Published in final edited form as:
Arch Gen Psychiatry. 2012 November 1; 69(11): 1151–1160. doi:10.1001/archgenpsychiatry.2011.2277.

Childhood adversities and first onset of psychiatric disorders in a national sample of adolescents

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Abstract

Context—Although childhood adversities (CAs) are known to be highly co-occurring, most research examines their associations with mental disorders one at a time. Recent evidence from adult studies suggests, though, that the associations of multiple CAs with mental disorders are non-additive, arguing for the importance of multivariate analysis of multiple CAs. No attempt has yet been made to carry out a similar kind of analysis among children or adolescents.

Objective—To examine the multivariate associations of 12 CAs with first onset of mental disorders in a national sample of US adolescents.

Design—US national survey of adolescents (ages 13–17) assessing DSM-IV anxiety, mood, behavior, and substance disorders and CAs. The CAs include parental loss (death, divorce, other separations), maltreatment (physical, sexual, and emotional abuse, neglect), parental maladjustment (psychopathology, substance abuse, criminality, violence) and economic adversity.

Setting—Dual-frame household-school samples.

Participants—6,483 adolescents-parent pairs.

Main outcome measure—Lifetime DSM-IV disorders assessed with the WHO Composite International Diagnostic Interview.

Results—58.3% of adolescents reported at least one CA, among whom 59.7% reported multiple CAs. CAs reflecting maladaptive family functioning (MFF) were more strongly associated than other CAs with disorder onsets. The best-fitting model included terms for type and number of CAs and distinguished between MFF and Other CAs. CAs predicted behavior disorders most strongly and fear disorders least strongly. The joint associations of multiple CAs were sub-additive. The population-attributable risk proportions for disorder classes ranged from 15.7% for fear disorders to 40.7% for behavior disorders. CAs were associated with 28.2% of all onsets.

Conclusions—CAs are common, highly co-occurring, and strongly associated with onset of mental disorders among US adolescents. The sub-additive multivariate associations of CAs with

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Author Contributions: All authors had full access to all of the data in the study. Kessler takes responsibility for the integrity of the data and the accuracy of the data analysis.

The remaining authors report nothing to disclose.

disorder onsets have implications for targeting interventions to reduce exposure to CAs and to mitigate the harmful effects of CAs to improve population mental health.

Keywords

childhood adversity; maltreatment; adolescent; mental disorder

Childhood adversities (CAs) are among the most consistently documented risk factors for psychiatric disorders.[1–6] Research has shown that a number of different CAs, including parental death, abuse, neglect, and family violence, are strongly related to mental disorders.[6–10] Research has also shown that these diverse CAs often co-occur.[3, 11–13] Despite this evidence of co-occurrence, though, most research has focused either on single CAs[7–9, 14] or on a count of number of CAs as predictors of mental disorders.[1, 3, 15] This has led to an over-estimation of the effects of individual CAs and to the neglect of potentially important multivariate CA profiles. Recent studies using retrospective CA reports among adults have tried to address this problem by studying multivariate associations of numerous CAs with mental disorders.[4, 16] These studies documented strong non-additive associations of CAs related to maladaptive family functioning (maltreatment and parental maladjustment) with adult mental disorders. The use of retrospective reports of CAs in these studies, though, could have introduced systematic recall bias into results.[4, 17, 18] No attempt has yet been made to determine if similar patterns exist among children or adolescents. We present such data in the current report based on analysis of the National Comorbidity Survey Replication Adolescent Supplement (NCS-A),[19] a national general population survey of the prevalence and correlates of DSM-IV mental disorders among US adolescents.

METHODS

Sample

As previously reported in more detail,[20] the NCS-A was carried out between February 2001 and January 2004. Adolescents aged 13–17 were interviewed face-to-face in dual-frame household and school samples.[20, 21] The household sample included adolescents who were recruited from households that participated in the National Comorbidity Survey Replication (NCS-R).[22] A total of 879 school-attending adolescents participated in the household survey, with a response rate of 86.8% (conditional on adult participation in the NCS-R). The remainder of the sample included 9,244 adolescents recruited from a representative sample of schools in NCS-R sample areas. The adolescent response rate in the school sample was 82.6% (conditional on school participation). The total NCS-A sample, combining household and school samples, included 10,123 adolescents. Although the proportion of initially selected schools that participated in the NCS-A was low (28.0%), replacement schools were carefully matched to the original schools. Comparison of household sample respondents from nonparticipating schools with school sample respondents from replacement schools found no evidence of bias in estimates of either prevalence or correlates of mental disorders.[20]

One parent or guardian was asked to complete a self-administered questionnaire (SAQ) about the participating adolescent's developmental history and mental health. The SAQ response rate, conditional on adolescent participation, was 82.5% in the household sample and 83.7% in the school sample. Written informed consent was obtained from parents or guardians before approaching adolescents. Written adolescent assent was then obtained from adolescents before surveying either adolescents or parents. Each respondent was given $50 for participation. These recruitment and consent procedures were approved by the Human Subjects Committees of Harvard Medical School and the University of Michigan. This

report focuses on the 6,483 student adolescent-parent pairs for whom data were available from both adolescent interviews and SAQs.

Once the survey was completed, cases were weighted for variation in within-household probability of selection in the household sample and residual discrepancies between sample and population socio-demographic and geographic distributions. The household and school samples were then merged with sums of weights proportional to relative sample sizes adjusted for design effects in estimating disorder prevalence. These weighting procedures are detailed elsewhere.[20] The weighted socio-demographic distributions of the composite sample closely approximate those of the Census population.[21]

Measures

Diagnostic Assessment—Adolescents were administered a modified version of the Composite International Diagnostic Interview (CIDI), a fully-structured interview administered by trained lay interviewers.[23] Previous factor analysis of lifetime DSM-IV disorders in the NCSA found that they differentiated into four disorder classes:[24] fear disorders (panic disorder with or without agoraphobia, agoraphobia without history of panic disorder, social phobia, specific phobia, and intermittent explosive disorder [IED]), distress disorders (major depressive disorder [MDD] or dysthymia, generalized anxiety disorder [GAD], post-traumatic stress disorder [PTSD], and separation anxiety disorder), behavior disorders (attention-deficit/hyperactivity disorder [ADHD], oppositional-defiant disorder [ODD], and conduct disorder [CD]), and substance disorders (alcohol abuse with or without dependence and drug abuse with or without dependence). Although our finding that internalizing disorders are best represented by separate fear and distress dimensions is consistent with previous research,[25, 26] it is unclear how these dimensions will map onto the domains recently proposed in the NIMH Research Domain Criteria.[27]

Parents provided information about adolescent symptoms of MDD/dysthymia, ADHD, ODD, and CD, disorders for which parent reports have previously been shown to play a large role in diagnosis.[28, 29] Parent and adolescent reports were combined at the symptom level using an “or” rule, such that a symptom was considered present if it was endorsed by either respondent. All diagnoses were made using DSM-IV organic exclusion rules. All but two diagnoses were made using DSM-IV diagnostic hierarchy rules. The exceptions were ODD, which was defined with or without CD, and substance abuse, which was defined with or without dependence.

A clinical reappraisal study blindly re-interviewed a sub-sample of NCS-A respondents with the Schedule for Affective Disorders and Schizophrenia for School-Age Children Lifetime Version (K-SADS).[30] As reported in more detail elsewhere,[31] concordance between lifetime CIDI/SAQ and K-SADS diagnoses was good, with area under the receiver operating characteristic curve (AUC) of .81–.94 for fear disorders, .79–.87 for distress disorders, .78–.98 for behavior disorders, .56–.98 for substance disorders, and .87 for any disorder. Diagnoses of IED were not validated because IED is not assessed in the K-SADS.

Childhood Adversities—The NCS-A interviews and parent SAQs assessed twelve CAs. These included three types of interpersonal loss (parental death, parental divorce, and other loss of contact with parents or caregivers), four types of parental maladjustment (mental illness, substance abuse, criminality, and family violence), four types of maltreatment (physical abuse, sexual abuse, emotional abuse, and neglect), and family economic adversity. Parental death and divorce were assessed only in regards to biological parents, not step-parents or other caregivers. The measure of other loss of contact with parents or caregivers, however, included any disruption of a relationship that lasted for six months or longer that either involved a caregiver leaving the respondent’s home (e.g., the biological

mother abandoned the family) or the respondent leaving home (e.g., foster care placement or adoption). Respondents who were born to a single mother and never experienced any further disruption of this parenting arrangement were not coded as experiencing parental loss. We did not code separations from caregivers that involved the respondent being placed in a juvenile detention center or running away from home. We collected information on timing (i.e., the respondent's age) for all parental loss events.

Physical and emotional abuse of the respondent by parents or caregivers were assessed with a modified version of the Conflict Tactics Scale (CTS).[32] Sexual abuse was assessed with questions from the CIDI regarding sexual assault, attempted rape, and rape. Information was also collected on the age at which sexual abuse first occurred. Neglect was assessed with a battery of questions used in studies of child welfare that asked about frequency of not having adequate food, clothing, or medical care, having inadequate supervision, and being required to do chores that were age-inappropriate.[33] Parental criminality was assessed with questions in the CIDI and the SAQ about whether a parent either engaged in criminal activities like burglary or selling stolen property or was ever arrested or sent to prison for criminal activity.[5] Parental mental illness (major depression, GAD, panic disorder, suicide attempt) and substance abuse were assessed with the Family History Research Diagnostic Criteria (FHRDC) Interview[34] and its extensions,[35] as well as with items completed by parents in the SAQ. Family violence was assessed with the modified CTS and an item in the trauma section of the CIDI on the respondent's age when they first observed inter-parental violence. Economic adversity was assessed with questions in the SAQ about whether the respondent's family received welfare or other government assistance or often did not have enough money to pay for basic necessities of living.

Analysis Methods

Associations of dichotomously-scored CAs with first onset of mental disorders were estimated using discrete-time survival analysis with person-year the unit of analysis,[36] controlling for respondent age at interview, gender, race-ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic, Other), and other DSM-IV/CIDI disorders with onsets prior to the focal disorder under investigation. The controls for earlier-onset disorders were included to adjust for the associations of CAs with earlier-onset disorders and the associations of these disorders with subsequent disorder onsets. A number of multivariate models were estimated using the modeling approach developed in our earlier work on this topic.[4, 16] Each model included dummy predictor variables for CAs and controls. M1 was a series of bivariate models (i.e., one CA at a time predicting disorders). M2 was an additive model that included a separate predictor variable for each of the 12 CAs. M3 included predictor variables for number of CAs without variables for specific types of CAs. M4 included 12 predictors for type of CA and additional predictors for number of CAs, the latter representing nonspecific interactions. M5 modified M4 by including separate counts of CAs associated either with indicators of maltreatment and parental maladjustment or with other CAs. This distinction was based on evidence in our earlier adult studies[4] that maltreatment and parental maladjustment, which we refer to collectively as indicators of maladaptive family functioning (MFF), were more important than other CAs in predicting mental disorders. M6 modified the counts in M5 to distinguish aspects of MFF associated with harsh treatment of the adolescent (physical abuse, emotional abuse, neglect) from other aspects of MFF (divorce, inter-parental violence, parent mental illness, substance disorder, and criminality) based on the results of a factor analysis in the NCSA that found this distinction in the data. (Detailed results of the factor analysis are available on request). M7, finally, included predictors not only for types and number of CAs, but also for interactions between types and number.

The Akaike Information Criterion (AIC)[37] and Bayesian Information Criteria (BIC)[38] were used to select the best multivariate model among M2–M7 to predict first onset of any disorder based on a consolidated data file that stacked the 14 separate disorder-specific person-year data arrays and included 13 dummy variables to distinguish among these files, thereby forcing the estimated slopes of disorders on CAs to be constant across the 14 disorders. This best-fitting specification was then used to predict first onset of disorders within each of the four broad disorder classes (fear, distress, behavior, and substance disorders). Survival coefficients and their standard errors were exponentiated and are reported as odds-ratios (ORs) and 95% confidence intervals (95% CIs).

The population attributable risk proportion (PARP) of the outcomes was computed for the best-fitting model to provide a sense of the overall importance of CAs in predicting adolescent mental disorders. PARP is the proportion of observed disorders that would not have occurred in the absence of CAs if the associations described in the survival coefficients reflect causal effects of CAs.[39] Although it is inappropriate to infer causality from non-experimental data, the calculation of PARP is nonetheless useful to provide a sense of the magnitude of associations. PARP was calculated using simulation methods to generate individual-level predicted probabilities of mental disorders from the coefficients in the best-fitting model with and without coefficients for CAs. PARP is equal to one minus the ratio of the predicted prevalence estimates in the two specifications. PARP for the pooled dataset is the average PARP across all disorders based on a constant model across disorders. All significance tests were evaluated using .05-level two-sided tests. The design-based Taylor series method implemented in the SUDAAN software system[40] was used to estimate standard errors.

RESULTS

Prevalence and co-occurrence of childhood adversities

More than half (58.3%) of NCS-A adolescent respondents reported exposure to at least one CA. (Table 1) The most common CAs were parental divorce (28.4%), parental criminality (26.3%), economic adversity (16.2%), and parental mental illness (15.6%). The vast majority of respondents with at least one CA reported exposure to multiple CAs, with the rate of co-occurrence ranging from 70.9% for parental divorce to 97.8% for parental substance abuse. The mean number of CAs among respondents with more than one was 3.2.

Associations of childhood adversities with first onset of DSM-IV disorders

In the bivariate models (M1) that considered only one CA at a time, all 12 CAs were significant predictors of the DSM-IV disorders considered here in pooled models, with ORs in the range 1.7–2.2 for MFF CAs and 1.3–1.6 for other CAs. (Table 2) The ORs were attenuated in the additive multivariate model (M2), which corrects for over-estimation of the associations involving individual CAs in bivariate models. Nine CAs remained significant in M2, with ORs of 1.2–1.4 for MFF CAs and 1.1–1.2 for other CAs. The test for the joint associations of all CAs in this model was significant (χ^2_{12}=775.3, p<.001), as were the tests for the joint associations of MFF (χ^2_8=291.8, p<.001) and other CAs (χ^2_4=28.0, p<.001). A test for variation in ORs was also significant, indicating that the strength of the ORs varied across the CAs (χ^2_{11}=25.4, p=.008).

The multivariate model that considered only number and not type of CAs (M3) showed monotonically increasing ORs with number of CAs, ranging from 1.4 for exactly one CA to 4.6 for 7+ CAs. The test for the joint associations of number-of-CAs was significant (χ^2_7=320.6, p<.001). However, subsequent models that included information about both type and number of CAs had better measures of fit based on AIC and BIC. The best-fitting

model (M5) distinguished MFF CAs from other CAs but did not further divide the MFF CAs into those directed at the adolescent (i.e. abuse-neglect) from those involving parental maladjustment. (Detailed results of model-fitting are available on request) In this model, types of CAs were significant as a set after controlling for number of CAs (χ^2_{12}= 113.4, p<.001) and number of MFF CAs were significant as a set after controlling for CA types (χ^2_8= 24.1, p<.001). (Table 3) The joint test for number of other CAs, however, was not significant (χ^2_2= 5.6, p=.061). As in the additive model, this model showed variation in the strength of the ORs across CA types (χ^2_{11}=34.0, p<.001), with MFF CAs having consistently higher ORs than other CAs. The ORs associated with CA types in this model were generally higher than in the additive model, indicating that the additivity assumption led to a downward bias in the estimated associations of individual CAs with disorders. This bias occurred because the ORs associated with number of CAs in the more complex model were generally less than 1.0 and became increasingly smaller as the number of CAs increased. This pattern of sub-additive interactions indicates that the odds of disorder onset increased at a significantly *decreasing rate* as number of CAs increased. This best-fitting model is the one used in subsequent disaggregated analyses.

Differential associations by class and type of DSM-IV disorder

A test for variation in the 20 CA coefficients (12 for CA types and 8 for number of CAs) across the four disorder classes was significant (χ^2_{60}=704.6, p<.001), indicating that the associations of CAs with disorder onsets varied across disorder classes. Types of CAs were always associated with increased odds of disorder onset jointly (χ^2_{12}=42.0–158.1, p<.001). Eight CA types were associated with onset of behavior and substance disorders, 6 with distress disorders, and 4 with fear disorders. MFF CAs were significantly associated with onset of fear, distress, and substance disorders (χ^2_8= 28.3–58.7, p<.001), but not behavior disorders (χ^2_8=12.8, p=.12). Other CAs, in contrast, were associated with onset of fear, distress, and behavior disorders (χ^2_4=10.4–28.2, p=.19–<.001), but not substance disorders (χ^2_4=7.9, p=.09). (Table 3) The ORs associated with number of MFF CAs were associated with significantly decreased odds (again, indicating the existence of sub-additive interactions) of fear and substance disorders (χ^2_7=14.7–17.8, p=.023–.007) but not distress and behavior disorders. The ORs associated with number of other CAs were not significant for any outcome.

The joint associations of the 20 CA coefficients with individual disorder onsets also varied *within* each of the disorder classes ($\chi^2_{20–100}$=136.9–390.6, p<.001). (Detailed results are available on request.) For fear disorders, CAs were most consistently associated with social phobia, specific phobia, and IED and were unrelated to agoraphobia or panic disorder. Within the distress disorders, CAs were most strongly and consistently associated with PTSD followed by MDD/dysthymia, less consistently with GAD, and were largely unrelated to separation anxiety disorder. Of the behavior disorders, CAs were associated most consistently with ADHD. For substance disorders, finally, CAs were more consistently associated with alcohol abuse/dependence then drug abuse/dependence.

Differential associations by gender and race/ethnicity

To evaluate whether the associations of CAs with disorder onsets differed for males and females, we added interactions between gender and both type and number of CAs to the best-fitting model. The BIC indicated that the additive model fit the data best, while the AIC indicated that the interactive model fit best. Global χ^2 tests for the overall significance of interactions between CAs and gender were significant in predicting any disorder as well as each of the four disorder classes (χ^2_{20}=47.4–413.9, p<.001). Inspection of individual interactions found 12.0% to be significant at the .05 level. However, there was no clear

pattern of results either overall or for particular classes of CAs or disorders. (Detailed results are available on request.)

We also added interactions between race/ethnicity (Non-Hispanic Black and Hispanic vs. others) and both type and number of CAs. AIC and BIC both indicated that the interactive model fit best. Overall interactions between CAs and race/ethnicity were significant in predicting any disorder as well as each of the four classes of disorders (χ^2_{20}=59.6–401.9, p<.001 for Non-Hispanic Black respondents and χ^2_{20}=77.2–169.0, p<.001 for Hispanic respondents). However, inspection of individual interactions revealed no clear pattern of results, and only 6% of interactions were significant at the .05 level. (Detailed results are available on request.)

The population-level associations of childhood adversities with disorder onset

PARPs of the outcomes associated with the CAs based on the best-fitting model showed that CAs explain (in a predictive rather than a causal sense) 28.2% of all disorders, 15.7% of fear disorders, 32.2% of distress disorders, 40.7% of behavior disorders, and 34.4% of substance disorders. (Table 4) The MFF CAs were more important than other CAs (23.7% vs. 6.4%). The most important individual CAs were parental criminality (9.2%) and parental mental illness (6.8%).

DISCUSSION

The above results are limited in several ways. First, even though recall bias is expected to be less extreme in a survey of adolescents than adults, recall bias is still a possibility in NCS-A retrospective reports of both CAs and lifetime disorders. Special procedures shown experimentally to improve the accuracy of disorder age-of-onset reports were used to address this problem,[41] but recall bias is impossible to eliminate completely. Second, our analysis focused on the sample of adolescents for whom we were able to obtain parent SAQs. It is possible that parents of adolescents with higher exposure to CAs were less likely to provide these SAQs, resulting in underestimation of CA prevalence. Third, the NCS-A assessed the timing only of discrete CAs (parental loss events, sexual abuse), which means that some disorder onsets may have occurred prior to the occurrence of the CAs that we used as predictors. Reverse causation is a particular concern for behavior disorders, because disruptive behavior problems are known to increase the likelihood of harsh parenting.[42, 43] This limitation is especially important because the associations of CAs with psychopathology may vary depending on the timing of exposure.[44, 45] Fourth, the NCS-A lacks information on frequency or severity of CAs. The stronger associations for MFF CAs than other CAs might be due, at least in part, to this limitation. Finally, our definition of CA was not exhaustive. We focused specifically on family-related adversities, consistent with previous work,[12, 15] but numerous other adversities are associated with elevated risk of early-onset psychopathology.[46–48]

Within the context of these limitations, the NCS-A results suggest that the majority of U.S. adolescents have been exposed to at least one of the CAs considered here, that exposure to multiple CAs is the norm among those exposed, that many of these CAs are significant correlates of child-adolescent mental disorders, that MFF CAs are of special importance in this regard, and that the joint associations of multiple CAs are sub-additive. These results are highly consistent with those found in our parallel studies of adults.[4, 16] The NCS-A results are quite similar for boys and girls and for adolescents from different racial/ethnic backgrounds, a finding that is consistent with most, although not all,[49, 50] previous studies. We did not investigate whether associations vary as a function of socio-economic status or other socio-demographic characteristics of respondents. This is a subject for future research.

The NCS-A results diverge in one way from our previous adult studies, in that the latter studies found little evidence of differential CA associations by disorder type.[4, 16] Substantial variation of this sort is apparent, though, in the NCS-A, as CAs are associated most strongly with behavior and substance disorders and least strongly with fear disorders. The particularly strong associations with substance and behavior disorders may reflect associations of CAs with the development of brain areas associated with impulsivity,[51, 52] a possibility that warrants additional investigation in future research. One explanation for the more specific pattern of associations in adolescents than adults is that many of the disorders not associated with CAs in the NCS-A typically begin after adolescence.[53] To evaluate this possibility, we conducted a more detailed analysis examining the associations of CAs with individual disorders and found that the CAs considered here generally have the strongest associations within disorder classes with the disorders that have early ages-of-onset.[53] For example, within the fear disorders, CAs are more strongly associated with specific phobia and social phobia than panic disorder or agoraphobia. This means that CAs are especially important in promoting onset of temporally primary disorders that, in turn, predict subsequent onsets of temporally-secondary disorders.[24] The one exception to this pattern is the distress disorders, where CAs are unrelated to separation anxiety disorder, the disorder shown in previous research to have the earliest onset,[24] and are associated most strongly with PTSD, a disorder with the latest onset. The especially strong associations of CAs with PTSD in the NCS-A are consistent with prospective evidence indicating that CAs have especially strong predictive associations with PTSD.[54]

With regard to differential associations across the CAs, some previous research found stronger associations of sexual abuse than other CAs with subsequent onset of mental disorders after accounting for other CAs.[9, 55–57] This pattern was observed in the NCS-A as well. Indeed, the OR associated with sexual abuse was either the largest or second largest in predicting three of the four disorder classes (fear, distress, and substance), and for six individual disorders in these classes. Behavior disorders were the only outcomes for which sexual abuse was not among the strongest predictors. This pattern is consistent with our findings from adult studies.[4]

The evidence of strong co-occurrence among CAs is also consistent with our previous work in adult samples[4, 16] as well as with prior studies of CAs in both children and in adults.[12, 58, 59] This high degree of co-occurrence suggests that previous studies focused on single CAs were likely to have overestimated the importance of those CAs. Furthermore, although the magnitude of the associations of individual CAs with mental disorders is uniformly attenuated after adjustment for co-occurring CAs, virtually all the CAs continue to have significant associations with disorders in multivariate models. This documents that no single CA or small group of CAs captures the full range of CA effects.

The results of the PARP analysis show that CAs are associated with a substantial proportion of child-adolescent mental disorder onsets, including more than 40% of behavior disorder onsets and one-third of distress and substance disorder onsets. This is consistent with our previous work in adult samples,[4, 16] although CAs are associated with *larger* proportions of distress (32.2% versus 26.2%) and substance (34.4% versus 21.0%) disorders among adolescents than in the adult NCS-R data. Because both distress and substance disorders have relatively later ages-of-onset,[53] this pattern suggests that CAs might have a larger role in predicting childadolescent onset variants of certain distress and substance disorders. In contrast, CAs are associated with a relatively *smaller* proportion of anxiety disorders in adolescents than in our adult data (15.7% versus 32.4%), most likely reflecting the fact that CAs are associated more strongly with early-onset than later-onset anxiety disorders. The large PARPs in the NCS-A suggest that CAs are very important either as determinants of child-adolescent onset mental disorders (causal risk factors) or as markers of other

determinants (risk markers).[60] As such, they represent promising targets for intervention efforts.

The NCS-A data cannot distinguish between the possibility that CAs are causal risk factors rather than merely risk markers. Only experimental studies can provide definitive adjudication between these two possibilities. However, experiments that randomly assign youths to exposure to CAs are virtually nonexistent, and interventions that randomly assign youths to interventions aimed at ameliorating the effects of these exposures are rare. The existence of subadditive interactions among co-occurring CAs has important implications for intervention planning because the existence of these interactions implies that interventions aimed at protecting high-risk youths exposed to a large number of CAs are unlikely to have strong effects if they target only a subset of the adversities to which these youths are exposed. The ameliorative effects of incremental reductions in CAs would be expected to be small if harmful effects of incremental increases in CAs are small. We would consequently expect interventions that address a large number of CAs, such as home visiting programs aimed at preventing many different types of child maltreatment[61] or foster care,[62] to have much more powerful effects than interventions targeted as only one CA.[63, 64] Alternatively, given the strong co-occurrence of the CAs examined here with parental psychopathology, interventions aimed at treating parents with mental disorders may also result in reductions in other CAs such as maltreatment, criminal behavior, and family violence. Indeed, some evidence suggests that successful treatment of parental disorders can reduce psychopathology in children.[65] We are unaware of any attempts to measure CAs among youths in such interventions, but this would be useful information to obtain in order to allow an assessment of the extent to which intervention effects vary as a function of number and types of CAs.

Acknowledgments

Financial Disclosure: Dr. Kessler has been a consultant for AstraZeneca, Analysis Group, Bristol-Myers Squibb, Cerner-Galt Associates, Eli Lilly & Company, GlaxoSmithKline Inc., HealthCore Inc., Health Dialog, Integrated Benefits Institute, John Snow Inc., Kaiser Permanente, Matria Inc., Mensante, Merck & Co, Inc., Ortho-McNeil Janssen Scientific Affairs, Pfizer Inc., Primary Care Network, Research Triangle Institute, Sanofi-Aventis Groupe, Shire US Inc., SRA International, Inc., Takeda Global Research & Development, Transcept Pharmaceuticals Inc., and Wyeth-Ayerst; has served on advisory boards for Appliance Computing II, Eli Lilly & Company, Mindsite, Ortho-McNeil Janssen Scientific Affairs, Plus One Health Management and Wyeth-Ayerst; and has had research support for his epidemiological studies from Analysis Group Inc., Bristol-Myers Squibb, Eli Lilly & Company, EPI-Q, GlaxoSmithKline, Johnson & Johnson Pharmaceuticals, Ortho-McNeil Janssen Scientific Affairs., Pfizer Inc., Sanofi-Aventis Groupe, and Shire US, Inc.

Funding/Support and Role of the Sponsors: The National Comorbidity Survey Replication Adolescent Supplement (NCS-A) is supported by the National Institute of Mental Health (NIMH; U01-MH60220 and R01-MH66627) with supplemental support from the National Institute on Drug Abuse (NIDA), the Substance Abuse and Mental Health Services Administration (SAMHSA), the Robert Wood Johnson Foundation (RWJF; Grant 044780), and the John W. Alden Trust. Preparation of this paper was also supported by NIMH K01- MH092526 (McLaughlin) and NIMH K01-MH085710 (Green). The views and opinions expressed in this report are those of the authors and should not be construed to represent the views of any of the sponsoring organizations, agencies, or U.S. Government. A complete list of NCS-A publications can be found at http://www.hcp.med.harvard.edu/ncs. Send correspondence to ncs@hcp.med.harvard.edu. The NCS-A is carried out in conjunction with the World Health Organization World Mental Health (WMH) Survey Initiative. We thank the staff of the WMH Data Collection and Data Analysis Coordination Centres for assistance with instrumentation, fieldwork, and consultation on data analysis. The WMH Data Coordination Centres have received support from NIMH (R01-MH070884, R13-MH066849, R01-MH069864, R01- MH077883), NIDA (R01-DA016558), the Fogarty International Center of the National Institutes of Health (FIRCA R03-TW006481), the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, and the Pan American Health Organization. The WMH Data Coordination Centres have also received unrestricted educational grants from Astra Zeneca, BristolMyersSquibb, Eli Lilly and Company, GlaxoSmithKline, Ortho-McNeil, Pfizer, Sanofi- Aventis, and Wyeth. A complete list of WMH publications can be found at http://www.hcp.med.harvard.edu/wmh/.

The sponsors had no role in the design and conduct of the study; collection, management, analysis, interpretation of the data; or preparation, review, or approval of the manuscript.

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Table 1

Prevalence and co-occurrence of childhood adversities (CAs) in the National Comorbidity Survey Adolescent Supplement (n=6,483)

		Prevalence of individual CAs		Proportion of respondents with a given CA who had additional CAs		Mean number of other CAs among respondents with specific CAs	
	Weighted n	%	SE	%	SE	Mean	SE
Parent Death	472	7.3	0.6	73.5	4.4	3.5	0.1
Parent Divorce	1,841	28.4	1.2	70.9	1.7	3.2	0.1
Other Parent Loss	318	4.9	0.6	84.6	2.6	4.2	0.3
Parent Mental Illness	1,011	15.6	0.8	89	1.3	3.8	0.1
Parent Substance	691	10.7	0.7	97.8	0.8	4.2	0.1
Parent Criminal	1,703	26.3	1.1	84.1	2.1	3.6	0.1
Family Violence	545	8.4	0.5	90.2	4.1	4.2	0.1
Physical Abuse	274	4.2	0.5	96.4	1.5	5.1	0.3
Sexual Abuse	282	4.4	0.4	90.3	1.9	3.9	0.2
Emotional Abuse	379	5.9	0.7	83.7	2.6	4.5	0.2
Neglect	145	2.2	0.5	97.9	0.9	5.4	0.3
Economic Adversity	1,050	16.2	1.1	75	2.7	3.7	0.1
Any Adversity	3,781	58.3	1.3	59.7	1.9	3.2	0.1

Arch Gen Psychiatry. Author manuscript; available in PMC 2013 November 01.

Table 2

Bivariate (M1) and multivariate (M2–M4) models of the associations between CAs and first onset of DSM-IV mental disorders (n=6,483)[1]

	M1[2]		M2[3]		M3[4]		M4[5]	
	OR	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Maladaptive Family Functioning CAs								
Emotional Abuse	1.9*	(1.7–2.2)	1.4*	(1.2–1.6)	--	--	1.3*	(1.1–1.6)
Physical Abuse	2.1*	(1.7–2.6)	1.2	(1.0–1.4)	--	--	1.1	(0.9–1.4)
Sexual Abuse	2.2*	(1.9–2.6)	1.7*	(1.4–2.1)	--	--	1.7*	(1.4–2.0)
Neglect	2.2*	(1.6–3.0)	1.3*	(1.0–1.7)	--	--	1.4*	(1.1–1.7)
Parent Mental Illness	1.7*	(1.6–1.9)	1.4*	(1.2–1.5)	--	--	1.2*	(1.1–1.7)
Parent Substance	1.7*	(1.4–2.0)	1.0	(0.8–1.2)	--	--	1.0	(0.8–1.2)
Parent Criminal	1.8*	(1.6–2.0)	1.4*	(1.2–1.5)	--	--	1.2*	(1.0–1.4)
Family Violence	2.0*	(1.8–2.2)	1.4*	(1.2–1.6)	--	--	1.4*	(1.2–1.6)
χ^2_8		--		291.8*				49.7*
Other CAs								
Parent Death	1.3*	(1.1–1.6)	1.2*	(1.0–1.5)	--	--	1.2	(1.0–1.4)
Parent Divorce	1.4*	(1.3–1.5)	1.2*	(1.1–1.3)	--	--	1.1*	(1.0–1.2)
Other Parent Loss	1.6*	(1.2–2.1)	1.2*	(1.0–1.5)	--	--	1.2	(1.0–1.5)
Economic Adversity	1.3*	(1.1–1.6)	1.1	(1.0–1.2)	--	--	1.0	(0.9–1.5)
χ^2_4		--		28.0*		--		7.1)
χ^2_{12}		--		775.3*		63.8*		63.8*
Number of CAs								
0	--	--	--	--	--	--	--	--
1	--	--	--	--	1.8*	(1.6–2.2)	--	--
2	--	--	--	--	2.4*	(2.0–2.8)	1.3*	(1.1–1.6)
3	--	--	--	--	2.6*	(2.1–3.1)	1.5*	(1.2–1.8)
4	--	--	--	--	3.0*	(2.5–3.6)	1.4*	(1.1–1.8)

	M1[2]		M2[3]		M3[4]		M4[5]	
	OR	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
5	--	--	--	--	3.8*	(2.9–5.0)	1.3	(1.0–1.8)
6	--	--	--	--	4.6*	(3.5–6.0)	1.4	(0.9–2.3)
7+	--	--	--	--	1.4*	(1.2–1.6)	1.4	(0.8–2.4)
χ^2_7	--	--	--	--	320.6*		30.0*	

*Significant at the .05 level, two-sided test

[1]Models were estimated in a discrete-time survival framework with person-year as the unit of analysis. A separate person-year file was created for each of the 14 disorders and survival analysis was performed using the pooled set of all 14 of these data files, thereby forcing the slopes to be constant across the 14 disorders. Each model controlled for person-year, age, sex, race/ethnicity, 13 dummy variables for the outcome disorder category, and included controls for the previous onset of comorbid conditions.

[2]Models were estimated with one CA at a time and the controls noted in footnote 1.

[3]The model was estimated with all 12 CAs and the controls noted in footnote 1.

[4]The model was estimated with dummy variables for the number of CAs without any information about CA type and the controls in footnote 1.

[5]The model was estimated with dummy variables for both number and type of CAs plus the controls noted in footnote 1.

Table 3

Multivariate associations between CAs and first onset of DSM-IV classes of mental disorder based on M5 (n=6,483)[1]

	Fear		Distress		Behavior		Substance		All	
	OR	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Maladaptive Family Functioning CAs										
Emotional Abuse	1.1	(0.8–1.3)	1.9*	(1.4–2.7)	1.7*	(1.2–2.3)	2.3*	(1.3–4.1)	1.5*	(1.2–1.8)
Physical Abuse	1.1	(0.7–1.5)	1.4	(1.0–2.1)	1.3	(0.8–2.0)	2.0	(0.8–4.7)	1.3*	(1.0–1.6)
Sexual Abuse	2.0*	(1.4–2.9)	1.7*	(1.2–2.4)	1.5	(0.8–2.8)	4.8*	(2.2–10.2)	1.9*	(1.6–2.2)
Neglect	1.8*	(1.2–2.5)	1.4	(1.0–2.0)	1.6*	(1.0–2.5)	2.7*	(1.1–6.8)	1.5*	(1.2–2.0)
Parent Mental Illness	1.2	(0.9–1.6)	1.6*	(1.3–1.9)	1.5*	(1.1–2.0)	1.8*	(1.2–2.8)	1.4*	(1.2–1.7)
Parent Substance	1.0	(0.8–1.2)	0.9	(0.7–1.3)	1.3	(0.8–2.1)	2.4*	(1.0–5.5)	1.1	(0.9–1.3)
Parent Criminal	1.2	(1.0–1.6)	1.5*	(1.1–1.9)	1.3*	(1.0–1.6)	2.6*	(1.8–3.6)	1.4*	(1.1–1.6)
Family Violence	1.4	(1.0–2.0)	1.4*	(1.1–1.9)	1.6*	(1.2–2.4)	2.4*	(1.3–4.3)	1.5*	(1.3–1.8)
χ^2_8	28.3*		51.7*		12.8		42.4*		58.4*	
Other CAs										
Parent Death	0.8	(0.6–1.1)	1.4	(0.9–2.0)	1.3	(1.0–1.6)	1.1	(0.6–2.2)	1.2	(0.9–1.4)
Parent Divorce	1.1	(0.9–1.3)	1.3*	(1.1–1.6)	1.2	(0.9–1.4)	1.0	(0.6–1.6)	1.1*	(1.0–1.3)
Other Parent Loss	1.4*	(1.1–1.7)	0.9	(0.6–1.3)	1.4	(1.1–1.8)	0.8	(0.4–1.6)	1.2	(0.9–1.4)
Economic Adversity	1.1	(0.8–1.4)	0.7	(0.6–0.9)	1.4	(1.1–1.7)	0.5*	(0.2–1.0)	1.0	(0.8–1.1)
χ^2_4	10.4 (.035)*		22.1 (<.001)*		28.2 (<.001)*		7.9 (.090)		9.5 (.049)*	
χ^2_{12}	54.7*		158.1*		42.0*		60.5*		113.4*	
Number of MFF CAs										
0	--	--	--	--	--	--	--	--	--	--
1	--	--	--	--	--	--	--	--	--	--
2	1.0	(0.7–1.6)	1.1	(0.8–1.5)	1.2	(0.8–1.9)	0.6	(0.3–1.2)	1.0	(0.8–1.4)
3	1.0	(0.6–1.8)	0.9	(0.5–1.5)	1.2	(0.6–2.4)	0.2*	(0.1–0.6)	0.9	(0.6–1.4)
4	0.8	(0.4–1.5)	0.8	(0.4–1.6)	1.0	(0.4–2.3)	0.1*	(0.0–0.6)	0.8	(0.5–1.3)
5	1.0	(0.4–2.5)	0.6	(0.2–1.6)	0.9	(0.3–3.1)	0.1*	(0.0–0.7)	0.8	(0.4–1.3)

	Fear		Distress		Behavior		Substance		All	
	OR	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
6	0.4	(0.2–1.2)	0.6	(0.2–2.1)	1.0	(0.2–4.3)	0.0*	(0.0–0.4)	0.6	(0.3–1.1)
7	0.3	(0.1–1.2)	0.9	(0.3–2.8)	0.5	(0.1–4.4)	0.0*	(0.0–0.3)	0.4	(0.2–0.8)
χ^2_6		17.8*		11.6		6.7		14.7*		24.1*
Number of Other CAs										
0	--	--	--	--	--	--	--	--	--	--
1	--	--	--	--	--	--	--	--	--	--
2	1.1	(0.9–1.4)	1.6*	(1.0–2.4)	1.1	(0.9–1.5)	1.5	(0.7–3.4)	1.2*	(1.0–1.4)
3	1.0	(0.7–1.6)	1.4	(0.7–3.0)	1.2	(0.8–2.0)	2.4	(0.5–11.7)	1.2	(0.9–1.6)
4+	--	--	--	--	--	--	--	--	--	--
χ^2_2		0.8		4.6		1.0		1.5		5.6

*Significant at the .05 level, two-sided test

1See Footnote 1 in Table 2 for a description of the overall modeling approach. The model shown here was estimated with predictors for types of CAs and number of CAs (distinguishing number of MFF CAs from number of other CAs) in addition to the controls used in the models described in Table 2. Note that no term was included in the model for having exactly 1 CA. This means that the coefficients for types of CAs can be interpreted as the associations of pure CAs (ie, having 1 and only 1 particular type of CA compared with having none) with onset, whereas the associations with number of CAs represent the extent to which the incremental associations of co-occurring CAs (ie, the added risk of an additional CA in respondents who are otherwise equivalent in terms of the number of other CAs, controlling for types of other CAs) differ from the associations of pure CAs.

Table 4

Population Attributable Risk Proportions (PARPs) of lifetime DSM-IV disorder classes associated with childhood adversities (n=6,483)[1]

	All	Fear	Distress	Behavior	Substance
Maladaptive Family Functioning CAs	23.7	11.8	26.6	32.1	37.0
Emotional Abuse	3.1	0.4	5.2	4.4	4.9
Physical Abuse	1.5	0.2	2.1	1.5	2.9
Sexual Abuse	2.5	1.9	2.5	1.3	8.0
Neglect	1.4	1.3	1.0	1.8	2.6
Parent Mental Illness	6.8	2.7	8.8	9.2	9.4
Parent Substance	1.3	−0.4	−1.2	4.4	9.0
Parent Criminal	9.2	5.0	10.7	8.8	21.7
Family Violence	3.7	2.0	3.4	4.5	7.7
Other CAs	6.4	4.6	8.0	13.6	−4.6
Parent Death	0.6	−0.6	1.7	1.1	0.6
Parent Divorce	3.1	1.3	6.8	3.1	0.1
Other Parent Loss	0.7	1.3	−0.7	1.8	−1.1
Economic Adversity	−0.4	1.5	−5.7	6.4	−9.8
All CAs	28.2	15.7	32.2	40.7	34.4

[1]The PARPs were calculated using simulation methods to generate individual-level predicted probabilities of the outcome disorders twice from the coefficients in the best-fitting model: the first time using all the coefficients in the model (probability of the disorder in those exposed to CAs) and the second time assuming that the coefficients associated with the CAs were all zero (probability of the disorder in those unexposed). One minus the ratio of the predicted prevalence estimates in the 2 specifications was then used to calculate PARP.