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Adverse Childhood Experiences: Health Care Utilization And Expenditures In Adulthood

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ABSTRACT Adverse childhood experiences (ACEs) have been shown to be strong predictors of socioeconomic status, risky health behaviors, chronic health conditions, and adverse outcomes. However, less is known about their association with adult health care utilization and expenditures. We used new data from the 2021 Medical Expenditure Panel Survey–Household Component (MEPS-HC) to provide the first nationally representative estimates of ACEs-related health care utilization and expenditure differences based on direct observation, rather than model-based extrapolation. Compared to demographically similar adults without ACEs, those with ACEs had substantially higher utilization and 26.3 percent higher expenditures. The aggregate spending difference across the 157.6 million US adults with ACEs was $292 billion in 2021. Moreover, we observed large, graded relationships between ACEs and health status, health behaviors, and some dimensions of socioeconomic status. We also found associations between ACEs and a range of adverse adult circumstances, also newly measured in the 2021 MEPS, including financial and housing problems, social network problems, little or no life satisfaction, stress, food insecurity, verbal abuse, physical harm, and discrimination.

Adverse childhood experiences (ACEs) have been shown to be strong predictors of socioeconomic status, risky health behaviors, chronic conditions, and adverse outcomes such as increased mortality and losses in disability-adjusted or quality-adjusted life-years.[1–11] ACEs can cause lasting physiological changes in the brain, hormonal balance, and immune system, all of which can result over time in damage to health.[1,3–5,12–15] ACEs can also affect children's psychosocial development, which can in turn, through a "chain of risks," lead to additional adversity in adulthood, such as lower socioeconomic status, substance abuse, self-harm, and increased stress, again leading to worse adult health.[16–19]

Whereas ACEs-related differences in adult socioeconomic status, health, and health behaviors have been extensively documented, less is known about ACEs and adult health care utilization and expenditures. Prior research, including two US studies of selected patient samples[7,20] and a population-based study in Canada,[21] found ACEs to be associated with higher utilization and higher spending. More recently, a nationally representative study that focused only on out-of-pocket payments found ACEs were associated with much higher spending.[8] These findings are not surprising, given the magnitude of ACEs-related differences in health and health behaviors, yet caution is required when generalizing from small patient cohorts, evidence from other countries, or evidence for a single payment source.

Because of data limitations, some researchers have constructed estimates of ACEs-related ex-

penditures by combining ACEs-related differences in health and health behaviors estimated using one data source with average treatment costs from other data sources. One such study recently estimated aggregate ACEs-related expenditures in the US to have been $183 billion in 2019.[10] As the authors noted, however, even the most meticulous extrapolation from differences in health and health behaviors may underestimate ACEs-related expenditures by not accounting fully for all conditions and by missing potential ACEs-related differences in illness severity or patterns of comorbidity. Such studies would also miss ACEs-related differences in access to and demand for health care beyond those associated with the health and health behaviors included in the model.

To help fill data gaps that have constrained ACEs research on adult utilization and expenditures, the new Social Determinants of Health Self-Administered Questionnaire[22] in the 2021 Medical Expenditure Panel Survey–Household Component (MEPS-HC)[23] included eleven ACEs questions drawn from the 2019 Behavioral Risk Factor Surveillance System (BRFSS).[24] We used these new data to provide the first nationally representative estimates of ACEs-related health care utilization and expenditure differences based on direct observation, rather than model-based extrapolation. In addition, we explored ACEs-related differences in socioeconomic outcomes, health, and a range of adverse adult circumstances also measured by the Social Determinants of Health Self-Administered Questionnaire, including financial and housing problems, social network problems, life satisfaction, stress, food insecurity, verbal abuse, physical harm, and discrimination.

Study Data And Methods

MEPS is a nationally representative survey of the US civilian noninstitutionalized population conducted annually by the Agency for Healthcare Research and Quality (AHRQ).[23] Our sample consisted of 18,356 adults ages eighteen and older at the start of 2021 who were in the 2021 MEPS Full Year Consolidated Public Use File and who completed the Social Determinants of Health Self-Administered Questionnaire.

Adults were asked the eleven ACEs questions from the BRFSS about their childhoods, including household members' mental illness, drinking problems, prescription or illicit drug problems, and incarceration; divorced or separated parents; physical abuse (of each other or of the child) and verbal abuse (of the child) by parents or other adults in the home; and sexual abuse of the child by a person at least five years older (see the online appendix[25] for the ACEs questionnaire). We combined ACEs that occurred "once" or "more than once" to form 0/1 indicators, which we then summed to categorize adults as having zero, one to three, or four or more ACEs.

OUTCOMES Our main outcomes of interest were utilization and expenditures. We combined office and outpatient hospital visits into counts of primary care visits (to physicians, such as general practitioners, and nonphysicians, such as nurse practitioners) and specialty care visits (to specialist physicians and nonphysician specialists, including psychologists). We also examined emergency department visits (excluding those resulting in hospital admissions), inpatient hospital stays, dental visits, and prescription drug use (number of fills). Expenditures in MEPS were constructed from household-reported amounts, supplemented with billing information from hospitals, physician offices, and pharmacies.[23]

Other outcomes included adult socioeconomic status, adverse adult circumstances, health, and health behaviors. Socioeconomic status measures were education (no high school diploma, high school diploma or equivalent, and college degree or more); marital status (never married, married or widowed, and divorced or separated); family income relative to the federal poverty level; and health insurance categorized for adults ages 18–64 as any private coverage, any public coverage (with no private coverage), and full-year uninsured, and for adults ages sixty-five and older as any private (typically in combination with Medicare) and public only.

We constructed ten indicators of adverse adult circumstances based on thirty-eight questions in the Social Determinants of Health Self-Administered Questionnaire (see the appendix for details).[25] Two indicators addressed overall well-being: having little or no life satisfaction and feeling stressed ("quite a bit" or "very much" of the time). Three indicators involved budgetary concerns and living conditions: housing problems (general dissatisfaction or any specific problem with pests, lead, heat, or cooking); food insecurity (sometimes or always ran out of food or worried about paying for food); financial problems (being unable to afford rent or mortgage payments or pay utility bills, finding it very hard to pay for basics, lacking confidence in meeting an unexpected $400 expense, or having credit payment or debt collection issues). We created an indicator of social network problems when respondents reported having five or more of the following ten problems: expecting very little or no help if needed from family, friends, or community; in a typical week, not talking on the phone with family or friends, getting togeth-

ACEs-related health differences were steeper for adults with more severe health problems.

er with family or friends, attending church, or attending club meetings; and sometimes or often lacking companionship, often feeling left out, or often feeling isolated. We also created two measures regarding the broader societal environment: fair or poor crime safety and having faced discrimination (ever faced discrimination in health care, at work, applying for a job, in housing, by police, applying for services, or in stores). Finally, we included two indicators of harm and abuse: ever physically harmed or threatened and sometimes, fairly often, or frequently verbally abused (insulted, screamed at, or cursed at).

Health and health behavior measures included indicators for ever being diagnosed with high blood pressure, heart disease, high cholesterol, cancer, diabetes, asthma, stroke, emphysema, or arthritis; an indicator for limitations (needing help with instrumental activities of daily living or activities of daily living or having any functional or activity limitation); perceived physical and mental health categories (excellent or very good, good, and fair or poor); and measures of probable depression (a score of 3 or higher on the Patient Health Questionnaire) and moderate and serious psychological distress (K6 Index scores of 7–12 and 13 or higher, respectively) (see the appendix for details).[25] We also examined current smoking; ever having vaped; excessive alcohol consumption (either regular or binge drinking); getting no regular exercise; having sleep troubles (either "several times a week" or "almost every day"); and body mass index (BMI) indicators for overweight, obese, and severely obese.

METHODS Our study was descriptive. We began by estimating the unadjusted prevalence by ACEs group (0 ACEs, 1–3 ACEs, and 4 or more ACEs) of the following demographic characteristics: age (18–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, and 85 and older), sex, race and ethnicity (Hispanic of any race; and non-Hispanic White, Black, Asian, and other or multiple races, including American Indian and Alaska Native), census region, and urbanicity (whether respondents lived in a Metropolitan Statistical Area). We also computed the relative risk of demographic characteristics, equal to prevalence among adults with ACEs (1–3 or 4 or more) divided by prevalence among those with zero ACEs.

Next, for each ACEs group, we estimated the prevalence of adult socioeconomic status, adverse adult circumstances, and health and health behaviors, adjusting for differences in age, sex, and race and ethnicity. To estimate adjusted prevalence, we used ordinary least squares linear models to regress each measure on fully interacted indicators for age, sex, race and ethnicity, and the three ACEs groups. We then used these coefficients together with sample characteristics to generate nonparametric estimates of what prevalence would have been for a given ACEs group if the group had the full sample's joint distribution of age, sex, and race and ethnicity. Adjusted prevalence estimates were then used to construct adjusted relative risk.

To obtain adjusted means for utilization counts and expenditures, we once again estimated fully interacted dummy variable regressions. In this case, however, we only adjusted the mean estimates of adults without ACEs, aligning them with the demographic characteristics of adults with ACEs (1–3 or 4 or more). This enabled us to compare the observed utilization and expenditures of adults with ACEs with the utilization and expenditures we would have expected among adults without ACEs if they had the same demographic distribution as adults with ACEs (see the appendix for details).[25]

We used Stata, version 18.0. All estimates were sample weighted, with all statistical tests incorporating the complex design of MEPS. Two-tailed t-tests were used to test the significance of differences across ACEs groups in estimated prevalence (for demographics, adult socioeconomic status, adverse adult circumstances, health, and health behaviors) and means and totals (for utilization and expenditures). The significance of relative risk differences (against a null hypothesis of RR = 1) and percentage differences employed the delta method with two-tailed z-tests. Estimates discussed in the text were statistically significant at the 5 percent level unless otherwise noted.

LIMITATIONS Our study had several limitations.

Because ACEs were self-reported, recall bias is possible and may have caused ACEs to be underreported, especially by older people.

Expenditures reported in MEPS were based on household-reported medical events. As of 2012, household underreporting resulted in a 21.4 percent gap between MEPS and corresponding expenditures in the National Health Expenditure

Accounts.[26] Although MEPS improvements in 2018 likely narrowed this gap,[23] it is also true that MEPS by design excludes important populations (for example, the institutionalized) and certain types of goods and services (for example, over-the-counter medications). Because of the combined impact of underreporting and differences in scope, aggregate MEPS expenditures in 2021 for all age groups, estimated at $2.30 trillion, were 35.4 percent below the National Health Expenditure Accounts total of $3.56 trillion for the category Personal Health Care.[27] To the extent that the expenditure differences we examined were similarly affected, the full difference in expenditures between adults with and without ACEs may have been substantially higher than we estimated.

Our findings were descriptive in nature. Research has identified causal pathways whereby adverse events in childhood can affect health later in life.[1,3–5] Adults with ACEs in our study may nevertheless have had genetic endowments or other environmental exposures (in childhood or later in life) that would have increased their adult expenditures even if the ACEs we studied had not occurred. MEPS does not measure childhood socioeconomic status, which is likely correlated with both ACEs and the adult outcomes we studied. ACEs may therefore serve as a proxy for a larger constellation of child stressors and adult circumstances, in addition to being direct measures of important childhood experiences. For all of these reasons, we view our results as associations, rather than causal effects.

Another important caveat is that our study period coincided with year two of the COVID-19 pandemic. This might have altered many dimensions of our study, including socioeconomic status, social network problems and other adverse adult circumstances, health status, health behaviors, health insurance, health care use, and spending. Moreover, the pandemic may have differentially affected adults with ACEs.[18]

Study Results

ACES AND DEMOGRAPHIC CHARACTERISTICS Among all civilian noninstitutionalized adults, 41.7 percent (104.9 million) reported one to three ACEs and 21.0 percent (52.7 million) reported four or more ACEs, for a total of 62.6 percent (157.6 million) with any ACEs (data not shown). Distributions of age, sex, and race and ethnicity varied markedly by number of ACEs (exhibit 1). Compared to adults without ACEs, those with ACEs tended to be substantially younger. For instance, adults with four or more ACEs were 28 percent more likely to be ages 25–34 and approximately half as likely to be ages 75–84 (RR: 1.28 and 0.48, respectively) compared to adults without ACEs. Age differences likely reflected long-term trends, such as rising divorce, incarceration, and drug abuse rates, as well as a lower probability of surviving to older ages among those with ACEs.[28] Recall difficulties may also have affected responses, especially in the two oldest age groups; however, declining relative risks began at ages 55–64, before cognitive concerns were likely to have been a factor.

We found associations between ACEs and a range of adverse adult circumstances that are plausibly connected to adult health.

Compared to adults without ACEs, those with four or more ACEs were more likely to be female (RR: 1.22), less likely to be Hispanic or non-Hispanic Asian (RR: 0.87 and 0.36, respectively), and more likely to live in the West (RR: 1.20).

ACES AND ADULT SOCIOECONOMIC STATUS We found mixed evidence on the relationship between ACEs and level of educational attainment or income. Adults with one to three ACEs were more likely to have completed high school than adults without ACEs, and yet fewer adults with four or more ACEs held college degrees (RR: 0.82) (exhibit 2). Similarly, differences in adult poverty levels were small across ACEs groups and often not significant, although adults with four or more ACEs were significantly less likely than adults with zero ACEs to have family income of 400 percent of the poverty level or above (RR: 0.89).

Differences in marital status across ACEs groups were large and graded by number of ACEs. The divorce or separation rate among adults with one to three ACEs was about one-third higher (RR: 1.34) than the rate for adults with no ACEs, and the rate for adults with four or more ACEs was nearly two-thirds higher (RR: 1.64).

For adults ages 18–64, there were differences in insurance coverage by number of ACEs. In this age group, adults with four or more ACEs were substantially more likely than those without ACEs to have public coverage, and both ACEs groups were less likely to be uninsured than

EXHIBIT 1

Prevalence and relative risk of age, sex, race and ethnicity, and geographic distribution in US adults, by number of adverse childhood experiences (ACEs), 2021

	Prevalence (%)			Relative risk	
	0 ACEs (ref)	1–3 ACEs	4+ ACEs	1–3 ACEs	4+ ACEs
Age, years					
18–24	10.4	12.3**	10.1	1.183**	0.967
25–34	16.0	18.3***	20.5***	1.147**	1.284***
35–44	15.7	16.4	18.4**	1.044	1.173**
45–54	14.4	15.6	18.6***	1.085	1.294***
55–64	16.8	16.1	17.2	0.961	1.025
65–74	14.9	12.8***	10.5***	0.859***	0.707***
75–84	8.6	6.5***	4.1***	0.752***	0.478***
85 and older	3.3	2.0***	0.6***	0.609***	0.185***
Female	49.0	50.0	59.8***	1.021	1.222***
Race and ethnicity					
Hispanic, any race	17.9	16.6	15.5**	0.928	0.865**
Non-Hispanic White	59.7	63.8***	62.1	1.070***	1.042
Non-Hispanic Black	11.8	11.4	13.5*	0.965	1.144*
Non-Hispanic Asian	8.9	5.1***	3.2***	0.573***	0.356***
Non-Hispanic other or multiple races	1.7	3.1***	5.7***	1.792***	3.301***
Census region					
Northeast	18.9	16.7**	15.4***	0.886**	0.816***
Midwest	19.6	22.1**	19.9	1.129**	1.017
South	39.8	36.5***	38.7	0.917***	0.972
West	21.8	24.7***	26.0***	1.134**	1.196***
Metropolitan Statistical Area					
Yes	87.0	86.2	86.6	0.991	0.996
No	13.0	13.8	13.4	1.060	1.028

SOURCE Authors' calculations using data from the 2021 Medical Expenditure Panel Survey–Household Component (MEPS-HC). **NOTES** Estimates are for the civilian, noninstitutionalized population ages 18 and older at the start of 2021 who were in the 2021 MEPS Full-Year Consolidated Public Use File and who responded to the MEPS Social Determinants of Health Self-Administered Questionnaire ($N = 18{,}356$). For each ACEs group, percentages sum to 100% across categories of age, race and ethnicity, census region, and Metropolitan Statistical Area. Relative risks are the ratios of estimated prevalence for adults with ACEs divided by estimated prevalence for adults without ACEs. Statistical tests were adjusted for the complex design of MEPS. For prevalence, *p*-value levels are for comparisons to adults with 0 ACEs; for relative risk, *p*-value levels are for comparisons with the value 1.000. *$p < 0.10$ **$p < 0.05$ ***$p < 0.01$

adults without ACEs, although only the difference for adults with one to three ACEs was statistically significant.

ACES AND ADVERSE ADULT CIRCUMSTANCES Adults with more ACEs were more likely to report adverse adult circumstances than were adults with fewer or no ACEs, and the relationships were strong and graded (exhibit 2). For example, compared to adults without ACEs, those with four or more ACEs were more than four times as likely and those with one to three ACEs were more than twice as likely to report little or no life satisfaction (RR: 4.17 and 2.07, respectively). Compared to adults with no ACEs, those with four or more ACEs were five times as likely to report being physically harmed or threatened (RR: 5.01), and those with one to three ACEs were more than twice as likely (RR: 2.46). Rates for verbal abuse showed a similar pattern. We also observed strong graded relationships with financial problems, housing problems, food insecurity, feeling stressed, social network problems, crime, and discrimination.

ACES, HEALTH, AND HEALTH BEHAVIORS Except for cancer, adults with ACEs were more likely than those without ACEs to have been told by a doctor that they had chronic diseases (exhibit 3). Among adults with four or more ACEs, the adjusted rate of heart disease, which is a strong predictor of use and spending, was substantially higher than among adults without ACEs (RR: 1.54). There were also large and graded differences in having multiple chronic conditions and in functional limitations, which are dimensions of health that are also important predictors of expenditures. Among adults with four or more ACEs, the share with four or more chronic conditions was 17.1 percent, versus only 11.7 percent of adults without ACEs (RR: 1.47).

Perceived physical health status had a strongly graded relationship with the number of ACEs, as did perceived mental health. In both cases, dif-

EXHIBIT 2

Adjusted prevalence and relative risk of socioeconomic status and adverse adult circumstances in US adults, by number of adverse childhood experiences (ACEs), 2021

	Adjusted prevalence (%)			Adjusted relative risk	
	0 ACEs (ref)	1–3 ACEs	4+ ACEs	1–3 ACEs	4+ ACEs
SOCIOECONOMIC STATUS					
Education					
Less than high school	11.7	9.5***	10.3*	0.815***	0.881*
High school or GED	48.8	52.6***	57.4***	1.079***	1.177***
College degree or more	39.6	37.9	32.4***	0.958	0.817***
Marital status					
Never married	26.4	28.7***	29.8***	1.087***	1.128***
Married or widowed	63.5	57.8***	53.7***	0.910***	0.846***
Divorced or separated	10.0	13.4***	16.5***	1.341***	1.643***
Family income (% FPL)					
Less than 100%	10.3	9.3*	10.9	0.900*	1.057
100–199%	14.8	14.6	16.5*	0.991	1.117
200–399%	26.2	28.1*	29.5**	1.073*	1.125**
400% or more	48.7	47.9	43.1***	0.985	0.885***
Insurance coverage					
Ages 18–64					
Any private	57.8	58.9	54.7***	1.019	0.947***
Public only	12.2	12.3	16.1***	1.002	1.319***
Full-year uninsured	7.9	6.8**	7.1	0.857**	0.897
Age 65 or older					
Any private	10.4	10.8	10.1	1.037	0.976
Public only	11.7	11.3	11.9	0.967	1.021
ADVERSE ADULT CIRCUMSTANCES					
Little or no life satisfaction	2.8	5.9***	11.8***	2.074***	4.165***
Feeling stressed	11.0	20.4***	34.4***	1.859***	3.131***
Housing problems	19.2	29.6***	41.2***	1.545***	2.148***
Food insecurity	14.6	18.4***	28.5***	1.256***	1.945***
Financial problems	21.7	30.3***	43.3***	1.391***	1.990***
Social network problems	9.8	13.3***	22.7***	1.362***	2.332***
Fair or poor crime safety	10.3	12.9***	19.9***	1.249***	1.937***
Faces discrimination	19.0	33.2***	51.1***	1.746***	2.683***
Physically harmed or threatened	3.9	9.7***	19.7***	2.456***	5.014***
Verbally abused	6.3	17.0***	31.2***	2.686***	4.923***
No. of adverse adult circumstances					
0	43.0	26.4***	13.7***	0.614***	0.318***
1–3	48.9	55.8***	48.7	1.141***	0.994
4 or more	8.1	17.8***	37.7***	2.200***	4.662***

SOURCE Authors' calculations using data from the 2021 Medical Expenditure Panel Survey–Household Component (MEPS-HC). **NOTES** The sample population and size are defined in the notes to exhibit 1. Adverse adult circumstances (described in more detail in the text) were constructed measures from the Social Determinants of Health Self-Administered Questionnaire. Prevalence was adjusted for age, sex, and race and ethnicity to align each ACEs group with the full adult population. Relative risks are the ratios of adjusted prevalence for adults with ACEs divided by adjusted prevalence for adults without ACEs. Significance tests were adjusted for the complex design of MEPS. For prevalence, *p*-value levels are for comparisons to adults with 0 ACEs; for relative risk, *p*-value levels are for comparisons with the value 1.000. FPL is federal poverty level. *$p < 0.10$ **$p < 0.05$ ***$p < 0.01$

ferences were graded in two ways: more ACEs were associated with increased risk, and differences across ACEs groups were larger for the more costly "fair or poor" group than for the less costly "good" group. The risks of fair or poor physical and mental health for adults with four or more ACEs were nearly two and more than three times, respectively, those of adults without ACEs (RR: 1.95 and 3.15, respectively).

Relative risks were even higher for probable depression and psychological distress. Adults with four or more ACEs were 3.73 times as likely to have probable depression, 2.57 times as likely to have moderate psychological distress, and 6.37 times as likely to have serious psychological distress. The relationship with ACEs was graded in two ways: Having more ACEs was associated with greater risk, and relative risks were larger for serious than for moderate distress.

ACEs were strongly associated with risky health behaviors. Adults with ACEs were more likely than those without to smoke, vape, use

EXHIBIT 3

Adjusted prevalence and relative risk of health status and health behaviors in US adults, by number of adverse childhood experiences (ACEs), 2021

	Adjusted prevalence (%)			Adjusted relative risk	
	0 ACEs (ref)	1–3 ACEs	4+ ACEs	1–3 ACEs	4+ ACEs
Chronic conditions					
High blood pressure	31.2	33.6***	36.8***	1.077***	1.180***
Heart disease	12.0	14.8***	18.5***	1.230***	1.537***
High cholesterol	29.3	32.1***	34.2***	1.097***	1.166***
Cancer	11.5	11.3	11.4	0.985	0.994
Diabetes	10.9	11.4	12.0*	1.048	1.107*
Asthma	11.2	14.7***	19.0***	1.314***	1.699***
Stroke	3.0	4.2***	5.7***	1.365**	1.876***
Emphysema	1.0	1.5***	3.0***	1.551**	3.017***
Arthritis	22.4	26.1***	30.5***	1.166***	1.364***
No. of chronic conditions					
0	43.0	37.3***	33.4***	0.867***	0.778***
1	21.8	22.8	22.1	1.045	1.015
2	13.7	15.2**	14.6	1.103*	1.065
3	9.9	11.4***	12.7***	1.158**	1.290***
4 or more	11.7	13.4***	17.1***	1.150***	1.469***
Limitation[a]	16.5	21.0***	27.4***	1.274***	1.668***
Perceived physical health					
Excellent or very good	63.5	56.6***	48.0***	0.892***	0.757***
Good	27.1	31.0***	33.6***	1.145***	1.239***
Fair or poor	9.4	12.4***	18.4***	1.310***	1.947***
Perceived mental health					
Excellent or very good	67.2	59.0***	48.6***	0.877***	0.724***
Good	27.0	31.6***	33.1***	1.173***	1.226***
Fair or poor	5.8	9.4***	18.3***	1.617***	3.153***
Probable depression[b]	3.9	7.2***	14.5***	1.863***	3.729***
Psychological distress[c]					
Moderate	6.4	11.3***	16.3***	1.770***	2.568***
Serious	1.4	3.8***	9.2***	2.631***	6.366***
Current smoking	12.0	14.7***	21.5***	1.223***	1.796***
Ever vaped	9.1	15.5***	25.2***	1.708***	2.783***
Excessive alcohol	7.4	11.8***	15.2***	1.589***	2.059***
No regular exercise	19.0	20.9**	23.3***	1.098**	1.222***
Sleep problem[d]	14.0	20.4***	31.3***	1.458***	2.240***
Body mass index					
Overweight	34.4	31.5*	31.8	0.915**	0.925***
Obese	26.8	25.8	30.0**	0.963	1.118*
Severely obese	4.8	7.3***	9.2***	1.532**	1.915***

SOURCE Authors' calculations using data from the 2021 Medical Expenditure Panel Survey–Household Component (MEPS-HC), with linked data on alcohol consumption, sleep patterns, and body mass index from the 2020 MEPS. **NOTES** The sample population and size are defined in the notes to exhibit 1. Prevalence was adjusted for age, sex, and race and ethnicity to align each ACEs group with the full adult population. Relative risks are the ratios of adjusted prevalence for adults with ACEs divided by adjusted prevalence for adults without ACEs. Significance tests were adjusted for the complex design of MEPS. For prevalence, *p*-value levels are for comparisons to adults with 0 ACEs; for relative risk, *p*-value levels are for comparisons with the value 1.000. [a]Indicates needing help with instrumental activities of daily living or activities of daily living or having any functional or activity limitation. [b]Indicates a score of 3 or higher on the Patient Health Questionnaire. [c]Moderate and severe psychological distress indicate scores of 7–12 and 13 or higher, respectively, on the K6 Index. [d]Indicates sleep trouble several times per week or almost every day. *$p < 0.10$ **$p < 0.05$ ***$p < 0.01$

alcohol excessively, not exercise regularly, and have problems sleeping. ACEs were also associated with high BMI levels. Compared to adults without ACEs, those with four or more ACEs were nearly twice as likely to be severely obese.

HEALTH CARE UTILIZATION AND EXPENDITURES

Exhibit 4 presents results for utilization and expenditures. The first column presents means by number of ACEs. The next column presents means for adults with zero ACEs, adjusted to reflect the age, sex, and race and ethnicity of the corresponding ACEs group. The following column presents the difference between the first two columns—that is, the additional per capita

EXHIBIT 4

Health care utilization and expenditures of US adults with versus without adverse childhood experiences (ACEs), 2021

	Means, adults with ACEs	Adjusted means, adults with 0 ACEs	Adjusted differences		
			Per capita	Percent	Aggregate[a]
Primary care office and outpatient hospital visits					
1–3 ACEs	2.5	2.1	0.3***	14.7***	33.1***
4 or more ACEs	2.8	2.1	0.7***	32.4***	36.2***
All adults with ACEs	2.6	2.1	0.4***	20.6***	69.3***
Specialist office and outpatient visits					
1–3 ACEs	6.8	5.4	1.4***	26.8***	150.4***
4 or more ACEs	8.1	5.4	2.7***	49.9***	141.6***
All adults with ACEs	7.2	5.4	1.9***	34.5***	292.0***
Emergency department visits (per 100 adults)					
1–3 ACEs	17.6	14.4	3.2***	22.1***	3.3***
4 or more ACEs	26.0	14.6	11.5***	78.7***	6.0***
All adults with ACEs	20.4	14.5	6.0***	41.1***	9.4***
Inpatient stays (per 100 adults)					
1–3 ACEs	7.9	7.7	0.2	2.8	0.2
4 or more ACEs	11.9	7.5	4.5***	59.9***	2.4***
All adults with ACEs	9.3	7.6	1.6***	21.5***	2.6***
Prescription fills					
1–3 ACEs	11.3	9.4	1.9***	19.8***	196.1***
4 or more ACEs	13.7	9.2	4.6***	49.8***	241.0***
All adults with ACEs	12.1	9.3	2.8***	29.7***	437.1***
Dental visits					
1–3 ACEs	1.0	0.9	0.1***	12.0***	11.7***
4 or more ACEs	1.0	0.9	0.0	4.9	2.4
All adults with ACEs	1.0	0.9	0.1***	9.6***	14.1***
Total expenditures ($)					
1–3 ACEs	8,425	6,975	1,449***	20.8***	152***
4 or more ACEs	9,811	7,157	2,654***	37.1***	140***
All adults with ACEs	8,888	7,036	1,852***	26.3***	292***

SOURCE Authors' calculations using data from the 2021 Medical Expenditure Panel Survey–Household Component (MEPS-HC). **NOTES** The sample population and size are defined in the notes to exhibit 1. Means of adults without ACEs were adjusted for age, sex, and race and ethnicity to align adults without ACEs with adults with 1–3, 4 or more, and 1 or more ACEs (denoted as "all adults with ACEs"). Unadjusted means are in appendix exhibit 4; see note 25 in text. Adjusted per capita differences are the means for adults with ACEs minus the adjusted means for adults without ACEs. Percent differences are the differences in means (third column) divided by the adjusted means among adults without ACEs (second column). The last column shows aggregate differences equal to the product of the differences (third column) and the population totals (not shown) of adults with ACEs (104.9 million with 1–3 ACEs, 52.7 million with 4 or more ACEs, and 157.6 million with 1 or more ACEs). Expenditure amounts are in 2021 dollars. Standard errors were adjusted for the complex design of MEPS. [a]Numbers are millions, and expenditures are billions. ***$p < 0.01$

utilization and expenditures of adults with ACEs compared to those of adults without ACEs, holding age, sex, and race and ethnicity constant. The fourth column expresses this difference as a percentage of the mean for adults without ACEs, and the last column aggregates the differences across all adults with ACEs.

Adult utilization differences were generally large, in both absolute and percentage terms, and graded by the number of ACEs. On average, adults with ACEs had 20.6 percent more primary care visits and 34.5 percent more specialist visits than demographically similar adults without ACEs. They also had 41.1 percent more emergency department visits, 21.5 percent more inpatient stays, and 29.7 percent more prescription fills than adults without ACEs. Dental visit differences were smaller, and not all were statistically significant.

Reflecting these utilization differences, we observed a strongly graded relationship between ACEs and expenditures. Spending for adults with one to three and four or more ACEs was 20.8 percent and 37.1 percent greater, respectively, than for adults without ACEs. The average difference for all adults with ACEs was 26.3 percent.

The last column of exhibit 4 presents the aggregate differences between the utilization and expenditures of adults with ACEs and a demographically similar and equal-size population of adults without ACEs. For instance, applying the 1.85 difference in physician and nonphysician specialist office visits to the 157.6 million adults with ACEs yielded an aggregate difference of 292.0 million visits. Similarly, we found an aggregate difference of 2.6 million inpatient hospital stays. The aggregate difference in expenditures was $292 billion. This was 14.0 percent

It may be possible to reduce child exposure to ACEs through policies to reduce inequities in broader social determinants of health and well-being.

of all adult expenditures in MEPS (data not shown). The difference was roughly evenly split between adults with one to three ACEs ($152 billion) and those with four or more ACEs ($140 billion), with the latter group having larger per adult differences ($2,654 versus $1,449) and the former group being twice as large (104.9 million versus 52.7 million).

We also examined aggregate expenditure differences by source of payment (appendix exhibit 5).[25] ACEs were associated with 28.6 percent of total Medicaid spending, reflecting high rates of public coverage for nonelderly adults with ACEs. Comparable percentages were 13.7 percent of out-of-pocket spending, 12.8 percent of private insurance spending, and only 9.9 percent of Medicare spending, reflecting the younger population distribution of adults with ACEs.

Discussion

This study produced nationally representative estimates of utilization and expenditures for adults with and without adverse childhood experiences. Of US adults, 62.6 percent reported at least one such experience, similar to the national rate of 63.9 percent from the 2011–20 BRFSS.[6] Moreover, the two data sources (MEPS and BRFSS) had similar exposure patterns across age, sex, and race and ethnicity.[6] MEPS estimates of ACEs-related differences in health status and health behaviors were also similar to those in a large meta-analysis.[2] In our study, not only were there large, graded differences in many health measures, but also, ACEs-related health differences were steeper for adults with more severe health problems, including those with numerous chronic conditions, severe obesity, or serious psychological distress. Our findings therefore suggest an ACEs-severity correlation. We also found associations between ACEs and a range of adverse adult circumstances that are plausibly connected to adult health.

Not surprisingly, given large ACEs-related health differences, we also observed large differences in health care utilization. Our results were broadly consistent with ACEs-related estimates of general practitioner and emergency department use in Canada[21] and with estimates from a US sample of community health center users.[20]

Our main finding was that adults with ACEs had 26.3 percent higher expenditures than comparable adults without ACEs. This strong and graded difference in expenditures was in line with or below many of the differences we observed in health, health behaviors, and utilization. In 2021, the 157.6 million US adults with ACEs spent $292 billion more on health care, in aggregate, than adults without ACEs, after standardizing for age, sex, race and ethnicity, and population size. This difference accounted for 14.0 percent of total adult expenditures in the 2021 MEPS.

Our estimates of ACEs-related expenditure differences were similar to or lower than those found by two narrower studies that measured the expenditures of adults with and without ACEs. In a large health system, between 1992 and 2002, adult women who had experienced childhood physical or sexual abuse had 21 percent higher total annual expenditures than other adult women.[7] Using nationally representative data from the period 2011–15, another study found that having ACEs was associated with 39.1 percent higher out-of-pocket spending among adults living alone.[8]

In contrast, ACEs-related health care expenditure estimates have generally been much lower in studies that combine ACEs-related condition and behavior prevalence from one data set with average treatment costs from other data sets.[9] As noted earlier, one such study recently estimated aggregate ACEs-related expenditures to have been $183 billion in 2019.[10] Even after this estimate is adjusted for inflation (yielding $194 billion in 2021 dollars, using the Consumer Price Index for All Urban Consumers), our $292 billion estimate was approximately 50 percent higher. Moreover, this difference would have been greater still if we had adjusted our estimate upward to account for the gap between expenditures reported in MEPS and the National Health Expenditure Accounts. Whereas the $183 billion estimate was based on a limited number of conditions and behaviors and assumed average treatment costs for adults with ACEs,[10] MEPS measures expenditures arising from any health problem and reflects ACEs-related differences in condition severity, comorbidities, and access to and demand for care.

Policy Implications

Adverse childhood experiences have been associated with substantial losses in quality-adjusted or disability-adjusted life-years,[9] with a recent meta-analysis of ACEs-related health effects valuing the annual aggregate losses in disability-adjusted life years in US and Canada at $748 billion (in 2017 US dollars).[2] Our study quantified the extent to which childhood experiences, including ACEs and any childhood exposures they proxy, were also associated with large societal costs in the form of increased health care spending.

Our results, by adding to the already considerable evidence of ACEs' large societal costs, raise the potential for important returns on investment in policies that address these issues. Although additional research is needed to increase understanding of the causal factors leading to ACEs and to mitigate their effects on exposed children, much is already known regarding the efficacy of programs to reduce child abuse and neglect and to mitigate their long-term effects.[11,29,30] Policies range from home visiting for young children, improved child care, peer support programs, mentoring, family strengthening efforts, family-friendly labor laws, and education campaigns to changing how providers screen for ACEs and treat exposed children and adults. It may also be possible to reduce child exposure to ACEs through policies to reduce inequities in broader social determinants of health and well-being, such as education, housing, financial stability, and food security—factors that underlie so many dimensions of health and that have increasingly been associated with the exposure of children to ACEs.[11,31] ■

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