

Childhood Adverse Events and Adult Physical and Mental Health: A National Study

Amanda Rosinski, Rebecca A. Weiss*, and Lauren Clatch
John Jay College of Criminal Justice of The City University of New York

ABSTRACT. Prior research has established the negative effects of childhood adverse events on adult health. Despite this, few researchers have accounted for the impact of potentially confounding factors, including adulthood adverse events. The current study used data obtained from a uniquely generalizable sample ($N = 34,653$) to investigate the predictive effects of reported experience of any childhood adverse event, count of childhood adverse event types, and severity of childhood adverse events on quality of adult physical and mental health. A hierarchical linear regression analysis indicated that, for adult physical health, there was a significant main effect for experience of adulthood adverse events ($\Delta R^2 = .01, p < .001$) and a significant interaction effect between adulthood adverse events and all three predictor variables ($\Delta R^2 = .01, p < .001$). A hierarchical linear regression analysis indicated that, for adult mental health, there was a significant main effect for experience of adulthood adverse events ($\Delta R^2 = .02, p < .001$) and a significant interaction effect between adulthood adverse events and all three predictor variables ($\Delta R^2 = .03, p < .001$). Although the models were significant, they explained little variance, suggesting a youthful resilience against the long-term effects of childhood adverse events. These findings support the multifaceted relationship between childhood adverse events and adult health. Treatment providers may increase efficacy by focusing on preventative care for childhood clients who have experienced adverse events.

The Child Abuse Prevention and Treatment Act Reauthorization Act of 2010 (P.L. 111–320) defined child abuse and neglect as an act by a parent or caretaker that results in an immediate risk of serious physical or emotional harm, exploitation, or death of a child. Childhood adverse events are a pervasive phenomenon in the United States. In 2012, there were 3.4 million reports of child abuse that involved 6.3 million children (U.S. Department of Health and Human Services, 2013). In that year, there were 1,640 children fatalities as a result of childhood adverse events, resulting in an average loss of four to seven children per day (U.S. Department of Health and Human Services, 2013).

Childhood adverse events have a widespread

occurrence in the United States and existing research has established their long-term effects on adult mental health. Prior research has indicated an association between experiencing childhood adverse events and poorer adult mental health (Edwards, Holden, Felitti, & Anda, 2003; Felitti et al., 1998; Greenfield & Marks, 2010; Higgins & McCabe, 2003; Horwitz, Widom, McLaughlin, & White, 2001; Jovev et al., 2013; Kendall-Tackett, 2002; Keyes et al., 2012; Sugaya et al., 2012). In a study conducted by Greenfield and Marks (2010), maternal childhood psychological violence was associated with poorer mental health in adulthood. This relationship remained consistent even when physical violence was never or rarely present. In addition, paternal childhood violence has been

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linked with less psychological stability in adulthood (Greenfield & Marks, 2010). Research conducted by Edwards and colleagues (2003) established that childhood physical and sexual abuse were correlated with poorer mental health functioning in adulthood. In addition, respondents who reported experiencing at least two types of childhood adverse events were associated with even poorer mental health than those who reported experiencing only one type of childhood adverse event (Edwards et al., 2003). Finally, there was a positive correlation between respondents who self-reported emotional abusive families and increased mental health risks (Edwards et al., 2003). Similarly, in a study conducted by Felitti and colleagues (1998), participants who reported experiencing four or more types of childhood adverse events had a 4- to 12-fold increased risk for alcoholism, drug abuse, depression, and suicide attempts.

Research has also established the effects of experiencing childhood adverse events on risk for experiencing psychopathology later in life. Pérez-Fuentes and colleagues (2013) examined the effects of childhood sexual abuse on psychopathology, and concluded that individuals who experienced such abuse had higher risks of both psychopathology and suicide attempts. Childhood physical abuse has also significantly predicted a risk for psychopathological disorders, including attention-deficit hyperactivity disorder, posttraumatic stress disorder, and bipolar disorder (Sugaya et al., 2012). Results from a study conducted by Jovev and colleagues (2013) revealed that childhood abuse predicted an increase in symptoms of anti-social personality disorder, and childhood neglect predicted an increase in symptoms associated with borderline personality disorder. Similarly, Waxman, Fenton, Skodol, Grant, and Hasin (2014) found that different types of childhood adverse events predicted risk of different personality disorders in adulthood, such that sexual abuse increased risk for borderline and schizotypal personality disorders, physical abuse increased risk for antisocial personality disorder, and emotional neglect increased risk for avoidant and schizoid personality disorders. Further, research conducted by Horwitz and colleagues (2001) reported that victims of childhood abuse and neglect exhibited an increase in both dysthymia and antisocial personality disorder in adulthood. Female victims were also more likely to have alcohol problems in adulthood, but this was not true for male victims (Horwitz et al., 2001). This research heightens the adulthood mental health

risks associated with childhood adverse events.

In addition to the resulting mental health effects of childhood adverse events in adulthood, researchers have found evidence linking cognitive deficits in adulthood (Nikulina & Widom, 2013). For example, prior research has demonstrated that childhood maltreatment and childhood neglect were associated with both decreased executive functioning and nonverbal reasoning in middle adulthood. However, there were no links between physical or sexual abuse and poor executive functioning (Nikulina & Widom, 2013).

The research establishing the long-term effects of childhood adverse events on adult physical health is relatively limited although existing research has established an association between childhood adverse events and physical health deficits in adulthood. For example, childhood adverse events pose an increased risk of several physical health conditions in adulthood (Afifi, Mota, MacMillan, & Sareen, 2013; Felitti et al., 1998; Min, Minnes, Kim, & Singer, 2013; Morton, Schafer, & Ferraro, 2012; Rapoza et al., 2014; Scott et al., 2011). Scott and colleagues (2011) found that individuals who reported at least three childhood adverse events experienced an increased risk of heart disease, asthma, diabetes, osteoarthritis, chronic spinal pain, and frequent or severe headaches. Morton and colleagues (2012) demonstrated that childhood adverse events were associated with an increased risk of cancer in adulthood. This effect differed based on gender; physical abuse by a parent of the same gender increased cancer risk (Morton et al., 2012).

In addition to increased risk of several physical health conditions, Felitti and colleagues (1998) demonstrated that childhood adverse events were associated with several leading causes of death in the United States. In fact, participants who reported experiencing four or more types of childhood adverse events had a 2- to 4-fold increase in smoking, poor self-rated health, at least 50 sexual partners, sexually transmitted disease, a 1.4- to 1.6-fold increase in physical inactivity, and severe obesity (Felitti et al., 1998). Further, Felitti and colleagues (1998) established that the more types of childhood adverse events that respondents reported, the more likely the presence of ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease in those respondents.

An association between childhood adverse events and a decrease in overall adult health-related quality of life has also been examined in past literature (Corso, Edwards, Fang, & Mercy, 2008;

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Irving & Ferraro, 2006; Springer, Sheridan, Kuo, & Carnes, 2007). For example, Irving and Ferraro (2006) demonstrated that childhood adverse events were associated with poorer self-reported overall physical and mental health in a national United States sample. This study determined that emotional abuse was key in understanding the effects of childhood adverse events. Springer and colleagues (2007) established that parental physical abuse predicted a variety of both mental and physical health symptoms in adulthood, including depression, anxiety, anger, physical symptoms, and medical complications. Based on data collected in the Adverse Childhood Experiences Study, Corso and colleagues (2008) also reported a correlation between childhood adverse events and an overall loss in health-related quality of adulthood life. However, the sample in the study was not representative of the United States' population because it only included those who had access to health care (Corso et al., 2008). Still, these studies clearly linked an overall decrease in adulthood health with self-reported childhood adverse events.

Conversely, some previous research has indicated that the established relationship between childhood adverse events and lifetime overall health is confounded by other life stressors (Higgins & McCabe, 2003; Horwitz et al., 2001; Schafer, Morton, & Ferraro, 2014). For example, Horwitz and colleagues (2001) established that, after controlling for stressful adult life events, childhood adverse events had a minimal effect on adulthood mental health. In addition, the effects of childhood adverse events are not universal and may affect individuals differently. For example, Higgins and McCabe (2003) demonstrated that some individuals who reported experiencing childhood adverse events later exhibited psychological maladjustment in adulthood, and others displayed a higher level of adjustment (Higgins & McCabe, 2003). Schafer and colleagues (2014) proposed that the effects of childhood adverse events on adult health are often poorer when respondents also had a negative relationship with one or more of their parents. These studies suggest that childhood adverse events may actually have only a minimal effect on health in adulthood, especially after accounting for stressful adult life events.

Study Overview

Despite the evidence that childhood adverse events are a widespread phenomenon, the current literature base is limited for three reasons: (a) the lack

of representative samples, which may misconstrue rates of resulting adult impairment; (b) exclusive reliance on questionnaires without interviews, which may not be as accurate because some cases of childhood trauma may not be self-identified (Corso et al., 2008); and (c) inconsistent attention to potentially confounding variables that might affect adult adjustment and be mistakenly attributed to childhood adverse events, such as the experience of trauma as an adult (Horwitz et al., 2001).

To address these limitations, the current study investigated the nature of the relationship between childhood adverse events, sometimes referred to as adverse childhood experiences, and adult physical and mental health using a large and uniquely representative national sample that was collected during a face-to-face, computer-assisted personal interview. These data built upon previous research that suggested childhood adverse events have a negative effect on adult health. The current study expanded on the previous research by using data that featured an extensive assessment of a wider range of potentially confounding variables. Therefore, researchers were able to control for variables that have been found to affect self-reported adult health, including gender, age, race, education, personal income, marital status, and reported experience of adult adverse events, but that have not been consistently accounted for in past research (Alegria et al., 2013; Min et al., 2013). It was expected that participants who reported experiencing any form of childhood adverse events (physical abuse, sexual abuse, physical neglect, verbal abuse, and/or emotional neglect) would have lower physical and mental health scores as compared to participants who reported not experiencing any form of childhood adverse events. It was also anticipated that participants with a higher count of childhood adverse events (calculated by summing the total number of childhood adverse event types reported by the participant) would have lower physical and mental health scores as compared to participants with a lower count of childhood adverse events. Participants with greater perceived severity of childhood adverse events (calculated by summing the severity ratings of each reported childhood adverse event question) were expected to have lower physical and mental health scores as compared to participants with a lesser perceived severity of childhood adverse events. Finally, participants who reported experiencing any form of adulthood adverse events (sexual assault, physical assault, or close relationship with an alcoholic)

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would have lower physical and mental health scores as compared to participants who reported not experiencing any form of adulthood adverse events.

Method

Procedure

This study employed an archival analysis to examine the long-term effects of childhood adverse events on adult physical and mental health while accounting for several potential confounding variables, which was approved by the John Jay College of Criminal Justice (City University of New York) Human Research Protections Program Office. The study utilized cross-sectional survey data from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), collected by the National Institute of Alcohol Abuse and Alcoholism from 2004–2005. Wave 1 of NESARC was collected from 2001–2002 (Grant et al., 2004). Both waves of NESARC were conducted using face-to-face, computer-assisted personal interviews administered by trained lay interviewers. The research protocol, including informed consent, was approved by the U.S. Census Bureau and the U.S. Office of Management and Budget. Further details of the NESARC are available elsewhere (Grant et al., 2004; Grant, Dawson, & Hasin, 2007; Grant et al., 2009).

Participants

The NESARC represents the civilian, noninstitutionalized population of the United States, including respondents living in households and miscellaneous noninstitutional group residences. For the Wave 2 NESARC sample, all eligible participants from Wave 1 were re-interviewed, with a response rate of 86.7% (Grant et al., 2007). The study sample size from Wave 2 of NESARC was 34,653 participants.

Most participants (58.0%, $n = 20,089$) identified as women, and 42.0% ($n = 14,564$) identified as men. At the time of Wave 2, the sample of adults were 20 years of age or older. All participants in the study ranged in age from 20 to 90 ($M = 49.1$, $SD = 17.3$). Most of the sample (58.2%, $n = 20,161$) self-identified as non-Hispanic European American, 19.0% identified as African American ($n = 6,587$), 18.4% identified as Hispanic ($n = 6,359$), 2.8% identified as Asian/Native Hawaiian/Other Pacific Islander ($n = 968$), and 1.7% identified as American Indian/Alaska Native ($n = 578$). Although the level of reported total personal annual income ranged from \$0 to over \$100,000, most of the sample (72.7%; $n = 25,183$) reported a personal income

below \$40,000. Most participants reported at least some college (56.8%; $n = 19,687$), 27.3% ($n = 9,452$) reported a high school or equivalent degree, and 15.9% ($n = 5,514$) reported not completing high school. Most participants (54.4%; $n = 18,866$) reported that they were married, and 45.6% ($n = 15,787$) reported being single.

Childhood Adverse Events

All participants completed the Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV (AUDADIS-IV), Wave 2 version (Grant et al., 2007). This included an assessment of childhood adverse events occurring before the age of 18, which was based upon the Adverse Childhood Experiences study (Dong, Anda, Dube, Giles, & Felitti, 2003; Dube et al., 2003). The questions were a portion of the items in the Conflict Tactics Scale (Straus, 1979; Straus, Hamby, Boney-McCoy, & Sugarman, 1996) and the Childhood Trauma Questionnaire (Bernstein et al., 1994). Question topics included physical abuse, verbal abuse, sexual abuse, physical neglect, and emotional neglect.

Participants were asked to rate several questions about childhood adverse events (except emotional neglect) on a 5-point Likert-type scale (*never, almost never, sometimes, fairly often, and very often*). Emotional neglect was coded on a 5-point scale (*never true, rarely true, sometimes true, often true, and very true*). Responses were coded into categories of abuse and neglect based on prior research (Afifi et al., 2011; Afifi, Henriksen, Asmundson, & Sareen, 2012). Participants were categorized as having experienced physical abuse if they responded “sometimes” or greater to either (a) being pushed, shoved, grabbed, slapped, or hit by a parent or caregiver, or (b) to having bruises or injuries as a result of being hit by a parent or caregiver (Afifi et al., 2011; Afifi et al., 2012). Participants were coded as having experienced verbal abuse if they responded at least “fairly often” when asked about (a) a parent or caregiver threatening to hit or throw something at them, or (b) a parent or caregiver making the participants fear that they would be physically hurt or injured (Afifi et al., 2011; Afifi et al., 2012). Consistent with Wyatt (1985), participants were classified as having experienced sexual abuse if a response of anything other than “never” was reported when asked about (a) fondling, (b) touching in a sexual way, (c) attempted sexual intercourse, or (d) actual sexual intercourse with another adult when the participants were too young to know what was happening or did not want this.

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In the AUDADIS-IV, participants were coded as having experienced physical neglect if a response of anything other than “never” was recorded when asked about (a) difficult or dangerous chores; (b) being left alone or unsupervised; and not being provided (c) necessary things (e.g., school supplies or clothing), (d) regular meals, or (e) proper medical attention. In the current study, physical neglect was coded differently than the Adverse Childhood Experiences study (Dong et al., 2003; Dube et al., 2003) because one of the questions by the original researchers in the study was changed by the AUDADIS-IV (Afifi et al., 2011). For this reason, an adapted definition of physical neglect was used based on the AUDADIS-IV criteria.

Consistent with past research on emotional neglect (Afifi et al., 2011; Dong et al., 2003; Dube et al., 2003) participants were asked about (a) the extent of family support, (b) whether the family was considered close-knit, (c) whether the family made the participants feel special, (d) whether the family made the participants feel successful, and (e) whether the family believed in the participants. Responses were reverse-coded and summed, and participants who reported scores of 15 or greater were categorized as having experienced emotional neglect.

Coding Childhood Adverse Events

The three independent variables were then calculated based upon data for each of the childhood adverse events. For the first hypothesis, participants who reported any type of childhood adverse event were separated from participants who did not report any type of childhood adverse event in a dichotomous variable. For example, if one participant reported physical neglect only and another participant reported all five types of childhood adverse events, they were both coded the same, as reporting any childhood adverse event. For the second hypothesis, participants’ reports of each of the five types of childhood adverse events were summed together in a count variable (with a range of 0 to 5). More specifically, if a participant reported sexual abuse and emotional neglect, the variable was coded as 2. Finally, for the third hypothesis, participants’ responses to all 18 of the childhood adverse events questions were summed together (emotional neglect was reverse coded prior to the calculation) in a severity variable (with a range of 18 to 90). For example, if a participant scored 5 on sexual abuse, 3 on physical neglect, 0 on physical abuse, 7 on verbal abuse, and 10 on

emotional neglect (reverse coded), the severity variable was coded as 25. Any childhood adverse event, count of childhood adverse event types, and overall severity of childhood adverse events were the independent variables used in the analyses.

Adulthood Adverse Events

In the Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV (AUDADIS-IV), all participants completed five questions pertaining to adulthood adverse events (Alegria et al., 2013). Consistent with prior research, participants were coded as experiencing any adulthood adverse event if they responded “yes” to any one of the following dichotomous questions: (a) been sexually assaulted, molested, raped, or experienced unwanted sex, (b) been physically attacked, beaten, or injured by spouse or romantic partner, (c) been physically attacked, beaten, or injured by anyone else, (d) been married to an alcoholic, or (e) lived as if married to someone who was an alcoholic. The coded adulthood adverse event variable was utilized as a potential confounding variable in the analyses.

Adult Physical and Mental Health

Version 2 of the Short Form-12 Health Survey (SF-12v2; Ware, Kosinski, Turner-Bowker, & Gandek, 2002) was the primary self-report measure of adult physical and mental health. This measure probes life satisfaction and current functioning over the last 4 weeks. The SF-12v2 is scored to produce a norm-based mental component summary score and a norm-based physical component summary score (Ware et al., 2002). These scale scores are standardized with a range of 1–100 and a mean of 50 ($SD = 10$). Higher scores indicate better functioning. Reliability estimates for the United States general population are 0.89 on the physical component summary score, and 0.86 on the mental component summary score. The relative validity of the SF-12v2 physical component summary score compared to the SF-36 parallel scale is 0.81, and the mental component summary score comparison is 0.92 (Ware et al., 2002).

Data Analyses

The main outcome measure of interest was self-reported adult physical and mental health, measured by the SF-12v2 (Ware et al., 2002). The measure is scored to produce a standardized mental and physical component summary score, which were utilized as the outcome measure in two hierarchical linear regressions. Prior to the hierar-

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chical linear regressions, two independent-samples *t* tests were conducted to determine if there were significant differences in both adult physical and mental health between those who reported experiencing any childhood adverse event and those who did not report experiencing any childhood adverse event. Two additional independent-samples *t* tests were conducted to determine if there were significant differences in both adult physical and mental health between those who reported experiencing any adulthood adverse event and those who did not report experiencing any adulthood adverse event. Then, a hierarchical linear regression was conducted for the mental health variable and the physical health variable, controlling for the potential confounding variables of age, race, gender, education, personal income, marital status, and reported experience of any adulthood adverse event. Significance was set to a *p* value of less than .05 in all analyses.

Results

Reported Prevalence Rates of Childhood Adverse Events

Prior to all analyses, data were screened for missing values. Descriptive statistics were calculated to determine the reported prevalence rate for each type of childhood adverse event. Table 1 describes the reported prevalence rate for each of the types of childhood adverse events, as well as the reported prevalence rate of any of the five

types of childhood adverse events. For count of childhood adverse events, up to five types could be reported. As noted in Table 1, 44.5% (*n* = 15,426) of participants reported experiencing at least one type of childhood adverse event. Multiple types of childhood adverse events were reported by 18.1% (*n* = 6,279) of participants.

Correlational Analyses

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, homoscedasticity, and multicollinearity. To detect

TABLE 1

Participants' Reported Prevalence Rates of Childhood Adverse Events

Childhood Adverse Events (CAEs)	Reported Prevalence Rates	
	<i>n</i>	%
Reported Any CAE	15,426	44.5
Reported 1 CAE	9,147	26.4
Reported 2 CAEs	3,433	9.9
Reported 3 CAEs	1,623	4.7
Reported 4 CAEs	859	2.5
Reported 5 CAEs	364	1.1
Physical Abuse Frequency	6,294	18.2
Verbal Abuse Frequency	2,286	6.6
Sexual Abuse Frequency	3,786	10.9
Physical Neglect Frequency	10,768	31.1
Emotional Neglect Frequency	3,501	10.1

TABLE 2

Correlations Between Study Variables

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	---											
2. Age	.03***	---										
3. Race	.05***	-.14***	---									
4. Income	-.30***	-.06***	-.14***	---								
5. Education	-.02***	-.15***	-.18***	.40***	---							
6. Marital	.10***	.05***	.09***	-.11***	-.07***	---						
7. AAEs	.16***	-.04***	-.02***	-.05***	-.01*	.12***	---					
8. Any CAE	-.03***	-.02**	.05***	-.02***	-.04***	.02**	.23***	---				
9. Count	.03***	-.03***	.04***	-.05***	-.04***	.03***	.32***	.78***	---			
10. Severity	.04***	-.01*	.03***	-.08***	-.10***	.04***	.30***	.58***	.85***	---		
11. Phys Hlth	-.07***	-.40***	-.02***	.25***	.24***	-.12***	-.09***	-.07***	-.09***	-.11***	---	
12. Ment Hlth	-.11***	.02***	-.03***	.16***	.09***	-.11***	-.18***	-.15***	-.19***	-.22***	.14***	---

Note. AAEs = any adult adverse event; Any CAE = any childhood adverse event; Count = number of different types of childhood adverse events experienced; Severity = total score of every childhood adverse event question; Phys Hlth = adult physical health; Ment Hlth = adult mental health. * *p* < .05. ** *p* < .01. *** *p* < .001.

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TABLE 3

Model Summaries for Both Hierarchical Linear Regressions

Model		R^2	Adjusted R^2	F
Physical Health	1	.22	.22	1626.42*
	2	.23	.23	1451.76*
	3	.24	.24	1045.22*
Mental Health	1	.04	.04	227.07*
	2	.06	.06	322.33*
	3	.09	.09	332.18*

Note. * $p < .001$.

TABLE 4

Regression Coefficients for Physical Health

	Model	B	SE	β
Model 1	Gender	-0.01	.11	.00
	Race	-0.52	.11	-.02**
	Age	-2.32	.03	-.37**
	Education	1.26	.07	.11**
	Income	0.71	.02	.17**
	Marital Status	-1.70	.11	-.08**
Model 2	Gender	0.27	.11	.01*
	Race	-0.61	.11	-.03**
	Age	-2.35	.03	-.38**
	Education	1.24	.06	.10**
	Income	0.71	.02	.17**
	Marital Status	-1.50	.11	-.07**
Model 3	Any AAE Experience	-2.05	.12	-.09**
	Gender	0.24	.11	.01*
	Race	-0.57	.11	-.03**
	Age	-2.35	.03	-.38**
	Education	1.19	.06	.10**
	Income	0.69	.02	.17**
	Marital Status	-1.52	.11	-.07**
	Any AAE Experience	-1.48	.12	-.06**
	Severity of CAEs Total	-0.06	.01	-.04**
	Count of CAEs Total	-0.39	.12	-.04*
	Any CAE Experience	0.16	.17	.01

Note. CAE = childhood adverse event; AAE = adulthood adverse event.

* $p < .05$. ** $p < .001$.

potential violations of multicollinearity, variance inflation factor was used. All variance inflation factor values were less than 10, suggesting no concern for violation of multicollinearity (Myers, 1990). All predictor variables were statistically correlated, but weakly, with adult physical and mental health, which indicates that the data were appropriate for examination through multiple linear regressions. As summarized in Table 2, the Pearson correlations between the predictor, dependent, and potential confounding variables were all weak to moderate, ranging from $r = .02$ to $r = .40$, $p < .05$. Physical health was significantly associated with any childhood adverse event ($r = -.07$, $p < .001$), count of events ($r = -.09$, $p < .001$), and severity of events ($r = -.11$, $p < .001$). Mental health was associated with any childhood adverse event ($r = -.15$, $p < .001$), count of events ($r = -.19$, $p < .001$), and severity of events ($r = -.22$, $p < .001$).

Unadjusted Differences Between Groups

Two independent-samples t tests were conducted to determine if there were significant differences in both adult physical and mental health between those who reported any childhood adverse event ($n = 15,426$) and those who did not report any childhood adverse event ($n = 18,589$). Because Levene's Test for Equality of Variances was significant ($p < .001$) for both t tests, the assumption of homogeneity of variance was violated, so the results were interpreted using t tests with Satterthwaite approximations. On average, participants who reported any childhood adverse event reported a lower quality of physical health ($M = 48.93$, $SE = 0.09$) than those who did not report any childhood adverse event ($M = 50.37$, $SE = 0.08$). This difference, 1.44, bias-corrected and accelerated method (BC_a) 95% CI [1.21, 1.68], was significant, $t(31840.34) = 12.14$, $p < .001$. However, it represented a small-sized effect, $d = 0.13$. Similarly, participants who reported any childhood adverse event reported a lower quality of adult mental health ($M = 49.47$, $SE = 0.08$) than those who did not report any childhood adverse event ($M = 52.46$, $SE = 0.07$). This difference, 2.99, BC_a 95% CI [2.78, 3.20], was significant, $t(30847.21) = 28.05$, $p < .001$. However, it represented a small-sized effect, $d = 0.31$.

In addition, two independent-samples t tests were conducted to determine if there were significant differences in both adult physical and mental health between those who reported any adulthood adverse event ($n = 10,281$) and those who did not report any childhood adverse event ($n = 24,372$).

Once again, because Levene's Test for Equality of Variances was significant ($p < .001$) for both t tests, the assumption of homogeneity of variance was violated, so the results were interpreted using t tests with Satterthwaite approximations. On average, participants who reported any adulthood adverse event reported a lower quality of physical health ($M = 48.15$, $SE = 0.12$) than those who did not report any adulthood adverse event ($M = 50.28$, $SE = 0.07$). This difference, 2.13, BC_a 95% CI [1.87, 2.40], was significant, $t(17202.73) = 15.73$, $p < .001$. However, it represented a small-sized effect, $d = 0.20$. Similarly, participants who reported any adulthood adverse event reported a lower quality of adult mental health ($M = 48.30$, $SE = 0.11$) than those who did not report any adulthood adverse event ($M = 52.21$, $SE = 0.06$). This difference, 3.91, BC_a 95% CI [3.67, 4.15], was significant, $t(16348.49) = 31.70$, $p < .001$, and it represented a medium-sized effect, $d = 0.41$.

Hierarchical Linear Regressions

To examine the effects of all three predictor variables on adult physical and mental health, while controlling for several known confounding variables, two hierarchical linear regressions were conducted. Consistent with prior literature (Alegria et al., 2013; Min et al., 2013), confounding variables controlled for in the analyses included gender, age, race, education, personal income, marital status, and reported experience of adulthood adverse events. Both regressions were a three-step analysis. In Step 1, age, race, gender, education, income, and marital status were regressed. In Step 2, experience of adult adverse events was included. In Step 3, the predictor variables of any childhood adverse event, count of types, and severity of types were added simultaneously.

Reported experience of any childhood adverse event, count of types, and overall severity had significant effects on quality of adult physical health ($R^2 = .24$, $p < .001$). After Step 2, there was a significant main effect for experience of adulthood adverse events ($\Delta R^2 = .01$, $p < .001$). The total variance explained by the model was 23.0%, $F(7, 33,931) = 1451.76$; $p < .001$. After Step 3, there was a significant interaction effect between adulthood adverse events and all three predictor variables ($\Delta R^2 = .01$, $p < .001$). The total variance explained by the model as a whole was 23.5%, $F(10, 33,928) = 1045.22$; $p < .001$.

For adult mental health, reported experience of any childhood adverse event, count of types,

and overall severity were also significant predictors ($R^2 = .09$, $p < .001$). After Step 2, there was a significant main effect for experience of adulthood adverse events ($\Delta R^2 = .02$, $p < .001$). The total variance explained by the model as a whole was 6.2%, $F(7, 33,931) = 322.33$; $p < .001$. After Step 3, there was a significant interaction effect between adulthood adverse events and all three predictor variables ($\Delta R^2 = .03$, $p < .001$). The total variance explained by the model as a whole was 8.9%, $F(10, 33,928) = 332.18$; $p < .001$.

The model summaries for both regressions are summarized in Table 3. The increases in model fit, although relatively small in size, were consistently statistically significant for both adult physical and adult mental health. The betas, standardized beta

TABLE 5

Regression Coefficients for Mental Health

	Model	<i>B</i>	<i>SE</i>	β
Model 1	Gender	-1.40	.11	-.07**
	Race	0.19	.11	.01
	Age	0.26	.03	.05**
	Education	0.51	.06	.05**
	Income	0.40	.02	.11**
	Marital Status	-1.65	.11	-.08**
Model 2	Gender	-0.93	.11	-.05**
	Race	0.04	.11	.00
	Age	0.21	.03	.04**
	Education	0.48	.06	.05**
	Income	0.41	.02	.11**
	Marital Status	-1.32	.11	-.07**
	Any AAE Experience	-3.37	.12	-.16**
Model 3	Gender	-1.06	.11	-.05**
	Race	0.10	.11	.01
	Age	0.20	.03	.04**
	Education	0.33	.06	.03**
	Income	0.38	.02	.10**
	Marital Status	-1.35	.10	-.07**
	Any AAE Experience	-2.25	.12	-.11**
	Severity of CAEs Total	-0.19	.01	-.17**
	Count of CAEs Total	0.35	.12	.04 [†]
	Any CAE Experience	-1.13	.17	-.06**

Note. CAE = childhood adverse event; AAE = adulthood adverse event.
* $p < .05$. ** $p < .001$.

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values, and standard errors for the physical health regression are presented in Table 4, and also presented for the mental health regression in Table 5. In general, participants who reported experiencing any childhood adverse event also experienced a lower quality of adult physical and mental health, even after accounting for several confounding variables, including reported experience of adulthood adverse events.

Discussion

Previous research has demonstrated that the experience of childhood adverse events can result in a decrease of overall adulthood health (Corso et al., 2008; Irving & Ferraro, 2006; Springer et al., 2007). In this study, consistent with the previous research, reported experience of childhood adverse events was significantly associated with poorer adult physical and mental health. On average, participants who reported experiencing any type of childhood adverse event experienced an adult physical health score that was lower than participants who did not report experiencing any childhood adverse events. Similarly, participants who reported experiencing any childhood adverse event also experienced an adult mental health score that was lower than those who did not report experiencing any childhood adverse event.

Reported experience of any childhood adverse event significantly predicted a lower quality of health in the regression models. Count of childhood adverse event types and overall severity significantly predicted lower quality of adulthood physical health. Reported experience of any childhood adverse event, count of childhood adverse event types, and overall severity significantly predicted lower quality of adulthood mental health. This effect remained significant in both regression models after accounting for known demographic and clinical confounding variables. However, although the models remained significant, they do not explain a substantial portion of the variance. After accounting for the known confounding variables, the report of experiencing childhood adverse events only predicted an additional small percentage of the variance in adulthood physical health and adulthood mental health. The results suggest that, although experiencing childhood adverse events does significantly predict lower quality of adulthood physical and mental health, they do not explain a substantial portion of the variance. Because the current study utilized a large and uniquely representative U.S. sample, these findings pose significant

implications for the treatment of childhood abuse. For example, treatment providers may improve treatment outcomes by directing treatment toward preventative care for childhood clients who have experienced adverse events prior to adulthood.

In the current study, there were significant differences in both mental health and physical health scores between participants who reported experiencing adulthood adverse events and participants who reported not experiencing any adulthood adverse events. This variable was also a significant predictor in the regression models because it had a main effect on both adult mental health and adult physical health. These findings, in combination with the small change in variance in adulthood physical health and adulthood mental health scores after accounting for the reported experience of childhood adverse events, suggest a youthful resilience against the long-term effects of childhood adverse events. This finding is similar to other studies that have concluded that childhood adverse events may have a less substantial impact on adult health after controlling for adult life stressors (Horwitz et al., 2001).

As indicated by the results, the relationship between childhood trauma and adult health is complex, which may be due to the impact of repeated trauma. Existing research has established that individuals with a history of childhood physical abuse, sexual abuse, or neglect are at an increased likelihood for subsequent victimization (Widom, Czaja, & Dutton, 2008). For example, Gidycz, Coble, Latham and Layman (1993) suggested that childhood sexual victimization predicted poorer adjustment, which in turn predicted later adult revictimization. The findings from the current study may be explained by Gidycz and colleagues' (1993) findings, in that reported experiences of childhood adverse events were associated with deficits in adult physical and mental health, but the variables were not strongly associated after accounting for adulthood adverse events. The research is relevant for clinicians, who may increase efficacy by focusing on preventative care for childhood clients who have recently experienced adverse events.

There are three noteworthy elements of the current study that distinguish it from previous research on childhood adverse events. First, this study investigated the nature of the relationship between childhood adverse events and adult physical and mental health using a large and uniquely representative national sample. Second, data were collected during a face-to-face, computer-assisted

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personal interview. Third, the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) data featured an extensive assessment of a wide range of potentially confounding variables that have affected self-reported adult health in past research, but have not been consistently accounted for in past research.

Despite these findings, there are a number of limitations in this study that must be considered. All childhood adverse events were retroactively reported by participants, who were at least 20 years old, but up to 90 years old, at the time of participation. The reliability of these retroactively reported statements is an ongoing debate in the field. And, the debate about retrospective versus prospective findings in childhood adverse events research is mixed (Kendall-Tackett & Becker-Blease, 2004). Widom, Weiler, and Cottler (1999) found significant differences between retrospective findings and prospective findings within the same sample. Still, some researchers argue that retrospective findings are reliable over time (Dube, Williamson, Thompson, Felitti, & Anda, 2004). Kendall-Tackett and Becker-Blease (2004) concluded that, although prospective findings are valuable, they are not necessarily preferred over retrospective findings. Retrospective childhood adverse events research measures a portion of the population that prospective research fails to capture. For this reason, research regarding childhood adverse events would suffer if retrospective findings were rejected altogether (Kendall-Tackett & Becker-Blease, 2004).

A few other limitations must be considered in this study. First, childhood adverse events were determined based on a small number of questions. This limits the type of childhood adverse events that were included in the current coding scheme, and may restrict other experiences that would otherwise be included in the definition of childhood adverse events. Because only cross-sectional data from Wave 2 of NESARC was utilized in the current study, inferences about causality cannot be made. Finally, modifications were made to Version 2 of the Short Form-12 Health Survey (SF-12v2; Ware et al., 2002) in order to allow for its inclusion in the NESARC questionnaire. These modifications were not consented by the owners of the SF-12v2, OptumInsight Life Sciences (QualityMetric), and may limit the reliability and validity of the measure. However, in light of this limitation, scores for the SF-12v2 were derived and standardized by the National Institute of Alcohol Abuse and Alcoholism using the techniques described by Ware et al. (2002).

Due to the retrospective and cross-sectional nature of this study, as well as the limitations addressing the childhood adverse event questions, the effect of childhood adverse events on adult mental and physical health requires further replication. Future research should consider the use of a representative national sample measuring these variables that is collected both prospectively and retrospectively. Because prior research has demonstrated an effect of ethnicity in risk of revictimization (Widom et al., 2008), the imminent need for a nationwide sample that reflects the growing diversity in the United States should also be taken into consideration. This design is ideal because it would allow future researchers to determine if there are differences in adulthood health of an ethnically representative national sample when measured both prospectively and retrospectively, while accounting for known demographic and clinical confounding variables.

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Author Note. Amanda Rosinski, Department of Psychology, John Jay College of Criminal Justice of the City University of New York; Rebecca A. Weiss, Department of Psychology, John Jay College of Criminal Justice of the City University of New York; Lauren Clatch, Department of Psychology, John Jay College of Criminal Justice of the City University of New York.

Amanda Rosinski is now at the Department of Psychology, John Jay College of Criminal Justice of the City University of New York and the Graduate Center of the City University of New York.

Lauren Clatch is now at the Department of Psychology, University of Minnesota.

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Correspondence concerning this article should be addressed to Amanda Rosinski, Department of Psychology, John Jay College of Criminal Justice of the City University of New York, New York, NY 10019. E-mail: arosinski@jjay.cuny.edu

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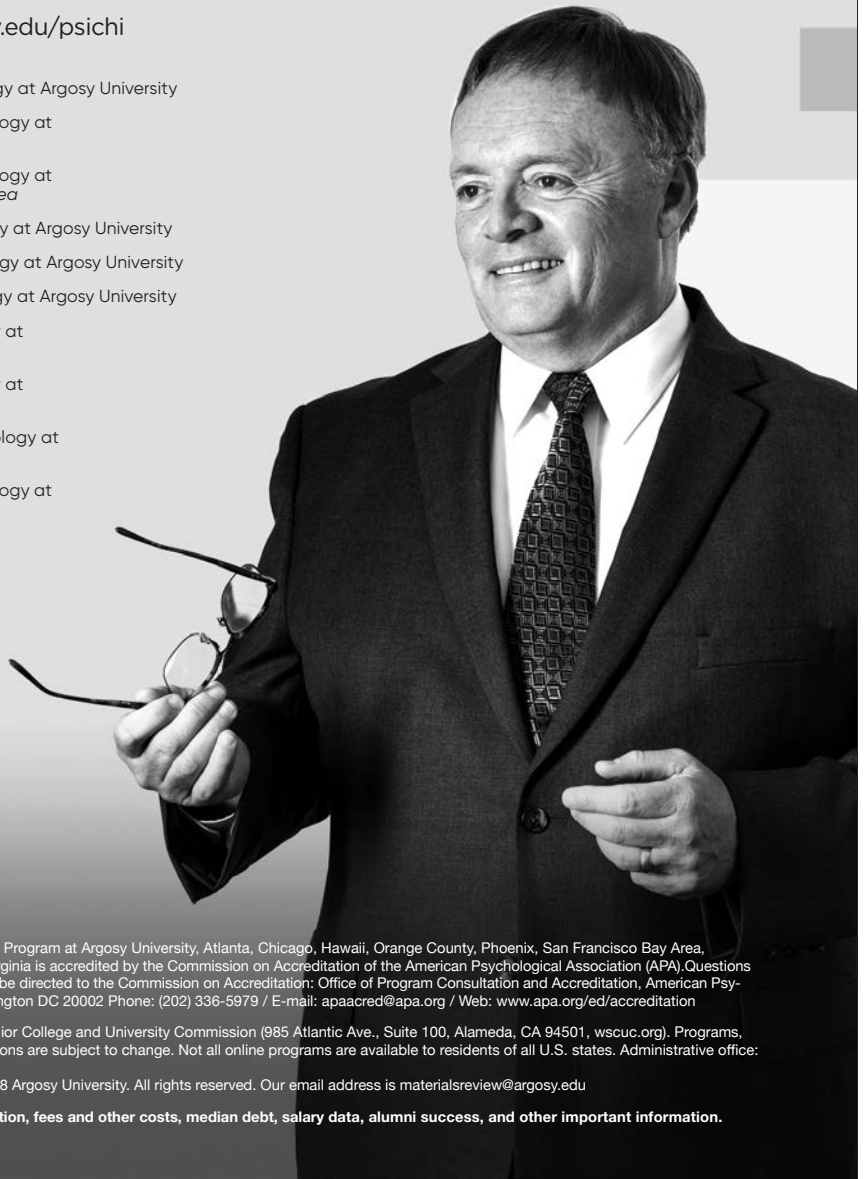
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