

Health Care Utilization and Costs Associated with Childhood Abuse

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BACKGROUND: Physical and sexual childhood abuse is associated with poor health across the lifespan. However, the association between these types of abuse and *actual* health care use and costs over the long run has not been documented.

OBJECTIVE: To examine long-term health care utilization and costs associated with physical, sexual, or both physical and sexual childhood abuse.

DESIGN: Retrospective cohort.

PARTICIPANTS: Three thousand three hundred thirty-three women (mean age, 47 years) randomly selected from the membership files of a large integrated health care delivery system.

MEASUREMENTS: Automated annual health care utilization and costs were assembled over an average of 7.4 years for women with physical only, sexual only, or both physical and sexual childhood abuse (*as reported in a telephone survey*), and for women without these abuse histories (reference group).

RESULTS: Significantly higher annual health care use and costs were observed for women with a child abuse history compared to women without comparable abuse histories. The most pronounced use and costs were observed for women with a history of both physical and sexual child abuse. Women with both abuse types had higher annual mental health (relative risk [RR]=2.07; 95% confidence interval [95%CI]=1.67–2.57); emergency department (RR=1.86; 95%CI=1.47–2.35); hospital outpatient (RR=1.35=95%CI=1.10–1.65); pharmacy (incident rate ratio [IRR]=1.57; 95%CI=1.33–1.86); primary care (IRR=1.41; 95%CI=1.28–1.56); and specialty care use (IRR=1.32; 95%CI=1.13–1.54). Total adjusted annual health care costs were 36% higher for women with both abuse types, 22% higher for women with physical abuse only, and 16% higher for women with sexual abuse only.

CONCLUSIONS: Child abuse is associated with long-term elevated health care use and costs, particularly for women who suffer both physical and sexual abuse.

KEY WORDS: health care utilization; costs; childhood abuse; physical abuse; sexual abuse.

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INTRODUCTION

Physical and sexual childhood abuse history in women is prevalent^{1–5} and is associated with poor health across the lifespan.^{6–12} Studies have also shown higher health care use and costs for women with a history of childhood abuse.^{1–4,12–15} For example, in a large study that used automated health plan data on health care use and costs, women with a history of childhood sexual abuse had unadjusted annual health care costs that were 18% higher than costs for women without reported abuse.¹² In a large Canadian study that used self-reported health care use and assigned costs to health care use, women with a history of both physical and sexual childhood abuse had annual health care costs that were 93% higher than costs for women without these abuse histories.⁴

Despite promising information from these studies, they relied on self-reported health care utilization;^{3,4,15} limited their examination to a subset of health services;^{13–15} included clinic-based convenience samples;^{1,13–15} or included women with an average or median age of only the mid to late 30s.^{4,13–15} Information regarding *actual* health care use and costs associated with specific childhood abuse types (e.g., physical, sexual, or both types of abuse) across the full range of health services for women through middle age is lacking.

This paper examines the actual health care utilization and costs associated with physical only, sexual only, or physical and sexual child abuse using data from women enrolled in a large health care delivery system. Our study improves on the methods of prior studies by isolating the association between physical, sexual, or both physical and sexual abuse and annual health care utilization and costs using automated visit encounter data over an average 7.4-year period, including a large population-based random sample of women (average age 47 years) and including a wide range of health services utilization areas.

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METHODS

Participants and Data Collection

The study was approved by Group Health Cooperative's Institutional Review Board. Group Health provides insurance and health services to more than 500,000 people in the Pacific Northwest. English-speaking women ages 18 to 64 who were enrolled at Group Health for at least 3 years were randomly sampled from enrollment files to participate in a telephone survey to assess intimate partner violence exposure and health status.^{5,16} Women were also asked about their history of child abuse (described below). An advance letter describing our interest in issues affecting women's health was mailed to women.^{5,16} After the advance letter was sent, we contacted women by telephone to ascertain their interest and consent to participate in the study.

Of 6,666 women randomly sampled, 345 were excluded because they did not meet the sampling criteria identified in the Group Health automated health plan records (209), were deceased (3), were too ill (15), or did not speak English or had a hearing impairment (118). Of the 6,321 remaining women, 1,829 (28.9%) refused participation when initially contacted by the study staff, 539 (8.5%) started but did not complete the interview, 385 (6.1%) could not be located, and 3,568 (56.4%) completed the interview. As reported previously,²⁰ a propensity score analysis of respondents compared to nonrespondents using data on age, length of enrollment, and diagnoses revealed that the probability of survey participation was similar for women with and without a history of child abuse (59% vs 58%).

For the utilization and cost analysis, we included women who (1) were enrolled at Group Health for at least 12 of the 41 calendar quarters preceding the calendar quarter of sampling (from January 1, 1992 to December 31, 2002) and (2) agreed to allow the study team to access their automated health care use data.¹⁷ Based on these criteria, a total of 3,333 women (of the 3,568 women who completed the telephone survey) were included in the analysis.

A woman's start date for the assessment of health care use was January 1, 1992 or her first quarter of enrollment in the health plan as an adult (>18 years of age) from January 1, 1992 to December 31, 2002, whichever was later. The end date was December 31, 2002 or the date of last disenrollment. A woman could have more than one start and stop date if she disenrolled and then reenrolled in the health plan between 1992 and 2002. To be considered enrolled in a calendar year, a woman had to meet our quarterly enrollment criterion (i.e., enrolled for at least 2 months of a quarter) for all 4 quarters. A total of 86.5% of women were enrolled for a single continuous period (range, 1–11 years); 13.5% had 2 or more enrollment periods.

Measurement

We used Andersen's behavioral model of health services use to guide our measurement approach.¹⁸ Andersen's model suggests that people's use of health services is a function of their *predisposition* to use health services (e.g., age, education), factors that *enable* or *impede* use (e.g., access to services), and *need* for health services (e.g., presence of symptoms and illness).¹⁸

In the telephone survey, we collected data on *predisposing* characteristics (e.g., age) and *need* characteristics (child abuse history, the primary exposure of interest) that could influence health care use. All participants had access to health care, an *enabling* component in Andersen's model. Other need characteristics could fall in the pathway between child abuse history and adult health service use—for example, abuse in adulthood and medical diagnoses.⁴ Whereas we collected information on these factors (described below), we did not adjust for them in our analysis, as they would likely overadjust for the impact of childhood abuse.

Child abuse history. Women were asked about their history of childhood physical abuse ("before you were 18, was there any time when you were punched, kicked, choked, or received at more serious physical punishment from a parent or other adult guardian") and childhood sexual abuse ("before you were 18, did anyone ever touch you in a sexual place or make you touch them when you did not want them to") using 2 questions from the Behavioral Risk Factor Surveillance System.⁵ From these questions, 4 exposure groups were constructed. The 4 groups included women with a history of (1) physical child abuse only, (2) sexual child abuse only, (3) both physical and sexual abuse, or (4) neither physical nor sexual child abuse.

Sociodemographic factors and health indicators. Women were asked about their age, household income, employment status, highest grade level completed, race/ethnicity, and number of children living in the home using questions from the U.S. Census Bureau.¹⁹ As described previously, women also answered questions about their health habits (tobacco, alcohol, and recreational drug use) and their health (depressive symptoms, physical symptoms such as chest pain, headache and nausea, weight, and overall health perception) using validated measures.^{16,20} To assess the presence of major chronic conditions in the past year, we also obtained diagnostic data for the 12 months before the telephone survey from Group Health's automated databases.

Health care utilization. We determined women's health care utilization—including visits to primary, specialty, urgent and behavioral health care; the emergency department and the hospital; and use of pharmacy, laboratory, and radiology services—from January 1, 1992 to December 31, 2002 using Group Health's automated databases.¹⁷ Group Health databases accurately capture health services provided by Group Health and other health care providers with whom Group Health contracts.²¹

Costs. The Group Health cost system captures utilization information on a monthly basis, calculating the precise cost for each unit of service delivered and assigning costs to patients based on the units of service utilized. The Group Health cost system ensures that actual costs from the general ledger are reported, overhead costs are fully allocated to patient care departments, total costs are reduced to the unit of service, and there is systematic verification of the automated data.¹⁷ All costs were adjusted to 2004 dollars using the medical care component of the Consumer Price Index for the Seattle-Tacoma-Everett Metropolitan Statistical Area (MSA).²²

Table 1. Characteristics of Women at the Time of Survey, by History of Child Abuse

	No CA*	Physical or sexual CA	Physical CA only	Sexual CA only	Physical and sexual CA
	n=2,205	n=1,128	n=216	n=671	n=241
Age, mean (SD)	46.7 (11.3)	47.4 (10.2)	47.3 (10.2)	48.0 (10.2)	45.8 (10.0)
Household income (%)					
<\$25,000	10.0	9.6	11.9	8.4	10.9
\$25,000–\$49,999	27.8	28.5	27.5	28.3	29.8
\$50,000–\$74,999	26.4	27.6	30.8	25.7	29.8
>\$75,000	35.8	34.4	29.9	37.6	29.4
Employed at least part time (%)	81.8	81.0	83.3	81.7	77.2
High school graduate or less (%)	11.9	11.0	12.0	10.4	11.6
White (%)	83.1	82.1	77.8 [†]	85.4	76.8 [†]
Children in the home (%)	33.6	34.0	32.9	34.1	34.9
Smoking status					
Never (%)	62.9	51.1	52.3 [‡]	53.1 [‡]	44.4 [‡]
Current (%)	11.2	15.4	19.0	12.6	19.9
Former (%)	25.9	33.6	28.7	34.4	35.7
Heavy drinker (%)	8.1	10.4	10.7	10.0	11.2
Binge drinker (%)	6.7	6.6	5.1	7.0	6.6
Drug use, past year (%)	3.9	6.8	5.2	6.3 [‡]	9.8 [‡]
Depressive symptoms (%)	17.1	25.9	27.3 [‡]	21.2 [†]	37.9 [‡]
Severe depressive symptoms (%)	8.6	15.5	18.1 [‡]	10.9	25.8 [‡]
Fair/poor health (%)	7.7	10.9	10.2	9.5	15.4 [‡]
Number of symptoms, mean (SD)	2.2 (2.2)	3.0 (2.6)	2.9 (2.5) [‡]	2.8 (2.4) [‡]	3.7 (2.8) [‡]
BMI, mean (SD)	27.2 (6.4)	28.6 (7.7)	28.3 (7.6) [†]	28.2 (7.3) [‡]	29.7 (8.5) [‡]

BMI: body mass index, CA: child abuse, SD: standard deviation

*No physical or sexual child abuse history.

[†] $p < .05$; comparison to no child abuse (CA) group

[‡] $p < .01$; comparison to no child abuse (CA) group

Statistical Analysis

We used analysis of variance and chi-square tests to test for differences in sociodemographic characteristics and self-reported health for women by child abuse history. For significant group differences, pairwise comparisons were undertaken. We estimated the past-year prevalence of major chronic conditions (using Group Health automated data) for women with a child abuse history and for women without similar abuse histories.

We compared annual health care utilization and costs over the study period (January 1, 1992 to December 31, 2002) for women with a history of physical only, sexual only, or both physical and sexual childhood abuse compared to health care use and costs in women with no reported abuse (reference group). The unit of analysis was the woman-year with women contributing on average 7.4 years of utilization data. To account for within-woman correlation across years, we used generalized estimating equations (GEE) with robust standard error estimates assuming an independent working correlation. For binary outcomes assessing “any use” of health services, relative risks (RR) were estimated using GEE with a log link and binomial errors. For counts of health care utilization (primary and specialty care visits and pharmacy fills), regression models were used to estimate incident rate ratios (IRR) using a log link and a gamma error distribution. An IRR is the ratio of 2 incidence rates, the incidence rate among the exposed group divided by the incidence rate in the comparison group.

Multivariable models were adjusted for calendar year, age, and education—factors that could influence health care utilization.^{12,17} To adjust for temporal trends, we included an indicator variable for calendar year, allowing for maximum flexibility in temporal change. We considered adjusting for

2 additional factors—abuse in women’s adult relationships and women’s current health. However, we did not adjust for these factors as they likely lie in the pathway between child abuse history and health care use and would lead to overadjustment.

We hypothesized that women with a history of child abuse would use health services at higher rates than women without abuse histories, particularly women with a history of both physical and sexual abuse. Multiple types of adverse experiences may produce more pronounced and long-lasting health effects than 1 type of adverse experience.²³

Table 2. Childhood Abuse History and Past-year Chronic Condition Diagnoses Obtained from Automated Health Plan Records

	No CA*	Any CA (physical or sexual)	Any CA versus No CA [†]	Any CA versus No CA [‡]
	%	%	OR (95%CI)	OR (95%CI) [§]
Asthma	4.3	5.8	1.37 (0.97, 1.95)	1.39 (0.98, 1.97)
Ischemic heart disease	0.9	1.6	1.74 (0.86, 3.49)	1.28 (0.99, 1.64)
Hypertension	10.3	12.4	1.23 (0.97, 1.57)	1.24 (0.89, 1.74)
Diabetes	5.4	6.5	1.22 (0.88, 1.69)	–
Depression	9.2	15.8	1.85 (1.47, 2.34)	1.85 (1.46, 2.34)
COPD	1.3	1.6	1.18 (0.62, 2.24)	–

CA: child abuse, COPD: chronic obstructive pulmonary disease, OR: odds ratio; 95%CI: 95% confidence interval

*No physical or sexual child abuse history.

[†]Unadjusted odds ratio.

[‡]Age-adjusted odds ratio.

[§]When age-adjusted odds ratio is missing, there were not enough events to estimate these rates.

Table 3. Unadjusted Annual Health Care Costs and Utilization for Women With and Without a History of Childhood Abuse, by Type of Child Abuse

	No CA*	Physical or sexual CA	Physical CA only	Sexual CA only	Both physical and sexual CA
Number of women	2,205	1,128	216	671	241
Number of women-years	16,362	8,316	1,563	5,071	1,682
Follow-up time, mean (SD)	7.42 (3.73)	7.37 (3.67)	7.24 (3.65)	7.56 (3.60)	6.98 (3.86)
Any service utilization (%)					
Mental health	8.1	14.5	18.3	12.6	16.9
Alcohol/drug	0.5	0.6	0.7	0.5	0.9
Inpatient	4.8	5.2	5.4	4.9	6.1
Hospital outpatient	8.7	10.2	9.5	9.9	11.7
ED	4.2	5.8	6.7	4.8	8.0
Ambulatory services, mean (SD)					
Primary care (no. of visits)	2.9 (2.9)	3.5 (3.3)	3.4 (3.1)	3.3 (3.2)	4.1 (3.9)
Specialty care (no. of visits)	1.4 (2.6)	1.6 (2.9)	1.5 (2.6)	1.6 (2.8)	1.8 (3.2)
Pharmacy (no. of fills)	11.7 (14.9)	15.0 (18.8)	14.3 (16.5)	14.3 (17.8)	17.7 (22.9)
Service costs (2004 dollars), mean (SD)					
Primary care	508 (758)	583 (653)	569 (641)	562 (656)	657 (650)
Pharmacy	394 (1,001)	495 (944)	459 (731)	467 (960)	611 (1,056)
Specialty	355 (871)	405 (1,002)	367 (696)	406 (1,110)	434 (894)
Laboratory	68 (140)	81 (158)	77 (123)	81 (175)	87 (132)
Radiology	173 (507)	191 (457)	201 (442)	180 (439)	216 (520)
Inpatient	380 (2,724)	423 (2,927)	433 (2,599)	405 (3,182)	468 (2,359)
Total	2,413 (5,550)	2,900 (5,808)	2,915 (5,406)	2,795 (6,183)	3,203 (4,928)

CA: child abuse, ED: emergency department, SD: standard deviation
 *No physical or sexual child abuse history.

RESULTS

Participant Characteristics

Thirty-four percent of women (1,128 of 3,333) reported a history of childhood abuse (Table 1). Women with any of the child abuse history types (physical only, sexual only, or physical and sexual) were less likely to never have smoked, were more likely to report depressive symptoms, and reported more physical symptoms and had higher body mass index compared to women without such abuse histories. Women with a history of childhood physical abuse (with or without sexual abuse) were less likely to be White than women without physical or sexual abuse (77% vs 83%) and were more likely to report severe depressive symptoms than women without these abuse histories. Finally, women with a history of childhood sexual abuse (with or without physical abuse) were more likely to have used recreational drugs in the past year compared to the reference group.

Women with a history of physical or sexual child abuse had higher prevalence of past-year depression diagnosis (15.8%) compared to women without such abuse histories (9.2%; Table 2). History of child abuse was not associated with the presence of other chronic conditions—asthma, diabetes, heart disease, hypertension, and pulmonary disease.

Unadjusted Annual Health Care Utilization and Costs

The unadjusted annual health care costs for women with a history of childhood abuse were notably higher than costs for women without such abuse histories (Table 3). The most pronounced difference in total annual health care costs was observed between women with a history of both physical and sexual child abuse compared to women without these abuse histories (\$790 higher mean annual costs). The total annual

Table 4. Adjusted Annual Health Care Utilization and Adjusted Rate Ratios of Annual Number of Utilizations for Women With and Without a History of Child Abuse, and by Type of Child Abuse

	Physical or sexual CA versus No CA*	Physical CA only versus No CA	Sexual CA only versus No CA	Physical and sexual CA versus No CA
Any service utilization, RR (95%CI)				
Mental health	1.78 (1.55, 2.04)	2.24 (1.80, 2.79)	1.54 (1.31, 1.82)	2.07 (1.67, 2.57)
Alcohol/drug	1.36 (0.86, 2.15)	1.50 (0.69, 3.30)	1.14 (0.64, 2.04)	1.89 (0.98, 3.65)
Inpatient	1.09 (0.95, 1.24)	1.10 (0.83, 1.44)	1.03 (0.89, 1.21)	1.22 (0.95, 1.57)
Hospital outpatient	1.17 (1.05, 1.31)	1.09 (0.87, 1.37)	1.14 (1.00, 1.29)	1.35 (1.10, 1.65)
ED	1.39 (1.20, 1.60)	1.58 (1.23, 2.03)	1.16 (0.97, 1.40)	1.86 (1.47, 2.35)
Ambulatory services, IRR (95%CI)				
Primary care (no. of visits)	1.19 (1.13, 1.25)	1.16 (1.05, 1.28)	1.13 (1.06, 1.20)	1.41 (1.28, 1.56)
Specialty care (no. of visits)	1.18 (1.09, 1.28)	1.12 (0.97, 1.30)	1.16 (1.05, 1.27)	1.32 (1.13, 1.54)
Pharmacy (no. of fills)	1.30 (1.19, 1.41)	1.24 (1.08, 1.43)	1.22 (1.11, 1.35)	1.57 (1.33, 1.86)

Adjusted for age, education, and calendar year.

CA: child abuse, ED: emergency department, 95%CI: 95% confidence interval, RR: relative risk, IRR: incident rate ratio or the incidence rate among the exposed group divided by the incidence rate in the comparison group

*No physical or sexual child abuse history.

Table 5. Adjusted[†] Ratio of Annual Health Care Costs (2004 Dollars) for Women With and Without a History of Child Abuse, by Type of Child Abuse

Costs	Physical or sexual CA versus No CA*	Physical CA only versus No CA	Sexual CA only versus No CA	Physical and sexual CA versus No CA
	Cost ratio (95%CI)			
Primary care	1.15 (1.09, 1.22)	1.13 (1.02, 1.26)	1.10 (1.04, 1.18)	1.32 (1.20, 1.46)
Pharmacy	1.27 (1.10, 1.46)	1.18 (0.95, 1.48)	1.18 (1.00, 1.39)	1.61 (1.26, 2.07)
Specialty	1.15 (1.05, 1.27)	1.05 (0.89, 1.23)	1.15 (1.03, 1.29)	1.25 (1.07, 1.47)
Laboratory	1.20 (1.09, 1.33)	1.16 (0.99, 1.35)	1.19 (1.05, 1.35)	1.29 (1.11, 1.51)
Radiology	1.12 (1.02, 1.24)	1.19 (0.98, 1.44)	1.04 (0.94, 1.16)	1.30 (1.08, 1.56)
Inpatient	1.16 (0.92, 1.46)	1.18 (0.79, 1.77)	1.12 (0.82, 1.51)	1.27 (0.90, 1.80)
Total	1.21 (1.11, 1.33)	1.22 (1.04, 1.44)	1.16 (1.04, 1.30)	1.36 (1.18, 1.57)

Adjusted for age, education, and calendar year.

CA: child abuse, 95%CI: 95% confidence interval

*No physical or sexual child abuse history.

unadjusted cost difference for women with physical abuse only was \$502; and for women with sexual abuse, it was only \$382.

Adjusted Annual Health Care Utilization

In adjusted models, compared to women without the abuse histories, women with a history of both physical and sexual childhood abuse had higher health service use across 6 areas: mental health (RR=2.07; 95%CI=1.67–2.57); hospital outpatient (RR=1.35=95%CI=1.10–1.65); emergency department (RR=1.86; 95%CI=1.47–2.35); primary care (IRR=1.41; 95% CI=1.28–1.56); specialty care (IRR=1.32; 95%CI=1.13–1.54); and pharmacy fills (IRR=1.57; 95%CI=1.33–1.86; Table 4). Women with physical abuse only also had higher service use in 4 areas (range, IRR=1.16 for primary care to RR=2.24 for mental health services) compared with women without physical or sexual child abuse histories. Women with sexual abuse only had higher service use in 4 areas (range, IRR=1.13 for primary care to RR=1.54 for mental health services).

Adjusted Annual Health Care Costs

In adjusted models, women with a history of both physical and sexual childhood abuse had higher annual health care costs across all service areas (except for inpatient costs) compared to women without such abuse histories (Table 5). Total annual health care costs were 36% higher for women with both physical and sexual childhood abuse compared to women without these abuse histories, and cost increases in other service areas ranged from 25% higher for specialty care to 61% higher for pharmacy services.

Total annual health care costs were also higher for women with a history of physical abuse only (22% higher) or sexual abuse only (16% higher) compared to women without physical or sexual childhood abuse. Women with a history of physical abuse only had higher costs for primary care (13% higher) but for no other service area; and women with a history of sexual abuse only had higher health care costs in 4 areas (range, 10% higher for primary care to 19% higher laboratory costs).

DISCUSSION

Women with a history of physical or sexual childhood abuse had higher annual health care use and costs many years after

the abuse. Consistent with our hypothesis, the most pronounced health care use and cost elevations were observed for women with a history of both physical and sexual abuse. However, women who experienced either physical abuse or sexual abuse only also had higher health care use and costs across multiple areas compared to women without these abuse histories.

People use health services based on their *predisposition* to use health services, factors that *enable* or *impede* use, and *need* for services.¹⁸ Women in our study had access to health services (a key enabling factor). Our multivariable models accounted for important predisposing factors, including age and education. The finding that abused women use health services at higher rates than women without similar abuse histories suggests that abuse history may be an important *need* factor driving service use. Women with any of the abuse exposure types used ambulatory services (mental health, primary care, and pharmacy services) at higher rates than women without reported abuse. Emergency service use was higher for women with histories of childhood physical abuse (with or without sexual abuse), and specialty care use was higher for women with histories of childhood sexual abuse (with or without physical abuse).

The higher annual costs observed for women with both abuse types (36% higher) was not as pronounced as that reported in the large survey of Tang et al. (93% higher).⁴ However, the study of Tang et al. relied on self-reported health care use (versus actual health care use), it considered a 1-year period only (versus an average of 7.4 years in our study), it used unadjusted costs, and the average age of women was 36 years (versus 47 years in our study). Because of these methodological differences, it is difficult to make direct comparisons.

Our study had several limitations. We relied on self-reported child abuse history. Reliance on retrospective reports may cause ambiguity in results because of forgotten or nondisclosed abuse.²⁴ However, if women underreported child abuse, our findings would be conservative. We did not ask about psychological childhood abuse or neglect, and therefore, were unable to evaluate whether these abuse types contributed to our findings. Verbal abuse sustained in childhood is independently associated with poor adult health.²⁵ Generalizability may be limited because of the employed, highly educated, and insured nature of the study sample. Our response rate was low; however, our propensity score analysis showed that the likelihood of response was similar for women with and without child

abuse histories. Therefore, nonresponse bias did not affect the study findings.

This study has important implications for the health care system along the life course. Primary prevention efforts that provide support to parents with young children can significantly improve parenting skills and reduce risk of child maltreatment and adverse health sequelae.^{26–28} All children who have been abused deserve evaluation by mental health professionals, and intervention to address the immediate and longer-term effects of abuse.

The reasons why some adults have high levels of ambulatory and emergency service use should be explored by health care providers, and the possibility of past child abuse and/or current intimate partner violence explored. Computer screening for such experiences has been used successfully.^{29–32} Given the high frequency of child abuse and its association with poor adult health, screening for past history of abuse should be considered, especially for women with high health care utilization. Interventions have been successful in improving mental health and abating symptoms and should be offered.^{33,34}

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