Adverse Childhood Environment: Relationship With Sexual Risk Behaviors and Marital Status in a Large American Sample

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Abstract
A substantial theoretical and empirical literature suggests that stressful events in childhood influence the timing and patterning of subsequent sexual and reproductive behaviors. Stressful childhood environments have been predicted to produce a life history strategy in which adults are oriented more toward short-term mating behaviors and less toward behaviors consistent with longevity. This article tests the hypothesis that adverse childhood environment will predict adult outcomes in two areas: risky sexual behavior (engagement in sexual risk behavior or having taken an HIV test) and marital status (currently married vs. never married, divorced, or a member of an unmarried couple). Data come from the Behavioral Risk Factor Surveillance System. The sample contains 17,530 men and 23,978 women aged 18–54 years living in 13 U.S. states plus the District of Columbia. Adverse childhood environment is assessed through 11 retrospective measures of childhood environment, including having grown up with someone who was depressed or mentally ill, who was an alcoholic, who used or abused drugs, or who served time in prison; whether one's parents divorced in childhood; and two scales measuring childhood exposure to violence and to sexual trauma. The results indicate that adverse childhood environment is associated with increased likelihood of engaging in sexual risk behaviors or taking an HIV test, and increased likelihood of being in an unmarried couple or divorced/separated, for both men and women. The predictions are supported by the data, lending further support to the hypothesis that childhood environments influence adult reproductive strategy.

Keywords
adverse childhood environment, acceleration theory, sexual risk behaviors, HIV test, marital status

A family of closely related yet divergent models hypothesize that there is a causal relationship between childhood environment and adult reproductive behaviors. Perhaps most notably, Belsky, Steinberg, and Draper (1991), drawing on earlier work by Draper and Harpending (1982, 1988), proposed that psychosocial stressors, including father absence, lead to earlier sexual maturation in girls. In this model, stressors (including father absence, low or unstable resources, and abusive or unstable family relationships) provide a cue to the developing child that resources are unstable in the present environment, and thus earlier maturation and reproduction are favored. Chisholm (1993) modified the theory to suggest that paternal absence is a cue to high mortality and lower life expectancy, thus favoring earlier and more frequent reproduction (including greater emphasis on short-term sexual relationships). A number of subsequent authors have modified the original model; Ellis (2004) summarizes five theories that link childhood exposure to stress with earlier pubertal timing among girls, while Sheppard, Snopkowski, and Sear (2014) list four hypotheses that specifically link father absence to reproductive behaviors. Most of these models predict that childhood stress will produce earlier maturation and reproduction, though in some sociocultural contexts where fathers facilitate marriage and reproduction,
father absence may lead to delayed reproduction (Scelza, 2010; Sheppard, Snopkowski, & Sear, 2014). For the purposes of this article, I will refer to the theory that childhood stress produces earlier sexual maturation and reproductive behaviors as acceleration theory.

Most of the empirical literature examining childhood stress and mating or reproductive outcomes has looked for associations between these variables, rather than testing the mechanisms involved or differentiating between the competing underlying theories. Childhood stress is hypothesized to affect reproductive maturation because stress hormones alter reproductive hormones, and ultimately growth trajectories and development, though few studies have directly tested these pathways (Ellis, 2004; Sheppard, Garcia, & Sear, 2015). To date, most research has focused on father absence as the key measure of childhood stress and age at menarche as the key measure of reproductive behavior. Most studies have found that father absence in childhood does indeed predict earlier menarche among girls (Alvergne, Faurie, & Raymond, 2008; Bogaert, 2005; Chisholm, Quinlivan, Petersen, & Coall, 2005; Culpin et al., 2014; Doughty & Rodgers, 2000; Hoier, 2003; La Guardia, Nelson, & Lertora, 2014; Maestripieri, Roney, Debias, Durante, & Spaepen, 2004; Matchcock & Susman, 2006; Moffitt, Caspi, Belsky, & Silva, 1992; Pesonen et al., 2008; Quinlan, 2003; Surbery, 1990), though a small number have failed to find this association (Anderson, 2015; Belsky et al., 2007; Campbell & Udry, 1995; Graber, Brooks-Gunn, & Warren, 1995; Kiernan & Hobcraft, 1997; Sheppard, Garcia, & Sear, 2014; Sheppard, Snopkowski, et al., 2014). Sheppard, Garcia, and Sear (2015) found that father absence from divorce or death predicted delayed puberty among boys, and only father absence from death was associated with earlier puberty among girls. In addition to reproductive maturation, other studies have found that childhood father absence predicts adult reproductive behaviors including earlier first intercourse, earlier marriage, earlier divorce, earlier first pregnancy, and more sexual partners (Alvergne et al., 2008; Anderson, 2015; Bereczkei & Csanaky, 1996; Chisholm et al., 2005; Ellis et al., 2003; Kiernan & Hobcraft, 1997; Koehler & Chisholm, 2007; Matchcock & Susman, 2006; Pesonen et al., 2008; Quinlan, 2003; Shenk, Starkweaer, & Kress, 2013; Sheppard, Garcia, et al., 2014; Sheppard, Snopkowski, et al., 2014; Waynforth, 2012). Mendle et al. (2009), however, used a sibling study to find that the effects of father absence on first intercourse largely disappear when family-level confounds are controlled for.

While father absence is the most widely used measure of childhood stress, a smaller number of studies have used other measures of childhood environment to test acceleration theory. In the United States, several studies report that childhood stress or family environment predicts earlier menarche, earlier age at sexual debut, earlier first birth, higher fertility, and greater likelihood of being a never-married parent (Brown, Masho, Perera, Mezuk, & Cohen, 2015; Davis & Were, 2007; Moffitt et al., 1992; Surbery, 1990). In Australia, Great Britain, and South Africa, childhood stress has been shown to correlate with earlier menarche, earlier first birth, earlier first pregnancy, as well as shorter relationship duration, greater number of sexual partners, and extrapair copulations (Anderson, 2015; Koehler & Chisholm, 2007, 2009; Nettle, Coall, & Dickins, 2011).

Most of the literature on, and empirical testing of, acceleration theory focuses solely on female reproductive behaviors (Ellis, 2004), and some debate exists as to whether the predictions for women should hold true for men as well (Sheppard et al., 2015). Men and women have different reproductive pathways; while more numerous sexual partners might increase male reproductive success, the same may not hold true for women. Some studies that have examined outcomes in both men and women find similar results for both sexes (Alvergne et al., 2008; Bogaert, 2005; Brown et al., 2015), while others do not (Anderson, 2015; Pesonen et al., 2008; Sheppard et al., 2015). Sheppard et al. (2015) note that chronic stress influences reproductive hormones differently in males and females, and in particular the stress hormone cortisol suppresses testosterone, which is expected to have greater effect on male maturation than female. They find that while parental absence (from divorce or death) delayed male puberty, father death accelerated female puberty. As noted in Anderson (2015), it remains unclear whether the predictions made by acceleration theory for female maturation and reproductive behaviors should hold true for men.

A body of literature which does not draw on an evolutionary perspective has also examined the relationship between adverse childhood environment (ACE) and adult reproductive behaviors. Exposure to ACE is associated with increased number of sexual partners, engagement in HIV/AIDS risk behaviors, and sexually transmitted infections (STIs; Bensley, Van Eenyk, & Simmons, 2000; Dube, Felitti, Dong, Giles, & Anda, 2003; Felitti et al., 1998). The proximate pathways by which ACE affects adult behaviors are rarely directly examined, but many plausible physiological pathways have been identified (Danese & McEwen, 2012).

Thus, while the bulk of research testing acceleration theory has used father absence to predict age at menarche, a smaller literature has examined broader measures of childhood stress as well as other reproductive outcomes. One limitation of these studies is their predominant emphasis on women of European descent (Anderson, 2015; Sheppard, Snopkowski, et al., 2014). The current study contributes to the literature on acceleration theory by examining the relationship between childhood stress and adult reproductive behaviors, using an ethnically diverse sample of American men and women. The reproductive behaviors to be examined include two separate areas related to reproductive fitness which have not received much attention in tests of the acceleration model: engagement in risky sexual behavior and marital status. While these are not direct measures of fertility, sexual and marital behavior has long been known to be important proximate determinants of fertility (Bongaarts 1978, 2015). Thus, understanding the influences on sexual and marital behavior will contribute to our understanding of the influences on fertility outcomes.
Engagement in risky sexual behavior, as well as having reason to take a test for an STI, can be considered proxies for engagement in short-term mating behavior. Exposure to STIs can come through many routes, including an unfaithful sexual partner, and infection with HIV, the virus responsible for AIDS, can occur through intravenous drug use and contaminated blood transfusion. In addition, the Centers for Disease Control (CDC) recommends routine screening of all pregnant women for HIV (as well as syphilis and hepatitis B and C) as part of standard prenatal care (CDC, 2015). Nonetheless, people who are at risk for STIs are more likely to have engaged in short-term or promiscuous mating behavior. This leads to

**Prediction 1:** Childhood stress will increase engagement in sexual risk behaviors and will increase the likelihood of having taken an HIV test.

The second variable under consideration is current marital status. Because marriage represents a long-term commitment between partners, married individuals have demonstrated a stable relationship investment strategy, in contrast to some individuals who are cohabiting, casually dating, divorced, or unmarried (Kohler and Chisholm 2009). People who have never married have apparently avoided marital commitments thus far, while people who are divorced or separated have seen their most recent long-term relationship end. Numerous studies show that cohabitating couples have less commitment to each other than married couples, while multipartnered fertility is more common among unmarried individuals (Furstenberg, 2014; Guzzo, 2014). Current marital status is not a perfect proxy of relationship strategy—married people commit infidelity, marriages end, and unmarried people may subsequently marry—but the association should be strong enough to lead to

**Prediction 2:** Childhood stress will predict reduced likelihood of being currently married and increased likelihood of being in a nonmarital relationship, being never married, or being divorced or separated.

### Method

These predictions will be tested using data from the Behavioral Risk Factor Surveillance System (BRFSS), an annual telephone survey administered by the CDC, and U.S. states and territories. Currently, BRFSS conducts telephone interviews with more than 400,000 adults (aged 18 years and older) each year, making it the world’s largest continuously conducted health survey (CDC, 2014). BRFSS is developed by the CDC, but field operations are managed by health departments of participating states and territories, following CDC guidelines.

BRFSS contains three parts (CDC, 2012b). The core module is used by all states and territories and contains a standard set of questions focusing on current health-related perceptions, conditions, and behaviors as well as demographic measures. Second, optional CDC modules are available, the number varying from year to year; most modules are used by a minority of states. Lastly, states may add their own questions to their particular BRFSS; these questions are not edited or evaluated by the CDC nor are they available through the CDC’s website. When weighted, BRFSS provides a nationally represented sample of the United States for each year. However, using variables from any optional BRFSS module will restrict the sample to the smaller number of states that used these modules.

The current analysis uses data from the optional adverse childhood experience (ACE) module, which was part of BRFSS from 2009 through 2012 (CDC, 2010, 2011, 2012, 2013). A total of 13 states plus the District of Columbia used the ACE module during those 4 years; 12 used it only once, while Vermont used it twice and Wisconsin used it 3 times. Across those 4 years, the 14 states or districts that used the ACE module collected data on a total of 117,876 men and women ages 18–99 years, with each state or district contributing between 2,161 and 12,950 observations per year. The complete BRFSS data are freely available at https://www.cdc.gov/brfss/.

### Variables

The ACE module used by BRFSS contains 11 questions which ask about “events that happened during [the respondent’s] childhood,” which the interviewer prompt subsequently defines as “the time period before you were 18 years of age” (CDC 2012b). The first 5 items were answered as yes or no. The last 6 items asked about the frequency of various events on a 3-point scale: never, once, or more than once. These questions in the ACE module were

1. Did you live with anyone who was depressed, mentally ill, or suicidal?
2. Did you live with anyone who was a problem drinker or alcoholic?
3. Did you live with anyone who used illegal street drugs or who abused prescriptions?
4. Did you live with anyone who served time in prison, jail, or other correctional facility?
5. Were your parents separated or divorced?
6. How often did your parents or adults in your home ever slap, hit, kick, punch, or beat each other up?
7. How often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way? Do not include spanking.
8. How often did a parent or adult in your home ever swear at you, insult you, or put you down?
9. How often did anyone at least 5 years older than you or an adult try to make you touch them sexually?
10. How often did anyone at least 5 years older than you or an adult ever touch you sexually?
11. How often did anyone at least 5 years older than you or an adult force you to have sex?

The first 5 items do not form a reliable scale in any combination (Cronbach’s $\alpha < .6$). Items 6–8 were combined into a scale of childhood violence ($\alpha = .70$), and items 9–11 were
combined into a scale of childhood sexual trauma (α = .86); each scale ranges from 0 to 6.

The BRFSS core module contains two measures of engagement in sexual risk behaviors. The core BRFSS module during these years included a section on HIV/AIDS. *Engagement in sexual risk behaviors* comes from a single question which asks respondents whether they have engaged in any of the following four risk behaviors over the past year: used intravenous drugs, been treated for a sexually transmitted or venereal disease, given or received money for sex, or had anal sex without a condom. The question does not note which of these activities the respondent engaged in, merely recording yes or no to any of these high-risk behaviors. *Taken an HIV test* is measured by a question which asks “Have you ever been tested for HIV? Do not count tests you may have had as part of a blood donation. Include testing fluid from your mouth.” This is answered yes or no.

*Martial status* is measured by a question in the core questionnaire which records whether the respondent is currently married, divorced, widowed, separated, never married, or a member of an unmarried couple. Because widowed is a rare outcome for people in the age bracket considered for this sample, widowed individuals were dropped from analysis. Separated is also a rare outcome and is combined with divorced for the purposes of analysis. Note that this question captures only current marital status. We do not know how many spouses currently married individuals have had, nor do we know if people who are members of an unmarried couple were once married. We also do not know if people who are members of an unmarried couple are cohabiting or living apart.

Several background variables are included in the analyses, including calendar year and respondent’s age at the time of interview. Education is coded as an ordinal variable with six levels: never attended school, elementary only, some high school, high school graduate, some college, or college graduate or more. (BRFSS does not distinguish between education levels higher than a college degree.) Income is coded as an ordinal variable with eight levels, from less than US$10,000 per year to US$75,000 or more. Race/ethnicity is coded as six separate indicator variables: White non-Hispanic, Black non-Hispanic, Asian, American Indian/Alaska Native, Hispanic, or Other races/multiracial. Lastly, geographic region was controlled for, as access to health care, engagement in risk behaviors, and disease prevalence can vary by region in the United States (Goldsmith, Dietrich, Du, & Morrison, 2010; Singh, Kogan, & van Dyck, 2008; Song et al., 2010). Dummy variables were created indicating if the respondent’s state was in the Southern United States (Arkansas, District of Columbia, Louisiana, North Carolina, Oklahoma, or Tennessee) or the Western United States (Montana, Nevada, or Washington), with the rest of the country being the omitted baseline.

**Analysis**

The initial BRFSS sample for the 13 states (plus Washington, DC) using the ACE module was 117,876, with ages ranging from 18 through 99. The analytical sample was restricted to individuals ages 18–54, as this age range is most likely to have reproduced recently. After eliminating individuals missing data for key variables, the final analytical sample contains 23,978 women and 17,530 men.

Logistic regression is used to model engagement in sexual risk behaviors or having had an HIV test. Multinomial logistic regression is used to model marital status, which has four outcomes: married, divorced/separated, never married, or member of an unmarried couple. Currently married is the omitted baseline. Each multivariate model controls for calendar year, age, education, income, race/ethnicity, and geographic region, with ACE the main predictor of interest. The svy commands in Stata/SE Version 14.1 are used to control for the complex design of the BRFSS data (StataCorp 2015); these commands weight the data to restore representativeness and stratify the data by state. Results are presented as odds ratios (ORs) for binary logistic regression and as relative risk ratios (RRRs) for multinomial logistic regression.

**Results**

Descriptive statistics for the analytical sample are presented in Table 1 by gender. About 4.6% of men and 4% of women report engaging in sexual risk behaviors over the past year, while 38% of men and 49% of women have ever taken an HIV test. The majority of men (53%) and women (59%) are currently married, while 31% of men and 24% of women have never married. In terms of ACE, larger proportions of women than men report having grown up with someone who was depressed, mentally ill, or suicidal (16% of men vs. 23% of women) or with a problem drinker or alcoholic (23% of men vs. 28% of women). In contrast, men and women report similar levels of exposure to crime or jail (about 9% for both sexes), or having parents who divorced or separated (about 32% for both sexes). For the scale indicating childhood exposure to violence, men and women report similar levels, with an average of about 1.3. In contrast, women are more likely to report childhood sexual trauma, with men averaging 0.2 on the scale and women 0.56 (Table 1).

Table 2 examines the two ACE scales in more detail by presenting frequency distributions for each scale. Overall, 54% of men and 55% of women report no exposure to childhood violence. In contrast, 93% of men report no exposure to childhood sexual trauma versus 83% of women. These results suggest that women and men are exposed to similar levels of childhood violence, but women are more likely than men to experience sexual trauma.

Table 3 presents multivariate logistic regression models of engagement in sexual risk behaviors and having taken an HIV test by sex. For men, every measure of ACE is associated with positive odds of engagement in sexual risk behaviors over the past year. For women, five of the seven ACE measures (lived with an alcoholic, lived with a drug abuser, parents divorced, and both the Violence and Sexual Trauma ACE Scales) are associated with increased odds of engagement in sexual risk.
In contrast, for both men and women, the same three ACE measures were associated with increased odds of having ever taken an HIV test: having lived with a drug abuser and the Violence and Sexual Trauma Scales.

Multinomial logistic regression models of current marital status, with currently married as the comparison group, are presented in Table 4. For men (Panel A), none of the ACE measures are associated with relative risk of being never married compared with currently married. Men who grew up with someone who was depressed or mentally ill have greater relative risk of being in an unmarried couple than currently married (RRR = 1.49), while men whose parents divorced or separated have greater relative risk of being divorced or separated themselves relative to currently married (RRR = 1.32). For women, as for men, none of the ACE measures predicts being never married (relative to currently married). Women who grew up with someone who abused drugs have lower relative risk of being in an unmarried couple (RRR = 0.67), while greater childhood exposure to violence is associated with increased relative risk of being in an unmarried couple (RRR = 1.1). Finally, women have increased relative risk of being divorced or separated if their own parents divorced or separated (RRR = 1.37), if they were exposed to greater levels of childhood violence (RRR = 1.05), or if they were exposed to childhood sexual trauma (RRR = 1.06).

Education is a potentially important pathway to influencing reproductive behaviors and may also interact with adverse childhood experiences. Education is associated with greater odds of sexual risk behaviors and HIV testing for men but not for women (Table 3), as well as increased relative risk of being never married for men and being never married or divorced for women (Table 4). The models presented in Tables 3 and 4 were repeated with interaction terms between education and each ACE variable added. In most models, none of the interaction terms were significant. Table 5 presents results (omitting the control variables) for the three models in which at least one Education × ACE interaction term and one main effect were significant. For engagement in sexual risk behaviors over the past year, Education × ACE interactions were significant only for women (Panel A). Specifically, women who grew up with someone who abused drugs have increased odds of engaging in sexual risk behaviors (OR = 8.66), but their odds decrease as education increases (interaction OR = 0.71). For both men and women, interaction terms between education and ACE variables were significant for only one form of current marital status. For men (Panel B), growing up with someone who went to prison was associated with reduced risk of being divorced or
separated (RRR = 0.11) but the risk increased with education (RRR = 1.68). For women (Panel C), the risk of being never married increased with education (RRR = 1.19), with having lived with someone who went to prison (RRR = 5.76) and with having divorced parents (RRR = 2.18, marginally significant at p = .050). However, the relationship between growing up with someone who went to prison or with divorced parents both decrease as education increases (RRR = 0.70 and 0.84, respectively). (Interaction terms between ACE and race/ethnicity were also examined but were nonsignificant.)
Discussion

This study used a representative sample of adult respondents from 13 U.S. states plus Washington, DC, reporting their exposure to 11 measures of adverse childhood experiences. The results are consistent with the hypothesis, drawn from acceleration theory, that adverse childhood experiences influence the adult reproductive behaviors of both men and women via the proximate pathways of sexual and marital behaviors (Belsky, Steinberg, & Draper, 1991; Ellis, 2004).

The first two predictions of the study state that ACE will lead to increased likelihood of engagement in short-term

| Variables                        | Male | Female |
|----------------------------------|------|--------|
|                                  | RRR  | p      | RRR  | p      | RRR  | p      |
| Intercept                        | 0.000| .000   | 0.000| .000   | 0.000| .000   |
| Year                             | 1.178| .043   | 1.083| .068   | 1.215| .048   |
| Age                              | 0.877| .003   | 0.926| .006   | 1.024| .005   |
| Education                        | 1.084| .043   | 0.923| .054   | 0.954| .042   |
| Income                           | 0.645| .013   | 0.714| .021   | 0.672| .014   |
| Black non-Hispanic (baseline)    | 2.489| .324   | 1.443| .417   | 1.581| .228   |
| Asian                            | 1.595| .286   | 0.748| .314   | 0.512| .169   |
| American Indian/Alaska Native    | 1.376| .479   | 1.493| .520   | 1.093| .333   |
| Other/multiracial                | 1.177| .221   | 2.244| .609   | 1.920| .517   |
| Hispanic                         | 0.610| .100   | 2.332| .407   | 0.646| .128   |
| South                            | 1.251| .055   | 0.729| .103   | 0.107| .945   |
| West                             | 0.916| .091   | 1.302| .206   | 1.565| .176   |
| ACE: Lived with depressed        | 0.995| .106   | 1.490| .248   | 0.997| .117   |
| ACE: Lived with alcoholic        | 0.916| .089   | 1.179| .182   | 1.090| .117   |
| ACE: Lived with drug abuser      | 0.900| .115   | 0.948| .221   | 1.171| .154   |
| ACE: Lived with prisoner         | 1.048| .160   | 1.064| .251   | 1.012| .165   |
| ACE: Parents divorced/separated  | 0.961| .080   | 1.155| .161   | 1.318| .122   |
| ACE Scale: Childhood violence    | 1.014| .024   | 1.018| .037   | 1.044| .025   |
| ACE Scale: Childhood sexual trauma | 1.006| .047   | 0.995| .059   | 1.019| .043   |

Note: ACE = adverse childhood environment; RRR = relative risk ratio.
mating behavior. The study found that exposure to each childhood adversity variable is associated with higher odds of engagement in sexual risk behaviors over the past year for men, while five ACE variables are associated with higher odds of engagement in sexual risk behaviors for women. Having ever taken an HIV test was predicted by the same three ACE variables for both men and women. This results support Prediction 1. Among both men and women, no ACE variable predicted being never married (compared with currently married) for either men or women. For men, one ACE variable was positively associated with being in an unmarried couple or being divorced or separated, while for women, two ACE variables were positively associated with being in an unmarried couple and three positively predicted being divorced or separated. Only one ACE variable predicted reduced likelihood of not being currently married: Among women, growing up with a drug abuser predicted reduced relative risk of being in an unmarried couple (compared with currently married). Although women report higher exposure to both childhood violence and childhood sexual trauma than men (Table 1), these scales are significantly associated with two and three outcomes, respectively, for men versus four and three, respectively, for women.

Several limitations of the data should be noted. These data are cross-sectional and self-reported. An increasing number of studies of fertility take advantage of experimental methodologies to tease apart causal mechanisms (reviewed in Coall, Tickenor, McAllister, & Sheppard, 2016; McAllister, Pepper, Virgo, & Coall, 2016); correlational studies such as the present one are unable to make strong claims of causality. Information about childhood conditions is collected retrospectively for a broad range of ages (“before you were 18”). This may reduce the observed statistical relationships, as stress experienced earlier in life, particularly before adrenarche or gonadarche, may be more influential than stress experienced at a later developmental stage (Ellis, 2004; Ellis & Essex, 2007). Engagement in

| Variables                        | A. Sexual Risk Behaviors—Female | B. Divorced/Separated—Male | C. Never Married—Female |
|----------------------------------|--------------------------------|---------------------------|-------------------------|
|                                  | OR/Standard Error/ p            | RRR/Standard Error/ p     | RRR/Standard Error/ p   |
| Education                        | 0.984/0.094/ .863              | 0.945/0.052/ .307        | 1.189/0.067/ .002      |
| ACE: Lived with depressed        | 0.734/0.540/ .674              | 2.169/1.222/ .161        | 0.587/0.286/ .275      |
| ACE: Lived with alcoholic        | 0.246/0.181/ .057              | 1.051/0.534/ .922        | 0.932/0.426/ .877      |
| ACE: Lived with drug abuser      | 8.659/9.616/ .007              | 2.360/1.478/ .173        | 1.583/1.068/ .496      |
| ACE: Lived with prisoner         | 1.614/1.262/ .540              | 0.110/0.072/ .001        | 5.762/4.222/ .017      |
| ACE: Parents divorced/separated  | 1.840/1.252/ .370              | 1.653/0.718/ .247        | 2.179/0.866/ .050      |
| ACE Scale: Childhood exposure to violence | 0.923/0.197/ .706 | 1.014/0.108/ .894 | 0.896/0.105/ .349 |
| ACE Scale: Childhood sexual trauma | 1.286/0.207/ .118 | 0.873/0.207/ .568 | 0.928/0.137/ .614 |
| Ed × Depression                  | 1.098/0.162/ .528              | 0.843/0.097/ .136        | 1.115/0.107/ .255      |
| Ed × Alcoholic                   | 1.376/0.203/ .030              | 1.005/0.108/ .965        | 1.014/0.094/ .880      |
| Ed × Drugs                       | 0.709/0.118/ .038              | 0.848/0.113/ .216        | 0.911/0.128/ .507      |
| Ed × Prison                      | 0.964/0.164/ .830              | 1.684/0.241/ .000        | 0.699/0.107/ .019      |
| Ed × Divorce                     | 0.844/0.119/ .232              | 0.951/0.086/ .581        | 0.845/0.067/ .033      |
| Ed × Violence                    | 1.035/0.044/ .425              | 1.007/0.023/ .760        | 1.025/0.024/ .285      |
| Ed × Sexual Trauma               | 0.984/0.032/ .630              | 1.032/0.051/ .524        | 1.018/0.030/ .549      |
| N                                | 23.978/17.530                  | 23.978                    |                         |
| F                                | 15.80/37.26                    | 49.33                     |                         |
| p                                | .000/.000                      | .000/ .000                | .000/ .000              |

Note. Models also control for year, age, income, race/ethnicity, and geographic region. Boldface indicates statistical significance (p < 0.05). ACE = adverse childhood environment; Ed = Education; RRR = relative risk ratio.
sexual risk behavior is measured only for the previous year, and we do not know which, or how many, of the qualifying four risk behaviors the respondent engaged in. The lack of detailed sexual, reproductive, or relationship histories limits the interpretation of the results. For example, we have no information on previous marital status for individuals who are not currently married or on lifetime number of marriages for those who have ever been married. In addition, we cannot distinguish cohabiting individuals from unmarried persons in a relationship with a noncohabiting partner. This distinction is important as cohabiting partners have greater commitment to each other than unmarried noncohabiting couples. For example, couples who are cohabiting when a child is born are much more likely to subsequently marry than unmarried couples who do not live together (Center for Research on Child Wellbeing, 2007); similarly, cohabiting men are much more likely to accept legal paternity for a newborn child than men who do not live with the mother (Child and Family Research Partnership, 2014).

Although BRFSS is nationally representative, the survey uses a telephone sampling frame, which has higher nonparticipation rates than face-to-face interviews and which does not sample individuals who do not have a telephone. Also, while BRFSS is representative of the states which used the ACE module in the years surveyed, it was used by no more than five states each year, and the results may not apply to the United States as a whole. Lastly, some of the outcomes measure relatively rare events. Fewer than 5% of respondents (about 800 men and 950 women) have engaged in sexual risk behaviors over the past year, and fewer than 6% of respondents (over 1,000 men and 1,100 women) are currently members of an unmarried couple. These statistical models involve a relatively small proportion of the population, which may affect the estimated coefficients and standard errors.

The strengths of the study include that it uses a population-based sample of both men and women from a variety of race/ethnic backgrounds and examines several reproductive outcomes that are rarely studied in tests of the acceleration theory. These novel features make the findings a contribution to the literature.

Conclusion

The study found support for the prediction that childhood stress influences adult reproductive behaviors. For both men and women, greater exposure to ACEs was associated with engagement in sexual risk behaviors, having taken an HIV test, or being a member of an unmarried couple or being divorced/separated. This study builds upon previous research suggesting that childhood conditions can have profound and long-lasting impacts on adult behaviors.

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Note

1. In 2009, the adverse childhood environment (ACE) module was used by Arkansas and Louisiana. In 2010, the District of Columbia, Hawaii, Nevada, Vermont, and Wisconsin used the ACE module. In 2011, it was used by Minnesota, Montana, Vermont, Washington, and Wisconsin, while in 2012, it was used by Iowa, North Carolina, Oklahoma, Tennessee, and Wisconsin.

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