

Population Attributable Fractions of Psychiatric Disorders and Suicide Ideation and Attempts Associated With Adverse Childhood Experiences

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Past research has established a strong association between exposure to childhood adversity and increased likelihood of psychiatric disorders^{1–5} and suicidal behavior^{6,7} in adulthood. In addition, when one looks at adverse childhood events along a continuum, a dose-response group relationship has been found with increasing severity of childhood adversity corresponding with poorer mental health outcomes.⁸ Although the relationship between childhood adversity and poor adult mental health is widely accepted, there is little information on what proportion of psychiatric disorders and suicidal behavior is attributable to adverse childhood experiences in the general population.

To date, only a few published studies have calculated population attributable fractions to estimate the proportion of psychiatric disorders and suicidality associated with adverse childhood experiences. In a study of a community sample, Scott found that 3.9% of psychiatric cases were attributable to childhood sexual abuse.⁹ Dube et al. used a clinic sample to assess the relationship between several adverse childhood experiences and illicit drug use and found that 56% of lifetime drug problems, 63% of illicit drug addiction, and 64% of intravenous drug use was attributable to having experienced at least 1 adverse childhood event.¹⁰ In a different study, Dube et al., using the same data, found that 67% of lifetime suicide attempts, 80% of child or adolescent suicide attempts, and 64% of adult suicide attempts were attributable to having experienced 1 or more adverse childhood events.¹¹ Finally, Molnar et al. found that after they controlled for the effects of psychiatric disorders and other adverse childhood experiences, 8% to 12% of serious suicide attempts were attributable to childhood sexual abuse in a nationally representative US sample.⁷

Objectives. We sought to determine the fractions of psychiatric disorders and suicide ideation and attempts in a general population sample attributable to childhood physical abuse, sexual abuse, and witnessing domestic violence.

Methods. Data were obtained from the US National Comorbidity Survey Replication. Population attributable fractions were calculated to determine the proportion of psychiatric disorders and suicide ideation and attempts attributable to adverse childhood experiences. The analysis was stratified by gender.

Results. The estimated attributable fractions for psychiatric disorders attributable to having experienced any adverse childhood event ranged from 22% to 32% among women and 20% to 24% among men. Having experienced any adverse event accounted for a substantial proportion of suicide ideation and attempts among women (16% and 50%, respectively) and men (21% and 33%, respectively). Substantial proportions of poor mental health outcomes were also attributable to increasing number of adverse events.

Conclusions. The estimated proportions of poor mental health outcomes attributed to childhood adversity were medium to large for men and women. Prevention efforts that reduce exposure to adverse childhood events could substantially reduce the prevalence of psychopathology and suicidal behavior in the general population. (*Am J Public Health*. 2008;98:946–952. doi:10.2105/AJPH.2007.120253)

The proportion of poor mental health outcomes attributable to adverse childhood experiences varies substantially from one study to another. At least some of this variation can be explained on methodological grounds. The size of the attributable fraction depends on the prevalence of the exposure in the population and the strength of association between the exposure and outcome variable.¹² In the 2 studies in which the authors reported high attributable fractions, broad definitions of any childhood events were used, including experiences such as parental divorce, which resulted in more than 60% endorsement of childhood adversity in the clinical sample.^{10,11} The high prevalence of adverse childhood events would contribute to the large estimated attributable fractions. Another explanation for the large attributable fractions in the study in which childhood adversity and suicide were examined was that the authors controlled for depressed affect, self-reported alcoholism, and

illicit drug use with single items, but did not control for psychiatric disorders.¹¹ Failure to control for psychiatric disorders when assessing the relationship between childhood adversity and suicide attempts would inflate associations and contribute to larger estimates of attributable fractions.

Conversely, other studies have shown lower attributable fractions, which are more common in epidemiological studies. The low attributable fraction in Scott's⁹ research may be partly because of the suspected underestimation of the prevalence of childhood sexual abuse, which led the author to conclude that the relationship between childhood sexual abuse and psychiatric disorders may be stronger than the results indicated. Lower attributable fractions reported by Molnar et al.⁷ were likely attributable to the inclusion of important covariates in the models.

In addition to the aforementioned methodological discrepancies in previous studies,

other methodological limitations of past research have included the calculation of attributable fractions for only 1 type of childhood adversity,^{7,9,13} the assessment of only 1 category of mental health outcome,^{7,10,11,13} the estimation of attributable fractions for females only¹³ or males and females combined without the consideration of possible gender differences,^{10,11} the failure to evaluate the impact of potentially important covariates,⁹ and the lack of nationally representative general population samples.^{9–11} We addressed the limitations of past research with the inclusion of numerous childhood adversities and mental health outcomes, the stratification of the analyses based on gender, the inclusion of important covariates, and the use of a contemporary nationally representative sample.

We sought to estimate the population attributable fractions for each group of psychiatric disorders (any mood disorder, any anxiety disorder, any substance use disorder, and any psychiatric disorder) and suicidal behavior (ideation and attempts) among men and women attributable to childhood physical abuse, childhood sexual abuse, having witnessed domestic violence, and the number of adverse childhood events experienced after adjustment for important covariates.

METHODS

Sample and Procedure

The original National Comorbidity Survey, a landmark mental health study of the US general population, was conducted in the early 1990s.¹⁴ In 2001 to 2003, data for the National Comorbidity Survey Replication (NCS-R; n=5692; response rate=70.9%) were collected in face-to-face interviews with a new US general population sample.¹⁵ The sample for our analysis was drawn from the NCS-R. Individuals 18 years and older were selected from a nationally representative multistage area probability sample that was representative of the American population on several census indicators (i.e., age, gender, race, education, marital status, region).¹⁶ Precise details of how the sample was adjusted to be representative of the American population and all weighting procedures can be found elsewhere.¹⁷

Measures

To assess childhood physical abuse, interviewers asked respondents, “As a child were you ever badly beaten up by your parents or the person who raised you?” Respondents who reported that such an event had occurred when they were 16 years or younger were considered to have experienced childhood physical abuse.

To assess childhood sexual abuse, interviewers asked respondents, (1) “Did anyone ever have sexual intercourse with you or penetrate your body with a finger or object against your will through use of threats or force, or when you were too young to understand?” and (2) “Other than rape, were you ever touched inappropriately when you did not want to be touched?” Respondents who reported that either or both of these events had occurred when they were 16 years or younger were considered to have experienced childhood sexual abuse.

To assess whether respondents had witnessed domestic violence, interviewers asked respondents if, as a child, they had ever witnessed serious physical fights at home, such as their father beating up their mother. Respondents who reported that such an event had occurred when they were 16 years or younger were considered to have witnessed domestic violence.

To assess the number of adverse childhood events experienced by respondents, the number of adverse childhood events (0 to 3) were computed and recoded into 2 variables. First, a dichotomous variable (0 vs 1 or more) was computed to assess having been exposed to any childhood adversity. Second, a continuous variable was computed (0, 1, 2, and 3) to assess the dose–response group relationship between increasing number of adverse childhood events and poor mental health outcomes.

Trained interviewers used the Composite International Diagnostic Interview 2.1¹⁸ to assess the presence of numerous psychiatric disorders based on the criteria of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.¹⁹ Lifetime psychiatric disorders were assessed in groups and included any mood disorder (major depression, dysthymia, bipolar I disorder, or bipolar II disorder), any anxiety disorder (agoraphobia, social phobia, specific phobia, generalized anxiety

disorder, posttraumatic stress disorder, or panic disorder), any substance use disorder (alcohol abuse or dependence or drug abuse or dependence), and any psychiatric disorder (including any aforementioned disorders). In addition, a dichotomous variable was computed to assess the presence of psychiatric comorbidity (2 or more psychiatric disorders). To establish a temporal sequence of events, the onset for each disorder must have occurred at age 17 years or older, after the possible occurrence of childhood physical abuse, childhood sexual abuse, and witnessing domestic violence (age of onset 16 years or younger).

To measure suicide ideation and attempts, interviewers asked respondents whether they had ever thought about committing suicide, or attempted suicide, and the age at which each event first occurred. To establish a temporal relationship with childhood adversity, suicide ideation and attempts must have occurred at age 17 years or older.

Because sociodemographic characteristics may have an impact on mental health outcomes, age, marital status, education, current household annual income, and race/ethnicity were included as covariates in all analyses. The age of the respondent was measured in years. Marital status was coded as married; separated, divorced, or widowed; or never married. Education was measured in number of years of formal education. Current household annual income was measured in US dollars. Race/ethnicity was coded as White, Black, Hispanic, or other.

Statistical Analysis

Statistical weights were applied in all analyses. Taylor series linearization was used as a variance estimation technique to account for the complex sampling design of the NCS-R.²⁰ Logistic regression analyses were used to compute adjusted odds ratios to determine the relationship between adverse childhood experiences and psychiatric disorders, suicide ideation, and suicide attempts among men and women.

When we assessed physical abuse, sexual abuse, and having witnessed domestic violence, all 3 types of childhood adversities were entered simultaneously in the models (along with sociodemographic covariates) to concurrently adjust for the experience of each

childhood adversity. Models that were used to assess any adverse childhood events and the increasing number of adverse childhood events were adjusted for sociodemographic covariates. When we assessed physical abuse, sexual abuse, and witnessing domestic violence with suicide ideation and attempts, each type of childhood abuse was entered into the models simultaneously along with sociodemographic variables, any psychiatric disorder, and psychiatric comorbidity. Models that were used to assess the association between any adverse childhood events and increasing number of adverse childhood events with suicidal ideation and attempts were adjusted for the impact of sociodemographic variables, any psychiatric disorder, and psychiatric comorbidity.

The following formula was used to calculate population attributable fractions:

$$(1) \quad P(OR-1)/1+P(OR-1),$$

where P was the percentage of the adverse childhood event endorsed in the population sample and OR was equal to the adjusted odds ratio for adverse childhood events and adult onset psychopathology and suicide ideation and attempts. The population attributable fraction estimates the proportion of the outcome in the population that would be reduced if the exposure were eliminated.²¹

RESULTS

Descriptive Statistics

The prevalence of adverse childhood events is presented in Table 1. Women were more likely than were men to have been sexually abused, to have witnessed domestic violence, and to have experienced more adverse childhood events. Table 2 reports the prevalence of mental health outcomes with age of onset of 17 years or older in the study sample. Women were more likely than were men to have a mood disorder, anxiety disorder, suicide ideation (borderline significant at $P=.051$), and suicide attempts, whereas men were more likely than were women to have a substance use disorder.

Adverse Childhood Events and Psychiatric Disorders

Adjusted odds ratios and population attributable fractions for childhood adversity and

TABLE 1—Prevalence of Adverse Childhood Events That Occurred at Age 16 Years or Younger Among US Adults in the General Population: National Comorbidity Survey Replication, 2001–2003

	Women, % (95% CI)	Men, % (95% CI)
Adverse childhood events		
Childhood physical abuse	6.1 (5.2, 7.2)	5.4 (4.5, 6.4)
Childhood sexual abuse***	19.2 (17.6, 21.0)	4.9 (4.0, 5.9)
Witnessing domestic violence*	14.3 (12.7, 16.1)	11.8 (10.3, 13.5)
No. of adverse childhood events***		
1	21.2 (19.2, 23.3)	12.3 (10.8, 14.1)
2	5.8 (5.0, 6.9)	3.5 (2.8, 4.4)
3	2.1 (1.7, 2.6)	0.7 (0.4, 1.20)

Note. CI = confidence interval.
* $P < .051$, from χ^2 test; *** $P < .001$, from χ^2 test.

psychiatric disorders among men and women are presented in Table 3. Among women, childhood sexual abuse and having witnessed domestic violence were associated with all groups of psychiatric disorders after we adjusted for all covariates. Childhood physical abuse was associated with any substance use disorder and any psychiatric disorder. An increasing number of adverse childhood events was associated with progressively increased odds of all groups of psychiatric disorders and moderate-to-large attributable fractions among women.

Among men, childhood physical abuse and having witnessed domestic violence were associated with all groups of psychiatric disorders after we adjusted for all covariates.

Childhood sexual abuse was associated with any mood disorder and any psychiatric disorder. An increased number of adverse childhood events was associated with progressively increased odds of all groups of psychiatric disorders and moderate-to-large attributable fractions among men with the exception of those who experienced 3 types of adverse childhood events and any mood disorder (which was not statistically significant probably because of a reduction of power).

In addition to the results reported in Table 3, the estimated attributable fractions for psychiatric disorders that were attributable to experiencing any adverse childhood events were 25% for any mood disorder, 22% for any anxiety disorder, 32% for any substance

TABLE 2—Prevalence of Mental Disorders With Age of Onset 17 Years and Older Among US Adults in the General Population: National Comorbidity Survey Replication, 2001–2003

	Women, % (95% CI)	Men, % (95% CI)
Psychiatric disorders		
Any mood disorder***	17.2 (15.9, 18.5)	10.9 (9.7, 12.1)
Any anxiety disorder***	16.4 (15.1, 17.7)	9.2 (8.1, 10.4)
Any substance use disorder***	7.6 (6.8, 8.6)	19.0 (17.3, 20.7)
Any mood, anxiety, or substance use disorder	29.6 (27.8, 31.4)	29.4 (27.4, 31.6)
Comorbidity of mood, anxiety, or substance use disorder	13.2 (12.1, 14.4)	14.9 (13.4, 16.4)
Suicide		
Suicidal ideation**	10.3 (9.3, 11.3)	8.7 (7.7, 9.9)
Suicide attempts***	4.7 (4.1, 5.4)	2.6 (2.1, 3.2)

Note. CI = confidence interval.
** $P < .05$, from χ^2 test; *** $P < .001$, from χ^2 test.

TABLE 3—Adjusted Odds Ratios (AORs) and Population Attributable Fractions (PAFs) for Psychiatric Disorders Among Women and Men in the US General Population: National Comorbidity Survey Replication, 2001–2003

	Any Mood Disorder		Any Anxiety Disorder		Any Substance Use Disorder		Any Disorder	
	AOR (95% CI)	PAF % (95% CI)	AOR (95% CI)	PAF % (95% CI)	AOR (95% CI)	PAF % (95% CI)	AOR (95% CI)	PAF % (95% CI)
Women								
Adverse childhood event ^a								
Physical abuse	1.36 (NS)	...	1.19 (NS)	...	1.62 (1.06, 2.47)	3.6 (0.4, 8.2)	1.65 (1.14, 2.37)	3.8 (0.8, 7.7)
Sexual abuse	1.89 (1.49, 2.41)	14.6 (8.6, 21.3)	1.57 (1.24, 2.00)	9.9 (4.4, 16.1)	1.48 (1.07, 2.03)	8.4 (1.3, 16.5)	1.79 (1.42, 2.25)	13.2 (7.5, 19.4)
Witnessing domestic violence	1.63 (1.23, 2.17)	8.3 (3.2, 14.3)	2.00 (1.50, 2.67)	12.5 (6.7, 19.3)	2.67 (1.89, 3.76)	19.3 (11.3, 28.3)	1.94 (1.45, 2.59)	11.8 (6.0, 18.5)
No. of adverse childhood events ^b								
1	1.83 (1.44, 2.33)	15.0 (8.5, 22.0)	1.61 (1.26, 2.07)	11.5 (5.2, 18.5)	2.16 (1.57, 2.97)	19.7 (10.8, 29.5)	1.83 (1.45, 2.30)	15.0 (8.7, 21.6)
2	2.67 (1.89, 3.78)	8.8 (4.9, 13.9)	2.67 (1.87, 3.80)	8.8 (4.8, 14.0)	3.27 (2.10, 5.08)	11.6 (6.0, 19.1)	3.16 (2.26, 4.43)	11.1 (6.8, 16.6)
3	4.17 (2.61, 6.69)	6.2 (3.3, 10.7)	3.99 (2.52, 6.31)	5.9 (3.1, 10.0)	6.66 (4.17, 10.64)	10.6 (6.2, 16.8)	6.14 (3.67, 10.27)	9.7 (5.3, 16.3)
Men								
Adverse childhood event ^a								
Physical abuse	1.78 (1.03, 3.06)	4.0 (0.2, 10.0)	2.30 (1.37, 3.85)	6.6 (2.0, 13.3)	1.78 (1.14, 2.78)	4.0 (0.8, 8.8)	1.91 (1.23, 2.98)	4.7 (1.2, 9.7)
Sexual abuse	1.78 (1.11, 2.88)	3.7 (0.5, 8.4)	1.52 (NS)	...	1.45 (NS)	...	2.03 (1.33, 3.12)	4.8 (1.6, 9.4)
Witnessing domestic violence	1.81 (1.18, 2.77)	8.7 (2.1, 17.3)	1.81 (1.19, 2.74)	8.7 (2.2, 17.0)	2.23 (1.59, 3.12)	12.7 (6.5, 20.0)	2.18 (1.56, 3.04)	12.2 (6.2, 19.4)
No. of adverse childhood events ^b								
1	2.62 (1.86, 3.70)	16.6 (9.6, 24.9)	2.20 (1.52, 3.17)	12.9 (6.0, 21.1)	2.17 (1.59, 2.97)	12.6 (6.8, 19.5)	2.53 (1.88, 3.41)	15.8 (9.8, 22.9)
2	2.71 (1.56, 4.73)	5.6 (1.9, 11.5)	2.75 (1.59, 4.74)	5.8 (2.0, 11.6)	3.72 (2.35, 5.89)	8.7 (4.5, 14.6)	3.43 (2.17, 5.44)	7.8 (3.9, 13.4)
3 ^c	3.03 (NS)	...	8.30 (2.56, 26.91)	4.9 (1.1, 15.4)	3.64 (1.14, 11.59)	1.8 (0.1, 6.9)	6.51 (1.69, 25.06)	3.7 (0.5, 14.4)

Notes. CI = confidence interval; NS = nonsignificant. Ellipses indicate that PAF percentage was not calculated because the AOR was not significant.

^aOdds ratios adjusted for age, marital status, income, education, ethnicity, and each adverse childhood event. Reference group for the dependent variable was absence of the disorder.

^bOdds ratios adjusted for age, marital status, income, education, and ethnicity. Reference group for the independent variable was having experienced no adverse childhood events.

^cThe sample sizes for having experienced 3 adverse childhood events by each group of psychiatric disorders among men were low (between 5 and 10), which indicates that these results should be interpreted with caution because of a reduction in power.

use disorder, and 27% for any psychiatric disorder among women and 23% for any mood disorder, 20% for any anxiety disorder, 22% for any substance use disorder, and 24% for any psychiatric disorder among men.

Adverse Childhood Events and Suicide Ideation and Attempts

Adjusted odds ratios and population attributable fractions for childhood adversity and suicide ideation and attempts among men and women are shown in Table 4. Among women, childhood physical and sexual abuse were each associated with suicide ideation, whereas all adverse childhood events were associated with suicide attempts after we adjusted for all covariates. An increased number of adverse childhood events was associated with progressively increased odds of suicide ideation and attempts and moderate-to-large attributable fractions among women. Among men, childhood physical abuse and having witnessed domestic violence were each significantly associated with

suicidal ideation, whereas childhood physical abuse and childhood sexual abuse were associated with suicide attempts after we adjusted for all covariates. An increased number of adverse childhood events was associated with progressively increased odds of suicidal ideation and attempts and moderate-to-large attributable fractions among men with the exception of those who experienced 3 types of adverse childhood events and suicide ideation (which was not statistically significant likely because of a reduction of power).

In addition to the results reported in Table 4, the experience of any adverse childhood event accounted for a substantial proportion of suicide ideation and attempts among women (16% and 50%, respectively) and men (21% and 33%, respectively).

DISCUSSION

The relationship between childhood adversity and poor adult mental health is widely

accepted. However, our study furthers this knowledge with the calculations of the estimated proportion of adult psychopathology in the general population that is attributable to childhood physical abuse, childhood sexual abuse, and having witnessed domestic violence. Our research indicated that childhood physical abuse, childhood sexual abuse, and witnessing domestic violence were associated with a substantial proportion of psychiatric disorders and suicidality in the general population among men and women.

Moreover, the pattern of findings differed among men and women. Childhood sexual abuse was significantly associated with all groups of psychiatric disorders among women after we adjusted for relevant covariates, whereas childhood physical abuse was significantly associated with all groups of psychiatric disorders among men. Although gender differences were noted, having witnessed domestic violence was significantly associated with all groups of psychiatric disorders among both

TABLE 4—Adjusted Odds Ratios (AORs) and Population Attributable Fractions (PAFs) for Suicide Ideation and Attempts Among Men and Women in the US General Population: National Comorbidity Survey Replication, 2001–2003

	Suicide Ideation		Suicide Attempts	
	AOR (95% CI)	PAF% (95% CI)	AOR (95% CI)	PAF% (95% CI)
Women				
Adverse childhood event ^a				
Physical abuse	1.54 (1.02, 2.32)	3.2 (0.1, 7.5)	2.39 (1.47, 3.89)	7.8 (2.8, 15.0)
Sexual abuse	1.51 (1.15, 1.97)	8.9 (2.8, 15.7)	3.24 (2.24, 4.67)	30.0 (19.2, 41.3)
Witnessing domestic violence	1.30 (NS)	...	1.78 (1.16, 2.74)	10.0 (2.2, 19.9)
No. of adverse childhood events ^b				
1	1.38 (1.04, 1.83)	7.5 (0.8, 15.0)	3.05 (2.02, 4.61)	30.3 (17.8, 43.4)
2	1.86 (1.23, 2.80)	4.8 (1.3, 9.5)	6.36 (3.90, 10.36)	23.7 (14.4, 35.2)
3	3.49 (2.08, 5.86)	5.0 (2.2, 9.3)	13.07 (7.75, 22.04)	20.2 (12.4, 30.6)
Men				
Adverse childhood event ^a				
Physical abuse	2.14 (1.32, 3.49)	5.8 (1.7, 11.9)	3.34 (1.62, 6.92)	11.2 (3.2, 24.2)
Sexual abuse	1.34 (NS)	...	2.28 (1.12, 4.64)	5.9 (0.6, 15.1)
Witnessing domestic violence	1.79 (1.20, 2.68)	8.5 (2.3, 16.5)	1.28 (NS)	...
No. of adverse childhood events ^b				
1	1.95 (1.32, 2.89)	10.5 (3.8, 18.9)	3.40 (1.92, 6.01)	22.8 (10.2, 38.1)
2	3.92 (2.36, 6.53)	9.3 (4.5, 16.2)	4.44 (2.07, 9.51)	10.7 (3.6, 22.9)
3 ^c	2.72 (NS)	...	6.63 (2.08, 21.09)	3.8 (0.8, 12.3)

Notes. CI = confidence interval; NS = nonsignificant. Ellipses indicate that PAF percentage was not calculated because the AOR was not significant.

^aOdds ratios adjusted for age, marital status, income, education, ethnicity, each adverse childhood event, having any psychiatric disorder, and psychiatric comorbidity.

^bOdds ratios adjusted for age, marital status, income, education, ethnicity, having any psychiatric disorder, and psychiatric comorbidity. Reference group for the independent variable was having experienced no adverse childhood events.

^cThe sample sizes for having experienced 3 adverse childhood events by suicidal ideation and attempts among men were low (n = 6 and n = 7), which indicated that these results should be interpreted with caution because of the reduction in power.

men and women. In addition, suicide ideation was attributable to childhood physical abuse and childhood sexual abuse among women and was attributable to childhood physical abuse and having witnessed domestic violence among men. However, suicide attempts were attributable to childhood physical abuse and childhood sexual abuse among men and all 3 types of childhood adversity among women.

A dose–response group relationship was found between increased number of adverse childhood events and increased odds of poor mental health outcomes. However, the same increasing pattern was not found for attributable fractions because the size of attributable fractions partly depends on the prevalence of the exposure. This means that even though the odds ratios were largest when all 3 types of abuse were experienced, the attributable fractions did not progressively

increase, because of the decreased prevalence of having experienced an increasing number of adverse childhood events. However, the estimated proportion of adult psychopathology and suicide ideation and attempts attributable to the increasing number of adverse childhood events were substantial. For example, only 2% of women experienced all 3 types of adverse childhood events, but those who experienced all 3 types attributed to 10% of any psychiatric disorder and 20% of suicide attempts among women.

The estimated attributable fractions for any adverse childhood event and each group of psychiatric disorders were substantial for men and women. Approximately 1 in 4 women with a mood disorder, 1 in 5 women with an anxiety disorder, and 1 in 3 women with a substance use disorder may not have had the disorder if the childhood physical abuse,

childhood sexual abuse, and witnessing domestic violence had not occurred. Among men, approximately 24% of psychopathology assessed was attributable to having experienced any childhood adversity. In other words, if the physical abuse, sexual abuse, and witnessing domestic violence in childhood did not occur, the prevalence of assessed psychiatric disorders among men in the general population might have been reduced by approximately 24%.

A striking finding from our study was that the highest attributable fraction corresponded with any childhood adversity and suicide attempts. More specifically, the results indicated that if childhood physical abuse, childhood sexual abuse, and having witnessed domestic violence did not occur, the prevalence of suicide attempts among women and men in the general population would have been reduced by approximately 50% and 33%, respectively. Childhood adversity may influence an individual's coping strategies and abilities to manage distress. Research has indicated that individuals who have experienced childhood abuse often use disengagement coping strategies such as denial, emotional suppression, and cognitive and behavioral avoidance.^{22–24} It also has been suggested that distress creates a desire to promptly escape severe emotional pain.²⁴ Without the use of positive coping mechanisms, abused individuals may have difficulty managing distress and turn to thoughts and behaviors of suicide as a means of escape. Regardless of the mechanism, the large attributable fraction for any adverse childhood events and suicide attempts among men and women found in our study illustrated the significant impact of abuse and witnessing domestic violence.

Limitations

Several limitations of this study should be considered. First, the data for the analysis were cross-sectional and retrospective in nature. Although the retrospective survey design may have introduced sampling error, there is evidence supporting the accuracy of recall of adverse childhood events.²⁵ Furthermore, a review of the literature indicated that there is little evidence that depressive or anxious mood is associated with memory deficits and that mood does not seem to influence the retrospective recall of early experiences.²⁶

Second, although a temporal relationship was established in the current analysis with adverse childhood events that occurred before the onset of psychiatric disorders and suicide ideation and attempts, a true causal relationship still cannot be determined because a longitudinal, prospective design with intervention versus nonintervention group assignment is needed for investigations of causality. This is an important point because an assumption of attributable fractions indicates that the relationship between exposure and outcome is causal.

Additionally, it should be noted that a large proportion of psychiatric disorders in our data predominantly had a late onset (i.e., at age 17 years or older) as opposed to an early onset (i.e., at age 16 years or younger). Finally, measures of neglect and psychological maltreatment were not assessed in the data and could not be directly accounted for in the models. Some of our results may have been further attenuated if neglect and psychological maltreatment had been included. Future research that includes such measures is necessary.

Important Public Health Implications

Our findings have important public health implications. Childhood physical abuse, childhood sexual abuse, and witnessing domestic violence contributed to moderate-to-large proportions of psychiatric disorders and suicidal ideation and attempts in the general population among both men and women. In some instances, the associations were relatively small; for example, 3.7% of any mood disorders were attributable to childhood sexual abuse among men. In other instances, the associations were large, with approximately 50% of suicide attempts attributable to the experience of childhood adversity among women. Reducing the prevalence of suicide attempts by 50% would have a dramatic impact on the health and well-being of a population. However, even substantially smaller reductions in psychiatric morbidity in a population would translate to significant reductions of tangible and intangible costs at the individual, familial, and societal level. Examples of these costs include an individual's reduced health and functioning, family stress and dysfunction, societal economic losses because of disability, and financial burdens on the healthcare system.

Broad social interventions that reduce child abuse may have a beneficial impact on the reduction of psychiatric illness and suicidality in the general population. Parenting programs and intensive family preservation services are examples of social interventions that have been implemented to reduce the incidence and prevalence of child abuse.^{27,28} Other interventions such as nurse home-visiting programs for improving maternal and child health and functioning have been proven to be effective in reducing child maltreatment in some populations.^{29,30} However, research has also indicated in other populations that nurse or paraprofessional home-visitation programs are not very effective in reducing child maltreatment.^{31–33} A meta-analysis of 40 early prevention programs for families at risk for child abuse determined that such programs produced overall positive, although somewhat modest, effects.³⁴ The identification of strategies that reduce incidence and recurrence of child abuse needs to be supported.³⁵ Prevention priorities that have been identified include the evaluation of the effectiveness of child abuse prevention strategies, interventions, policies, health care professional training programs, and surveillance methods; changing social norms; examining health consequences; and identifying at-risk populations and modifiable risk and protective factors.³⁶

From a public health perspective, research that investigates the proportion of poor mental health that is attributable to childhood adversity may help to inform healthy public policy. Rather than primarily focusing on preventive (e.g., educational campaigns) or ameliorative approaches (e.g., psychological treatment) that may only target a small proportion of the population, it has been suggested that a whole-population approach that balances upstream (healthy public policy), midstream (preventative), and downstream (curative) interventions would have the greatest overall impact on the health of a society.³⁷ For example, the World Health Organization population approach to child abuse prevention includes implementing legal reform and human rights, introducing useful social and economic policies, changing social and cultural norms, reducing economic inequalities, reducing environmental risk factors, implementing home visitation programs and parenting training,

reducing unplanned pregnancies, increasing access to prenatal and postnatal services, and training children to recognize and avoid abusive situations.³⁸ A whole population approach that successfully reduces childhood adversity may translate into an important reduction in psychiatric disorders and suicidal ideation and attempts in the population. Therefore, a whole population approach that begins with research to demonstrate its utility needs to be encouraged. ■

About the Authors

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Contributors

T.O. Afifi developed the research questions and study design, conducted the statistical analysis, and wrote most sections of the article. M.W. Enns developed the research questions and study design, wrote sections of the article, and revised and edited the article. B.J. Cox, G.J.G. Asmundson, M.B. Stein, and J. Sareen developed the research questions and study design and edited and revised the article.

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Human Participant Protection

The human subject committees from Harvard Medical School and the University of Michigan both provided ethical approval for recruitment and consent procedures, which included informed verbal consent from all participants.

References

1. Afifi TO, Brownridge DA, Cox BJ, Sareen J.

- Physical punishment, childhood abuse, and psychiatric disorders. *Child Abuse Negl.* 2006;30:1093–1103.
2. Kessler RC, Davis CG, Kendler KS. Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychol Med.* 1997;27:1101–1119.
 3. Levitan RD, Rector NA, Sheldon T, Goering P. Childhood adversities associated with major depression and/or anxiety disorders in a community sample of Ontario: issues of co-morbidity and specificity. *Depress Anxiety.* 2003;17:34–42.
 4. MacMillan HL, Fleming JE, Streiner DL, et al. Childhood abuse and lifetime psychopathology in a community sample. *Am J Psychiatry.* 2001;158:1878–1883.
 5. Molnar BE, Buka SL, Kessler RC. Child sexual abuse and subsequent psychopathology: results from the National Comorbidity Survey. *Am J Public Health.* 2001;91:753–760.
 6. Enns MW, Cox BJ, Afifi TO, de Graaf R, ten Have M, Sareen J. Childhood adversities and risk for suicidal ideation and attempts: a longitudinal population-based study. *Psychol Med.* 2006;36:1769–1778.
 7. Molnar BE, Berkman LF, Buka SL. Psychopathology, childhood sexual abuse and other childhood adversities: relative links to subsequent suicidal behaviour in the US. *Psychol Med.* 2001;31:965–977.
 8. Fergusson DM, Lynskey MT. Physical punishment/maltreatment during childhood and adjustment in young adulthood. *Child Abuse Negl.* 1997;21:617–630.
 9. Scott KD. Childhood sexual abuse: impact on a community's mental health status. *Child Abuse Negl.* 1992;16:285–295.
 10. Dube SR, Felitti VJ, Dong M, Chapman DP, Giles WH, Anda RF. Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: the adverse childhood experiences study. *Pediatrics.* 2003;111:564–572.
 11. Dube SR, Anda RF, Felitti VJ, Chapman DP, Williamson DF, Giles WH. Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study. *JAMA.* 2001;286:3089–3096.
 12. Young TK. *Population Health: Concepts and Methods.* New York, NY: Oxford University Press; 1998.
 13. Wonderlich SA, Wilsnack RW, Wilsnack SC, Harris TR. Childhood sexual abuse and bulimic behavior in a nationally representative sample. *Am J Public Health.* 1996;86:1082–1086.
 14. Kessler RC, McGonagle KA, Zhao S, et al. Lifetime and 12-month Prevalence of DSM-III-R Psychiatric Disorders in the United States. Results from the National Comorbidity Survey. *Arch Gen Psychiatry.* 1994;51:8–19.
 15. Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry.* 2005;62:617–627.
 16. Kessler RC, Berglund P, Demler O, et al. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *JAMA.* 2003;289:3095–3105.
 17. Kessler RC, Berglund P, Chiu WT, et al. The US National Comorbidity Survey Replication (NCS-R): design and field procedures. *Int J Methods Psychiatr Res.* 2004;13:69–92.
 18. Kessler RC, Ustun TB. The World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). *Int J Methods Psychiatr Res.* 2004;13:93–121.
 19. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.* Washington, DC: American Psychiatric Association; 1994.
 20. Shah BV, Barnswell BG, Bieler GS. *SUDAAN User's Manual: Software for Analysis of Correlated Data.* Release 6.40. Research Triangle Park, NC: Research Triangle Institute; 1995.
 21. Last JM. *A Dictionary of Epidemiology.* 4th ed. New York, NY: Oxford University Press; 2001.
 22. Gibson L, Leitenberg H. The impact of child sexual abuse and stigma on methods of coping with sexual assault among undergraduate women. *Child Abuse Negl.* 2001;25:1343–1361.
 23. Leitenberg H, Greenwald E, Cado S. A retrospective study of long-term methods of coping with having been sexually abused during childhood. *Child Abuse Negl.* 1992;16:399–407.
 24. Leitenberg H, Gibson LE, Novy PL. Individual differences among undergraduate women in methods of coping with stressful events: the impact of cumulative childhood stressors and abuse. *Child Abuse Neglect.* 2004;28:181–192.
 25. Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. *J Child Psychol Psychiatry.* 2004;45:260–273.
 26. Brewin CR, Andrews B, Gotlib IH. Psychopathology and early experience: a reappraisal of retrospective reports. *Psychol Bull.* 1993;113:82–98.
 27. *World Report on Violence and Health.* Geneva, Switzerland: World Health Organization; 2002.
 28. MacLeod J, Nelson G. Programs for the promotion of family wellness and the prevention of child maltreatment: a meta-analytic review. *Child Abuse Negl.* 2000;24:1127–1149.
 29. Olds DL, Henderson CR Jr, Chamberlin R, Tatelbaum R. Preventing child abuse and neglect: a randomized trial of nurse home visitation. *Pediatrics.* 1986;78:65–78.
 30. Olds DL, Eckenrode J, Henderson CR Jr, et al. Long-term effects of home visitation on maternal life course and child abuse and neglect. Fifteen-year follow-up of a randomized trial. *JAMA.* 1997;278:637–643.
 31. MacMillan HL, Thomas BH, Jamieson E, et al. Effectiveness of home visitation by public-health nurses in prevention of the recurrence of child physical abuse and neglect: a randomised controlled trial. *Lancet.* 2005;365:1786–1793.
 32. Duggan A, McFarlane E, Fuddy L, et al. Randomized trial of a statewide home visiting program: impact in preventing child abuse and neglect. *Child Abuse Negl.* 2004;28:597–622.
 33. Duggan A, Fuddy L, Burrell L, et al. Randomized trial of a statewide home visiting program to prevent child abuse: impact in reducing parental risk factors. *Child Abuse Negl.* 2004;28:623–643.
 34. Geeraert L, Van den Noortgate W, Grietens H, Onghena P. The effects of early prevention programs for families with young children at risk for physical child abuse and neglect: a meta-analysis. *Child Maltreat.* 2004;9:277–291.
 35. MacMillan HL, Wathen CN. Family violence research: lessons learned and where from here? *JAMA.* 2005;294:618–620.
 36. Centers for Disease Control and Prevention injury research agenda. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2002. Available at: http://www.cdc.gov/ncipc/pub-res/research_agenda/agenda.htm. Accessed March 12, 2008.
 37. McKinlay JB. Paradigmatic obstacles to improving the health of populations—implications for health policy. *Salud Publica Mex.* 1998;40:369–379.
 38. *Preventing Child Maltreatment: A Guide to Taking Action and Generating Evidence.* Geneva, Switzerland: World Health Organization; 2006.

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