ARTICLE

Improving the Adverse Childhood Experiences Study Scale

David Finkelhor, PhD; Anne Shattuck, MA; Heather Turner, PhD; Sherry Hamby, PhD

Objective: To test and improve upon the list of adverse childhood experiences from the Adverse Childhood Experiences (ACE) Study scale by examining the ability of a broader range to correlate with mental health symptoms.

Design: Nationally representative sample of children and adolescents.

Setting and Participants: Telephone interviews with a nationally representative sample of 2030 youth aged 10 to 17 years who were asked about lifetime adversities and current distress symptoms.

Main Outcome Measures: Lifetime adversities and current distress symptoms.

Results: The adversities from the original ACE scale items were associated with mental health symptoms among the participants, but the association was significantly improved (from $R^2=0.21$ to $R^2=0.34$) by removing some of the original ACE scale items and adding others in the domains of peer rejection, peer victimization, community violence exposure, school performance, and socioeconomic status.

Conclusions: Our understanding of the most harmful childhood adversities is still incomplete because of complex interrelationships among them, but we know enough to proceed to interventional studies to determine whether prevention and remediation can improve long-term outcomes.

JAMA Pediatr. 2013;167(1):70-75.
Published online November 26, 2012.
doi:10.1001/jamapediatrics.2013.420

Author Affiliations: Crimes Against Children Research Center, University of New Hampshire, Durham (Drs Finkelhor and Turner and Ms Shattuck); and Psychology Department, Sewanee, the University of the South, Sewanee, Tennessee (Dr Hamby).

THE ADVERSE CHILDHOOD Experiences (ACE) Study[1] has attracted considerable scientific and policy attention in recent years, in part because it suggests that potentially preventable childhood experiences, particularly physical and sexual abuse and neglect, may increase a person's risk for serious health problems and higher mortality rates much later in life.

The study has demonstrated relationships between adverse childhood experiences and many adult health risks.[1-10] These results, which have been published widely in the health sciences, are based on a survey and medical records of more than 17 000 members of the Kaiser Health Plan in San Diego, California.[1,11]

Nonetheless, research using the ACE Study model has some important limitations, in part because of the retrospective way in which data on childhood adversities have been gathered. The average age of respondents when they supplied information about their childhood experiences was 55 to 57 years. As a result, it is hard to be certain, particularly from such a remote vantage, whether it is these particular childhood experiences or unmeasured covariates that are the most important predictors. In addition, the ACE Study list of preventable childhood adversities omits certain domains judged by many developmental researchers to be important in predicting long-term health and well-being outcomes. Among the predictors missing from the ACE Study model are peer rejection, exposure to violence outside the family, low socioeconomic status, and poor academic performance.

For editorial comment see page 95

For example, longitudinal studies show that growing up in poverty increases lifelong risk for various negative life events and negative health outcomes.[12-14] Peer rejection and lack of friends are associated with the development of many disorders.[15-17] Poor school performance in childhood is associated with poor outcomes in adulthood, such as unemployment.[18] Witnessing community violence has been

shown to be a mental health hazard for adults and children.[19,20] These major childhood adversities are not currently measured by the ACE scale.

In addition, measuring childhood adversities during childhood, rather than later, may offer other improvements to the ACE Study's early life predictors of health outcomes.[21] It allows the possibility of obtaining a more accurate and comprehensive assessment of childhood events than one would be able to obtain after many years. It also would allow a more sensitive untangling of the relationship among various adversities in ways that better explain causal sequences.

Although an obvious disadvantage is the inability to assess the long-term effects of childhood adversity on the negative life events and health conditions posited in the ACE Study model, examining more short-term effects in childhood is consistent with the logic of the model. Specifically, the ACE Study model relies strongly on the idea that adverse childhood experiences create a burden of psychological stress that changes behavior, cognitions, emotions, and physical functions in ways that promote subsequent health problems and illness.[22] Among the hypothesized pathways, adverse childhood experiences lead to depression and posttraumatic stress disorder, which in turn can lead to substance abuse, sleep disorders, inactivity, immunosuppression, inflammatory responses, and inconsistent health care use, possibly leading to other medical conditions later in life.[23,24] Therefore, childhood behavioral and emotional symptoms very likely represent a crucial mediator linking adverse childhood experiences and the longer term health-related problems found in the ACE substudies.

Thus, in the present study, we tried to replicate the ACE Study findings in a cohort of youth, using psychological distress as an outcome measure, and to explore whether the adversities enumerated by the ACE Study could be improved upon by considering a more comprehensive range of possible adversities, including some of the domains not considered in the ACE Study.

METHODS

PARTICIPANTS

These analyses use data from the National Survey of Children's Exposure to Violence (NatSCEV),[25] a representative sample of US children and adolescents. The NatSCEV was designed to obtain incidence and prevalence estimates for a wide range of childhood victimizations and other adversities. The survey was conducted between January 2008 and May 2008 with a nationally representative sample of 4549 children aged 0 to 17 years living in the contiguous United States. Interviews with parents and youth were conducted over the telephone by the employees of an experienced survey research firm.

The foundation of the design was a nationwide sampling frame of residential telephone numbers from which a sample of telephone households was drawn by random digit dialing. This nationally representative cross section yielded 3053 of the 4549 completed interviews. To ensure that the study included a sizable proportion of racial/ethnic minorities and low-income respondents for more accurate subgroup analyses, there was also an oversampling of US telephone exchanges that had a population of 70% or more of African American, Hispanic, or low-income households. This oversample yielded the remaining 1496 of the completed interviews. Sample weights were calculated to adjust for differential probability of selection associated with (1) study design, (2) demographic variations in nonresponse, and (3) variations in within-household eligibility. For this study, we analyzed a subsample of the entire sample of 4549 respondents. This subsample consisted of 2030 youth who were aged 10 to 17 years at the time of the interview and for whom complete data were available on the variables of interest. Analyses in this study are weighted by the sample weights.

PROCEDURE

A short interview was conducted with an adult caregiver (usually a parent) in each household to obtain family demographic information. One child was randomly selected from all eligible children living in a household by choosing the child with the most recent birthday. If the selected child was aged 10 to 17 years, the main telephone interview was conducted with the child. If the child was younger than 10 years, the interview was completed with the caregiver. However, the current analysis is based only on the 2030 youth aged 10 to 17 years who provided self-report information. Respondents were paid $20 for their participation. The interviews, averaging 45 minutes in both waves, were conducted in either English or Spanish. All procedures were approved by the institutional review board at the University of New Hampshire.

RESPONSE RATES AND NONRESPONSE ANALYSES

The cooperation rate for the random digit dialing cross-section portion of the survey was 71%, and the response rate was 54%. The cooperation and response rates associated with the smaller oversample were somewhat lower at 63% and 43%, respectively. These are good rates by current survey research standards.[26-30] Although the potential for response bias remains an important consideration, several recent studies and our own analysis[25] have shown no meaningful association between response rates and response bias.[31-34]

MEASUREMENT

Victimization and Adversity

This survey used an enhanced version of the Juvenile Victimization Questionnaire, an inventory of childhood victimization.[35-37] The Juvenile Victimization Questionnaire obtains reports on 48 forms of youth victimization covering 5 general areas of interest: conventional crime, maltreatment, victimization by peer and siblings, sexual victimization, and witnessing and exposure to violence.[38] The survey also contains questions about adverse life events in the parent interview section and in a separate section on adversity.

For the present study, which was not originally designed to test the ACE Study model, we selected victimization and adversity items in 2 steps. First, we used screener items and their associated follow-up questions to construct victimization types that most closely matched the abuse and neglect items in the original ACE Study, and we chose family background and adversity items to match the household dysfunction items of the original ACE Study. Using these items, we constructed a replication of the original ACE Study. In the second step, we selected additional types of victimization and adversity items not included in the original ACE Study but that are known to be important correlates of health and well-being outcomes. The measures selected in these 2 steps are described in the next section of this article. Important differences from the ACE Study items are noted in eTable 1 (http://www.jamapeds.com).

Measures Used to Replicate Original ACE Study Items

The following measures were coded 0 for no and 1 for yes so that they could be summed to create the replicated ACE Study items. All are lifetime measures.

- Emotional abuse: One item asked respondents, "At any time in your life, did you get scared or feel really bad because grown-ups in your life called you names, said mean things to you, or said they didn't want you?"
- Physical abuse: Several screeners assessed the child's experience of physical assault. Children who answered yes to any of these assault screeners were coded as having experienced physical abuse if the incident was perpetrated by parent, an adult relative, or another adult caregiver.
- Sexual abuse: Four screeners asked about the child's experience of sexual assault or attempted rape by a known adult, an adult stranger, or a peer or sibling.
- Emotional neglect: Four questions about family social support were used to construct an indicator of emotional neglect. These items are shown in eTable 1. Total scores ranged from 4 to 16. Children whose family support score was 10 or lower were coded as having experienced emotional neglect.
- Physical neglect: A single item asked whether the child had ever experienced a time when adults in his or her life "didn't take care of them the way they should," including not providing enough food, not taking them to the doctor when they were sick, or not making sure they had a safe place to stay. Children who answered yes were coded as having experienced physical neglect.
- Mother treated violently: Twelve screeners asked children whether they had witnessed specific kinds of violence and abuse. Children who answered yes to any of these questions and who reported that their mother was the victim were coded 1 on this item.
- Household substance abuse: A single item assessed whether the child had a family member who "drank or used drugs so often that it caused problems."
- Household mental illness: Children who had a parent or sibling with depression, bipolar disorder, anxiety, or "other psychiatric disorder" (information obtained from the parent interview) or children who had "someone close" attempt suicide were coded 1 on household mental illness.
- Parental separation or divorce: We coded any respondent who was not currently living with 2 biological or adoptive parents as having experienced parental separation or divorce.
- Incarcerated household member: One adversity item asks whether a parent or guardian had ever been sent to prison.

Additional Victimization and Adversity Items Not Included in ACE Study

The measures listed herein, not included in the ACE Study, were examined as additional correlates of children's distress. A summary of these items is reported in eTable 2. Unless otherwise specified, questions regarding these items were asked in the child's portion of the interview:

- Peer victimization (assault, physical intimidation, or emotional victimization by a nonsibling peer)
- Parents always arguing (respondents were asked whether there was a time in their lives when their parents were always arguing)
- Property victimization (experience of a robbery, theft, or vandalism by a nonsibling perpetrator)
- Someone close to the child had a bad accident or illness
- Exposure to community violence (6 screeners asked whether the child had been exposed to certain types of crime and violence, including witnessing an assault, experiencing a household theft, having someone close murdered, witnessing a murder, experiencing a riot, or being in a war zone)
- No good friends (child had no "really good friends at school" at the time of the interview)
- Below-average grades (parent reported that the child had "below-average" grades in school)
- Someone close to the child died because of an accident or illness
- Parent lost job (children reported that there was a time when their "mother, father, or guardian lost a job or couldn't find work")
- Parent deployed to war zone (parent had to leave the country to fight in a war and was gone for several months or longer)
- Disaster (child had experienced a "very bad fire, flood, tornado, hurricane, earthquake, or other disaster")
- Removed from family (child was "sent or taken away from his or her family for any reason")
- Very overweight (parent reported that the child was "quite a bit overweight" compared with other boys/girls his or her age)
- Physical disability (parent reported that the child had been diagnosed with a "physical health or medical problem that affects the kinds of activities that he or she can do")
- Ever involved in a bad accident
- Neighborhood violence is a "big problem" (asked in the parent interview)
- Homelessness (a time when the child's family "had to live on a street or in a shelter because they had no other place to stay")
- Repeated a grade
- Less masculine or feminine than other boys or girls his or her age (asked in the parent interview)

Distress Symptoms

Distress symptoms were measured using shortened versions of the anger, depression, anxiety, dissociation, and posttraumatic stress scales of the Trauma Symptoms Checklist for Children (TSCC).[39] Respondents were asked how often they had experienced each symptom within the past month. Response options were on a 4-point scale from 1 (not at all) to 4 (very often), and responses from the items of all 5 scales were summed to create a total distress score consisting of 28 items. The Cronbach α value for total distress score in this study was 0.93.

Demographics

Demographic information was obtained in the initial parent interview, including the child's sex, age (in years), race/ethnicity (coded into 4 groups: white non-Hispanic, black non-Hispanic, other non-Hispanic, and Hispanic any race), socioeconomic status (SES), and place size of the child's town or city of residence. Socioeconomic status is a continuous composite score based on the sum of the standardized household income and standardized parental educational level (for the parent with the highest educational level) scores, which was then restandardized. For our revised version of the ACE scale, we created a dummy indicator for low SES that flags children whose continuous SES value fell in the bottom, roughly 20%.

RESULTS

The ACE scale constructed with variables from NatSCEV that mimic the original items is associated with distress levels among youth aged 10 to 17 years, as measured by the Trauma Symptom Checklist for Children. Model 1 in **Table 1** reports the regression of distress scores on

Table 1. Regression of Wave 1 Trauma Scores on Lifetime Victimization and Adversity

Characteristic (n = 2030)	%	Regression Coefficient, β[a] Model 1	Model 2
Demographics, time 1[b]			
Age, mean, y	13.5	-0.01	-0.03
Male sex	51.2	-0.03	-0.08[c]
Black, non-Hispanic	15.1	0.01	0.03
Other, non-Hispanic	5.7	-0.05[d]	-0.05[e]
Hispanic, any race	17.8	-0.02	-0.03
ACE scale items			
Physical abuse	14.9	0.16[c]	0.13[c]
Emotional abuse	17.7	0.16[c]	0.08[c]
Emotional neglect	7.7	0.12[c]	0.12[c]
Physical neglect	4.0	0.09[c]	0.07[c]
Household mental illness	27.9	0.08[c]	0.04[e]
Household substance abuse	16.8	0.08[c]	0.01
Sexual abuse	6.6	0.08[c]	0.05[d]
Mother treated violently	13.1	0.05[e]	-0.02
Incarcerated household member	11.1	0.02	-0.01
Parental separation or divorce	41.2	-0.01	-0.05[e]
Additional victimization and adversity items			
Peer victimization (nonsibling)	47.6		0.17[c]
Parents always arguing	22.0		0.15[c]
Property victimization (nonsibling)	41.0		0.11[c]
Someone close had a bad accident or illness	64.4		0.10[c]
Exposure to community violence	63.4		0.09[c]
No good friends	1.8		0.07[c]
Socioeconomic status	0.04		-0.06[d]
Below-average grades	6.1		0.04[e]
Someone close died from illness/accident	49.3		0.05[e]
Parent lost job	19.5		0.04[e]
Parent deployed to war zone	9.9		0.04
Disaster	10.9		0.03
Removed from family	4.8		0.03
Very overweight	3.0		0.02
Physical disability	6.9		-0.01
Involved in a bad accident	13.8		-0.02
Neighborhood violence is "big problem"	4.3		-0.02
Family homeless	3.2		-0.02
Repeated a grade	13.2		-0.03
Less masculine or feminine than peers	8.7		-0.03
Adjusted R^2		0.24	0.36

Abbreviation: ACE, Adverse Childhood Experiences.
[a] Change in adjusted R^2 was significant at $P < .001$.
[b] Reference category for race/ethnicity is white, non-Hispanic (61.4 % of sample).
[c] Coefficient is significant at $P < .001$.
[d] Coefficient is significant at $P < .01$.
[e] Coefficient is significant at $P < .05$.

the items from the replicated ACE scale. The cumulative items were strongly associated with distress, and there was a clear dose-response relationship between the adversities and distress, as has been demonstrated in previous research.[1]

However, the original ACE scale items did not each make an independent contribution to distress as illustrated in model 1 of Table 1. Two items, parental separation or divorce and incarceration of a household member, were not significant in the regression model of the whole scale. In addition, when other childhood adversities (not considered in the ACE studies) were added to the model (model 2 of Table 1), several ACE scale items dropped below significance. Moreover, several of the added childhood adversities showed strong associations with distress. These included peer victimization, property victimization, parents always arguing, having no good friends, having someone close with a bad illness or accident, SES, and exposure to community violence.

Table 2. Items in Original and Revised ACE Scales

ACE Scale Adversities (Lifetime)	
Original	Revised
Emotional abuse	Emotional abuse
Physical abuse	Physical abuse
Sexual abuse	Sexual abuse
Physical neglect	Physical neglect
Emotional neglect	Emotional neglect
Mother treated violently	Household mental illness
Household substance abuse	Property victimization (nonsibling)
Household mental illness	Peer victimization (nonsibling)
Incarcerated household member	Exposure to community violence
Parental separation or divorce	Socioeconomic status
	Someone close had a bad accident or illness
	Below-average grades
	Parents always arguing
	No good friends (at time of interview)

Abbreviation: ACE, Adverse Childhood Experiences.

A revised ACE scale was then constructed, removing the original items that were no longer significant in the extended model. Significant new items were added to the scale, including parents always arguing, having no good friends, having someone close with a bad illness or accident, peer victimization, property victimization, and exposure to community violence. The old and new scales are contrasted in **Table 2**. Regression with the new scale determined $R^2 = 0.34$ vs $R^2 = 0.21$ for the original version of the scale.

COMMENT

In this study, it was possible to improve the value of the original ACE scale considerably by adding some childhood adversities not included in the original scale and excluding others that were in the scale. The value of adding several items not considered in the ACE studies is consistent with several publications showing their harmful effect on child development. In fact, there are likely even more domains of childhood adversity that might be measured and added that could further improve its predictive ability, for example, low IQ,[40] parental death, and food scarcity. The present study illustrates that the original ACE scale could likely be improved even more with additional developmental research.

However, this analysis also confirms that some of the key ACE scale items, particularly the child maltreatment exposures, remain very important and make discrete independent contributions, even when many other adversities are considered. Moreover, several of the new

term health effects; therefore, the next generation of studies should probably focus on preventing and remediating these exposures and following up to determine whether health outcomes improve.

Accepted for Publication: June 7, 2012.
Published Online: November 26, 2012. doi:10.1001/jamapediatrics.2013.420
Correspondence: David Finkelhor, PhD, Crimes Against Children Research Center, University of New Hampshire, 126 Horton Social Science Center, 20 Academic Way, Durham, NH 03824 (david.finkelhor@unh.edu).
Author Contributions: *Study concept and design:* Finkelhor, Turner, and Hamby. *Analysis and interpretation of data:* Finkelhor, Shattuck, Turner, and Hamby. *Drafting of the manuscript:* Finkelhor and Shattuck. *Critical revision of the manuscript for important intellectual content:* Finkelhor, Turner, and Hamby. *Statistical analysis:* Shattuck. *Obtained funding:* Finkelhor and Turner. *Administrative, technical, and material support:* Finkelhor and Turner. *Study supervision:* Finkelhor.
Conflict of Interest Disclosures: None reported.
Online-Only Material: The eTables are available at http://www.jamapeds.com.

REFERENCES

1. Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the Adverse Childhood Experiences (ACE) Study. *Am J Prev Med.* 1998;14(4):245-258.
2. Anda RF, Croft JB, Felitti VJ, et al. Adverse childhood experiences and smoking during adolescence and adulthood. *JAMA.* 1999;282(17):1652-1658.
3. Dietz PM, Spitz AM, Anda RF, et al. Unintended pregnancy among adult women exposed to abuse or household dysfunction during their childhood. *JAMA.* 1999;282(14):1359-1364.
4. Anda RF, Felitti VJ, Chapman DP, et al. Abused boys, battered mothers, and male involvement in teen pregnancy. *Pediatrics.* 2001;107(2):E19. doi:10.1542/peds.107.2.e19.
5. Anda RF, Whitfield CL, Felitti VJ, et al. Adverse childhood experiences, alcoholic parents, and later risk of alcoholism and depression. *Psychiatr Serv.* 2002;53(8):1001-1009.
6. Dong M, Dube SR, Felitti VJ, Giles WH, Anda RF. Adverse childhood experiences and self-reported liver disease: new insights into the causal pathway. *Arch Intern Med.* 2003;163(16):1949-1956.
7. Dube SR, Anda RF, Felitti VJ, Croft JB, Edwards VJ, Giles WH. Growing up with parental alcohol abuse: exposure to childhood abuse, neglect, and household dysfunction. *Child Abuse Negl.* 2001;25(12):1627-1640.
8. 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(3):564-572.
9. Hillis SD, Anda RF, Felitti VJ, Nordenberg D, Marchbanks PA. Adverse childhood experiences and sexually transmitted diseases in men and women: a retrospective study. *Pediatrics.* 2000;106(1):E11. http://pediatrics.aappublications.org/content/106/1/e11.long. Accessed February 3, 2012.
10. 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(24):3089-3096.
11. Dong M, Anda RF, Felitti VJ, et al. The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse Negl.* 2004;28(7):771-784.
12. Melchior M, Moffitt TE, Milne BJ, Poulton R, Caspi A. Why do children from socioeconomically disadvantaged families suffer from poor health when they reach adulthood? a life-course study. *Am J Epidemiol.* 2007;166(8):966-974.
13. Duncan GJ, Ziol-Guest KM, Kalil A. Early-childhood poverty and adult attainment, behavior, and health. *Child Dev.* 2010;81(1):306-325.
14. Holzer H, Schanzenbach D, Duncan G, Ludwig J. *The Economic Costs of Poverty in the US: Subsequent Effects of Children Growing Up Poor.* Washington, DC: Center for American Progress; 2007.
15. Kupersmidt JB, Coie JD, Dodge KA. The role of poor peer relationships in the development of disorder. In: Asher SR, Coie JD, eds. *Peer Rejection in Childhood.* New York, NY: Cambridge University Press; 1990:274-301.
16. Bagwell CL, Newcomb AF, Bukowski WM. Preadolescent friendship and peer rejection as predictors of adult adjustment. *Child Dev.* 1998;69(1):140-153.
17. Danese A, Moffitt TE, Harrington H, et al. Adverse childhood experiences and adult risk factors for age-related disease: depression, inflammation, and clustering of metabolic risk markers. *Arch Pediatr Adolesc Med.* 2009;163(12):1135-1143.
18. Finn JD, Owings J. *The Adult Lives of At-Risk Students: The Roles of Attainment and Engagement in High School: Statistical Analysis Report.* Washington, DC: National Center for Education Statistics; 2006:2006-2328.
19. Clark C, Ryan L, Kawachi I, Canner MJ, Berkman L, Wright RJ. Witnessing community violence in residential neighborhoods: a mental health hazard for urban women. *J Urban Health.* 2008;85(1):22-38.
20. Council on Children and Families. Adverse childhood experiences among New York's adults. 2010. http://ccf.ny.gov/KidsCount/kcResources/ACE_BriefTwo.pdf. Accessed February 3, 2012.
21. Schilling EA, Aseltine RH Jr, Gore S. Adverse childhood experiences and mental health in young adults: a longitudinal survey. *BMC Public Health.* 2007;7:30. doi:10.1186/1471-2458-7-30.
22. Shonkoff JP, Boyce WT, McEwen BS. Neuroscience, molecular biology, and the childhood roots of health disparities: building a new framework for health promotion and disease prevention. *JAMA.* 2009;301(21):2252-2259.
23. Kendall-Tackett K. The health effects of childhood abuse: four pathways by which abuse can influence health. *Child Abuse Negl.* 2002;26(6-7):715-729.
24. Kendall-Tackett K. Psychological trauma and physical health: a psychoneuroimmunology approach to etiology of negative health effects and possible interventions. *Psychol Trauma.* 2009;1(1):35-48. doi:10.1037/a0015128.
25. Finkelhor D, Hamby SL, Ormrod RK, Turner HA. Violence, abuse, and crime exposure in a national sample of children and youth. *Pediatrics.* 2009;124(5):1-14.
26. Keeter S, Kennedy C, Dimock M, Best J, Craighill P. Gauging the impact of growing nonresponse on estimates from a national RDD telephone survey. *Public Opin Q.* 2006;70:759-779. doi:10.1093/poq/nfl035.
27. Babbie E. *The Practice of Social Research.* 11th ed. Belmont, CA: Wadsworth; 2007.
28. Atrostic BK, Bates N, Burt G, Silberstein A. Nonresponse in US government household surveys: consistent measures, recent trends, and new insights. *J Off Stat.* 2001;17(2):209-226.
29. Curtin R, Presser S, Singer E. Changes in telephone survey nonresponse over the past quarter century. *Public Opin Q.* 2005;69:87-98. doi:10.1093/poq/nfi002.
30. Singer E. Introduction: nonresponse bias in household surveys. *Public Opin Q.* 2006;70:637-645. doi:10.1093/poq/nfl034.
31. Curtin R, Presser S, Singer E. The effects of response rate changes on the index of consumer sentiment. *Public Opin Q.* 2000;64(4):413-428.
32. Keeter S, Miller C, Kohut A, Groves RM, Presser S. Consequences of reducing nonresponse in a national telephone survey. *Public Opin Q.* 2000;64(2):125-148.
33. Groves RM. Nonresponse rates and nonresponse bias in household surveys. *Public Opin Q.* 2006;70:646-675. doi:10.1093/poq/nfl033.
34. Merkle D, Edelman M. Nonresponse in exit polls: a comprehensive analysis. In: Groves RM, Dillman DA, Eltinge JL, Little RJA, eds. *Survey Nonresponse.* New York, NY: John Wiley & Son Inc; 2002:343-358.
35. Finkelhor D, Hamby SL, Ormrod RK, Turner HA. The Juvenile Victimization Questionnaire: reliability, validity, and national norms. *Child Abuse Negl.* 2005;29(4):383-412.
36. Hamby SL, Finkelhor D, Ormrod RK, Turner HA. *The Juvenile Victimization Questionnaire (JVQ): Administration and Scoring Manual.* Durham, NH: Crimes Against Children Research Center; 2004.
37. Finkelhor D, Ormrod RK, Turner HA, Hamby SL. Measuring poly-victimization using the Juvenile Victimization Questionnaire. *Child Abuse Negl.* 2005;29(11):1297-1312.
38. Finkelhor D, Ormrod RK, Turner HA, Hamby SL. The victimization of children and youth: a comprehensive, national survey. *Child Maltreat.* 2005;10(1):5-25.
39. Briere J. *Trauma Symptoms Checklist for Children (TSCC): Professional Manual.* Odessa, FL: Psychological Assessment Resources; 1996.
40. Martin LT, Fitzmaurice GM, Kindlon DJ, Buka SL. Cognitive performance in childhood and early adult illness: a prospective cohort study. *J Epidemiol Community Health.* 2004;58(8):674-679.
41. Finkelhor D, Ormrod RK, Turner HA. Poly-victimization: a neglected component in child victimization. *Child Abuse Negl.* 2007;31(1):7-26.
42. Turner HA, Finkelhor D, Ormrod R. Poly-victimization in a national sample of children and youth. *Am J Prev Med.* 2010;38(3):323-330.
43. Family Policy Council. ACE's (Adverse Childhood Experiences). http://www.fpc.wa.gov/publications.html#ACEs. Accessed February 28, 2012.
44. World Health Organization. Addressing adverse childhood experiences to improve public health: expert consultation. http://www.who.int/violence_injury_prevention/violence/activities/adverse_childhood_experiences/global_research_network_may_2009.pdf. 2009. Accessed February 3, 2012.
45. Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. *J Child Psychol Psychiatry.* 2004;45(2):260-273.