicidal ideation and attempts. Previous studies have demonstrated a stronger association between childhood adversities and early onset than later onset psychopathology (Kessler *et al.* 1997). This suggests the possibility that childhood sexual abuse may be a risk factor for

suicidal behavior but tends to result in onset of suicidal behavior at a relatively young age. In keeping with this possibility, it was observed in supplementary analyses that sexual abuse was significantly associated with subsequent suicide ideation and attempts when subjects with baseline suicidal behavior (many of whom may have manifested suicidal behavior at an early age) were not excluded.

Parental bonding

No significant associations between parental bonding and suicidal behavior were found in the primary analyses of this study. Although the PBI has been shown to be a reliable and valid measure of parenting experiences, it does not directly capture severe negative parenting experiences, including abuse (Parker *et al.* 1997), that appear to be more strongly related to suicidal behavior. Numerous clinical and population-based studies have found statistically significant associations between parental bonding, especially parental lack of care, and psychopathology (Parker & Hadzi-Pavlovic, 1992; Kendler *et al.* 2000; Enns *et al.* 2002). However, the association between parental bonding and psychopathology in community samples has generally been less robust (Kendler *et al.* 2000; Enns *et al.* 2002) or even non-significant (MacKinnon *et al.* 1989) in community as opposed to clinical samples. The association between parental bonding and suicidal ideation and attempts has been most convincingly demonstrated in studies of young people (Tousignant *et al.* 1993; Martin & Waite, 1994; Beautrais *et al.* 1996). This suggests the possibility that parenting behavior might have an influence on early but not later onset suicidal behavior. In keeping with this possibility, it was observed in supplementary analyses that maternal lack of care (but none of the other parenting variables) was significantly associated with subsequent suicide ideation and attempts when subjects reporting lifetime suicidal behavior at baseline were not excluded.

Parental mental illness

The influence of parental mental illness on offspring suicidal behavior is potentially complex, reflecting both heritable vulnerability to mental illness and multiple effects on childhood environment (Agerbo *et al.* 2002; Brent *et al.*

2002). In the present study the effect of parental mental illness was generally modest in magnitude. The few significant associations that were seen were all for suicide attempts rather than suicide ideation. The possibility that parental mental illness has differential effects on the development of suicidal ideation *versus* attempts merits further investigation, as earlier studies have more convincingly suggested an association between family history and completed (Agerbo *et al.* 2002) or attempted (Brent *et al.* 2002) suicide.

Limitations

The results of the present study should be considered in light of its limitations. First, although the assessment of childhood adversities was based on standardized questions, it relied on retrospective recall at the time of the baseline interview. In addition, a range of important adversities was evaluated in the study, but the list was not exhaustive. Second, the study did not assess differential effects of different forms of parental psychopathology. Third, although stringent analyses of the effect of mental disorders were conducted, some disorders known to be associated with suicidal behavior (e.g. post-traumatic stress disorder and borderline personality disorder) were not assessed in this study. Fourth, the accuracy of CIDI-based diagnoses of mental disorders has been demonstrated to be high (Wittchen, 1994; Kessler *et al.* 1998), but may not match the accuracy of clinician-based interviews. Similarly, the accuracy of the two face-valid interview questions used to assess suicide ideation and attempts may not match the accuracy of clinician-based interviews. Fifth, the evaluation of suicidal ideation and attempts was based on retrospective recall at the baseline and follow-up interviews and may therefore have been subject to recall bias. In particular, because of errors in long-term recall, some of the 'new cases' of suicide ideation or attempts seen at follow-up may have been false negatives at the baseline assessment. Finally, while the response rates obtained at each stage were very good for a study of this nature (69.7% at baseline; 68.5% at second follow-up), the overall response rate for the complete study was less than half (47.8%). However, it is somewhat reassuring that psychopathology was only modestly predictive

of attrition during follow-up (de Graaf *et al.* 2000).

CONCLUSIONS

The present study demonstrated in an adult general population sample that recalled childhood adversities, particularly abuse and multiple adversities, are associated with new onset of suicidal ideation and suicide attempts. Although Axis I mental disorders accounted for part of the association between adversities and suicidal behavior, the present results suggest that childhood adversities are also independent risk factors for future suicidal behavior. These results may have important clinical implications for the assessment of suicidal risk. On a population level, these results also imply that broad social interventions that reduce exposure of young people to social and familial adversity may impact on rates of suicidal behavior.

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DECLARATION OF INTEREST

None.

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