Child Abuse & Neglect 79 (2018) 413–422

Contents lists available at ScienceDirect

Child Abuse & Neglect

journal homepage: www.elsevier.com/locate/chiabuneg

Research article

The economic burden of child sexual abuse in the United States

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ARTICLE INFO

Keywords:
Child sexual abuse
Economic burden
Cost analysis

ABSTRACT

The present study provides an estimate of the U.S. economic impact of child sexual abuse (CSA). Costs of CSA were measured from the societal perspective and include health care costs, productivity losses, child welfare costs, violence/crime costs, special education costs, and suicide death costs. We separately estimated quality-adjusted life year (QALY) losses. For each category, we used the best available secondary data to develop cost per case estimates. All costs were estimated in U.S. dollars and adjusted to the reference year 2015. Estimating 20 new cases of fatal and 40,387 new substantiated cases of nonfatal CSA that occurred in 2015, the lifetime economic burden of CSA is approximately $9.3 billion, the lifetime cost for victims of fatal CSA per female and male victim is on average $1,128,334 and $1,482,933, respectively, and the average lifetime cost for victims of nonfatal CSA is of $282,734 per female victim. For male victims of nonfatal CSA, there was insufficient information on productivity losses, contributing to a lower average estimated lifetime cost of $74,691 per male victim. If we included QALYs, these costs would increase by approximately $40,000 per victim. With the exception of male productivity losses, all estimates were based on robust, replicable incidence-based costing methods. The availability of accurate, up-to-date estimates should contribute to policy analysis, facilitate comparisons with other public health problems, and support future economic evaluations of CSA-specific policy and practice. In particular, we hope the availability of credible and contemporary estimates will support increased attention to primary prevention of CSA.

1. Introduction

The present study aims to estimate the U.S. economic impact of child sexual abuse (CSA), defined by the World Health Organization (WHO) as the involvement of a child in sexual activity that he or she does not fully comprehend, is unable to give informed consent to, or for which the child is not developmentally prepared and cannot give consent, or that violates the laws or social taboos of society. [CSA] is evidenced by this activity between a child and an adult or another child who by age or development

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[1] The findings and conclusions in this report are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

https://doi.org/10.1016/j.chiabu.2018.02.020
Received 31 October 2017; Received in revised form 9 January 2018; Accepted 20 February 2018
Available online 20 March 2018

is in a relationship of responsibility, trust or power, the activity being intended to gratify or satisfy the needs of the other person (World Health Organization, 1999, p. 15–16).

This definition includes commercial sexual exploitation and use of children in pornographic performance and materials and defines "child" as anyone under the age of 18 years except where the legal age of majority is lower than 18 years. That CSA represents a grave public health problem is indisputable. Estimated lifetime prevalence rates of exposure to CSA by age 18 years are 26.6% for U.S. girls and 5.1% for U.S. boys (Finkelhor, Turner, Shattuck, & Hamby, 2015). International rates of exposure vary markedly but are often higher in low- and middle-income countries. For example, rates of CSA exposure varied from 26%–38% for girls and from 9%–21% for boys in Haiti, Kenya, Swaziland, and Zimbabwe (CDC, 2012).

The effects of CSA exposure extend well beyond the immediate act of harm and include increased risk for development of severe mental, physical, and behavioral health disorders across the lifecourse (Dong, Giles, Felittie, Dube, & Anda, 2004; Molnar, Buka, & Kessler, 2001; Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003; Noll, Zeller, Trickett, & Putnam, 2007; Putnam, 2003). Exposure to CSA is also associated with increased risk for sexually transmitted diseases including HIV (Sommarin, Kilbane, Mercy, Maloney-Kitts, & Ligiero, 2014), as well as self-inflicted injury, substance abuse, and violence (Molnar et al., 2001; Noll et al., 2003, Noll et al., 2007; Putnam, 2003). Moreover, CSA confers considerable risk for subsequent victimization and criminal offending (Ogloff, Cutajar, Mann, & Mullen, 2012). Given these negative outcomes, it is not surprising that CSA also reduces quality of life even after accounting for the effects of more proximal mental and physical health disorders, particularly among women who survived more severe forms of abuse (Dickinson, deGruy, Dickinson, & Candib, 1999).

The prevalence of CSA, the serious sequelae associated such abuse, and the fact that it is preventable has earned CSA a berth among the 24 risk factors identified by the WHO as substantively contributing to the global burden of disease (Mathers, Stevens, & Mascarenhas, 2009). In the U.S., CSA ranks 12th among preventable risk factors and accounts for 0.7% of the U.S. burden of disease (U.S. Burden of Disease Collaborators, 2013). Several studies have quantified the burden of child maltreatment in terms of potential economic impact (Fang et al., 2015a, Fang, Fry, & Brown, 2015b; Fang, Brown, Florence, & Mercy, 2012). Most notably, Fang et al. (2012)) used an incidence-based approach and conservative assumptions to estimate the total economic burden of all types of child abuse and neglect in the United States to be $124 billion in 2008 or $210,012 per case in 2010 dollars. This study did not distinguish costs by different types of abuse or neglect, and had a series of limitations discussed by the authors, including the exclusion of health-related quality of life.

To our knowledge, just three studies have estimated the economic burden specific to CSA. In a U.S.-based white paper, Miller, Cohen, and Wiersema, 1996) estimated victim-related tangible costs (i.e., productivity losses, medical care, police/fire services, social/victim services, and property loss/damage) and intangible costs (i.e., quality of life) associated with 20 types of criminal victimization including CSA. The cost attributed to each CSA victim ($125,000) was higher than that attributed to child physical abuse victims ($77,000) or child emotional abuse victims ($30,000) and CSA had the highest monetized losses per victimization/victim type, except for murder. Annual losses due to CSA were estimated as $23 billion. Limitations of the study include its age (20 years out of date), exclusion of some costs not borne directly by victims, exclusion of known impacts (e.g., education), and limited methodological detail. A Canadian study by Hankivsky and Draker (2003) is, to our knowledge, the only peer-reviewed study of the economic burden of CSA. They utilized a prevalence-based method to estimate the impact of CSA in fiscal year 1998. Cost categories included mental and physical health, social and public services, justice, education/employment, mortality, and work loss. Annual losses were estimated as approximately CAN$3.70 billion, although methods detail is limited. The most recent study is a white paper by Saied-Tessier (2014), which also utilized a prevalence-based method for estimating the cost of CSA in the UK for fiscal year 2013. Tangible cost categories included health, criminal justice, services for children, and lost productivity to society; intangible, quality-of-life costs were estimated separately. Results varied markedly for low and central estimates of tangible (£1.6 billion vs. £3.2 billion) and especially of intangible (£0.9 vs. £38 billion) costs.

Addressing the scientific and policy gaps with an updated, rigorous estimate of the economic burden of CSA in the United States is critical for drawing attention to the need for more robust CSA prevention efforts in the U.S. (Letourneau, Eaton, Bass, Berlin, & Moore, 2014). Moreover, as noted by Corso and Fertig (2010) and others (e.g., Byford, Torgerson, & Raftery, 2000), credible, contemporary "cost of illness" estimates can be used to help shape public health policy by (1) identifying the costliest sequelae of a specific public health problem, (2) providing a basis for comparing the economic impact of different public health problems, and (3), providing the basis for evaluating the cost effectiveness of prevention and treatment interventions—all of which are relevant data for policymakers who plan and prioritize funding and resources (Byford et al., 2000). More generally, estimates of economic impact help draw additional attention to a given public health problem, in part by demonstrating the depth of impact on the individual and society and hence the potential salience of effective prevention efforts, even to those who do not believe they are directly impacted by the problem (Byford et al., 2000; Corso & Fertig, 2010; Hankivsky & Draker, 2003). Therefore, the present study aims to provide an accurate and up-to-date estimate of the U.S. economic impact of CSA.

2. Methods

2.1. General overview

This study measured costs of CSA from the societal perspective. All costs were estimated in U.S. dollars and adjusted to the reference year 2015 using the gross domestic product (GDP) deflator (available from https://fred.stlouisfed.org/series/GDPDEF/). Future costs associated with CSA accumulating over time were discounted at 3% to reflect their present value, as suggested by Sanders and colleagues (Sanders et al., 2016).

Based on previous research and data availability, this study focuses on the following major types of costs that are associated with CSA: health care costs (child and adult, including physical and mental health), productivity losses, child welfare costs, violence/crime costs (including costs associated with assault, robbery, burglary, and theft), special education costs, suicide death costs, and (separately) quality-adjusted life year (QALY) losses. For each category, we used the best available secondary data to develop cost per case estimates.

A general literature review was performed to identify peer-reviewed studies published prior to January 2016 on all outcomes related to CSA with a potential economic cost or consequence. Articles were identified by keyword searching in a variety of databases, including PubMed, PsycInfo, EconLit, and Google Scholar. In addition to keyword searches, the bibliographies of all relevant articles were scanned to identify additional relevant studies. Whenever possible, published peer-reviewed studies were used to estimate the costs. However, in cases where the data on costs or effects were particularly sparse, we included non-peer-reviewed reports or white papers containing relevant economic outcomes of CSA. Reports and white papers were identified by examining the citations of peer-reviewed studies identified in the general literature review and through searches of EconLit, the Social Science Research Network, and Google and Google Scholar.

We relied upon National Child Abuse and Neglect Data System (NCANDS) as the source to estimate new cases of CSA. NCANDS obtains a full census of all cases reported to child protective agencies ((nstitute of Medicine & National Research Council (IOM & NRC), 2012). More specifically, we used the annual Child Maltreatment reports issued by the U.S. Department of Health and Human Services. These provide credible, if conservative estimates of new cases. However, the Child Maltreatment 2015 report (USDHHS, 2017) did not report to factors necessary for our estimates, including the median age of victims and the gender ratio of victims. A prior report on CSA victims in 2013 indicated a median age of 11 years (USDHHS, 2015). To calculate the average lifetime cost per victim, we begin the accounting for a representative case starting at this age of victimization. When discounted, estimates reflect the net present value of lifetime costs beginning at age 11 years, unless otherwise noted. (We describe our method for estimating the gender ratio below).

For each category, we used attributable costs whenever possible (e.g., healthcare costs); these estimates reflect econometric procedures to statistically identify the difference between the costs of CSA victims and non-CSA controls, adjusting for observed differences between the two groups. Attributable cost data were not available for some categories; in these, costs were estimated as the product of incremental effect of CSA on a specific outcome multiplied by the estimated cost associated with that outcome. For example, the cost of committing crime (e.g., burglary) due to CSA is estimated as the product of the incremental probability of committing a burglary by the average cost per burglary. The estimate of the aggregate lifetime cost of CSA in 2015 was obtained by multiplying per-victim lifetime cost estimates by the estimated cases of new CSA in 2015.

2.2. Incidence rate

To generate incidence-based estimates, we begin with an estimate of new CSA cases (no known prior victimization) and deaths during 2015. For cases, an estimated 57,286 children were determined by CPS agencies to be victims of CSA during 2015 (USDHHS, 2017). The information on the rate of CSA cases that are new was not provided by the Child Maltreatment 2015 report (USDHHS, 2017). However, the report estimated that overall 70.5% of victims of child abuse and neglect were first-time victims. The overall rate of first-time victims was applied to estimate the new cases of CSA, yielding an estimated 40,387 new victims of CSA in 2015. Although researchers have credibly argued that CPS data underestimate the total incidence of child maltreatment (Finkelhor, 1994; MacMillan, Jamieson, & Walsh, 2003; Stoltenborgh, van Ijzendoorn, Euser, & Bakermans-Krenenburg, 2011), to be conservative, this study uses the CPS estimate of CSA cases to estimate the minimum aggregate lifetime cost of CSA in 2015.

To estimate the number of CSA cases by gender, we need to estimate the gender ratio among CSA victims. Finkelhor and colleagues (Finkelhor et al., 2015) reported that the percent of children ages 0–17 years experiencing lifetime sexual assault is 1.6% for boys and 5.0% for girls. Combining these rates with annual estimates of the resident population by age group (0-17 years) and gender for the year of 2015 (available at https://www.census.gov/data/datasets/2016/demo/popest/nation-detail.html), the percent of CSA female victims ages 0–17 years was estimated to be 75%. We applied the gender ratio (75% females vs. 25% males) to estimate the incidence of nonfatal CSA by gender. Among 40,387 new CSA victims in 2015, 30,290 are female victims and 10,097 are male victims.

An incidence-based accounting of the costs of CSA must also include the value of mortality for fatal cases of sexual abuse. An estimated 1670 children nationally died from abuse or neglect in 2015 (USDHHS, 2017). Among these, 20 children (17 girls and 3 boys) died from sexual abuse (USDHHS, 2017). Valuation is described in detail below.

2.3. Average lifetime cost per victim of nonfatal child sexual abuse

2.3.1. Child health care costs

Beginning with the median age of CSA victimization, we apply annual health care costs for children from 11 to 17 years of age. A literature review was conducted to identify childhood medical costs of CSA. However, all of the identified studies were based on inpatient hospital data and limit per-case reporting time periods to a single inpatient episode (Brown, Fang, & Florence, 2011). Estimating the average annual medical costs of CSA requires capturing increased expenditures which may occur outside of hospital settings as well. For example, CSA may lead to increased costs for outpatient mental health services or prescription drugs, and only the most severe instances of CSA require inpatient care related to the case. In separate analyses, we estimated the medical costs of CSA during childhood using linked survey and Medicaid claims (Brown, Fang, Florence, & Mercy, 2017). Specifically, we linked a

sample of 1151 children with cases investigated by CPS, drawn from the National Survey of Child and Adolescent Well-Being, to individual 2000–2003 Medicaid claims. The control group was a propensity score matched sample of Medicaid children. Differences in medical costs by type of maltreatment were estimated using the generalized linear models, controlling for multiple types of abuse to avoid double-counting. The attributable difference in annual medical costs between the CSA case and control groups is $2034 (2009 dollars) per victim. Adjusted by GDP deflator, the cost difference measured in 2015 dollars is $2,237, or $14,357 per victim of nonfatal CSA for the present value of medical costs from 11 through 17 years of age.

2.3.2. Adult medical costs

A few sources of data exist for adult estimates of medical costs of child maltreatment (Bonomi et al., 2008; Hulme, 2000; Walker et al., 1999). Based on a review (Brown et al., 2011), we determined that Bonomi et al.'s (2008) estimates were most suitable for this study. They examined adult health care costs associated with physical, sexual, or both physical and sexual childhood abuse using data from 3333 women (18–64 years) enrolled in a large health care delivery system. Total annual health care costs were 16% higher (about $382) in 2004 for women with a history of CSA compared to women without child abuse history. Based on Bonomi et al.'s (2008) findings and acknowledging that their study only included women (as did the two other adult estimates), we assume that the average annual incremental health care costs for a CSA victim from 18 through 64 years of age are $382 (2004 dollars), or $472 in 2015 dollars. The present value of a stream of these incremental health care costs over the period from18 through 64 years of age is $9882 per case. We did not locate any studies that report incremental health care costs associated with CSA for adults older than age 65 years, so we have conservatively assumed no additional costs starting at age 65 years.

2.3.3. Productivity losses

Lifetime productivity losses associated with CSA were estimated using a human capital approach, reflecting the potential loss of earnings due to being maltreated during childhood. Robst (2008) examined the effect of CSA on adult wages for men and women, and found adult earnings for women who were victims of CSA are 20.3% lower than for women who were not victims of CSA, while the wage effects for men are statistically insignificant. The median annual earnings for full-time, year-round female workers in 2015 was $40,742 (Proctor, Semega, & Kollar, 2016). Based on the above findings, we assume that experience of CSA reduces female victim earnings by $8271 (2015 dollars) per year from ages 18 to 64, assuming that productivity losses are negligible beyond 65 when most retire. Assuming a long-term growth in labor productivity of 1% per year (Grosse, 2003), the present discounted value of these earnings losses from the perspective of victimization at age 11 years is $223,581. We do not include the value of lost tax receipts from reduced earnings. Although these are a cost to the government, from a social perspective, this is a transfer from individuals to the public sector, and there is no net loss.

2.3.4. Child welfare costs

The most recent national estimate of child welfare costs available is from 2006. Overall, states spent $25.7 billion in federal, state, and local funds on child welfare activities in fiscal year 2006, and an estimated 3,578,000 children received a CPS investigation in 2006 (DeVooght, Allen, & Geen, 2008). This yields an estimated $7183 in child welfare costs per investigated child. Given that the DeVooght et al.'s (2008) report did not provide the total child welfare costs specifically for CSA, we assume that the child welfare costs per CSA victim are $7183 (in 2006 dollars), or $8333 per child in 2015 dollars. Following other researchers' methodology (Barnett, Birnbaum, Cremieux, Fendrick, & Slavin, 2000; Fang et al., 2012), we assume that these costs are primarily accrued within one year of victimization and apply these only once (at age 11 years) when estimating the total lifetime burden per CSA victim.

2.3.5. Violence/crime costs

Violence/crime costs associated with CSA were determined based on the association between CSA and increased criminal activity, including assault, robbery, burglary, and theft (> $50). Currie and Tekin (2012) analyzed data from the National Longitudinal Study of Adolescent Health, and reported that relative to children with no reported history of maltreatment, sexually abused children are significantly more likely to commit assault (by 12 percentage points), robbery (by 8.3 percentage points), burglary (by 9.8 percentage points), and theft (by 9.8 percentage points). Costs associated with these crimes were previously estimated by Lochner and Moretti (2004). Updating their estimated costs to 2015 dollars and based on a mean age of committing crime of 20 years,[2] the expenditures associated with these crimes are $1389 (assault), $909 (robbery), $113 (burglary), and $23 (theft) per CSA victim.

2.3.6. Special education costs

Sexually abused children are more likely to receive special education, relative to nonabused children. Jonson-Reid and colleagues (Jonson-Reid, Drake, Kim, Porterfield, & Han, 2004) found that 19.9% of sexually abused children received special education, compared with 13.7% of children with no maltreatment record. Again, based on a simple difference, we assumed that the incremental effect due to CSA is 6.2%. Reynolds and colleagues (Reynolds, Drake, Kim, Porterfield, & Han, 2002) estimated that the average annual cost per child for special education services was $7791 (1998 dollars) above and beyond regular instruction. Assuming that the average number of years receiving special education services is 6 years (from 11–17 years of age) and the incremental effect is

[2] Age-crime curves vary by type of offense, among other factors. However, the peak age of offending for all but one crime type reported in the F.B.I.'s Uniform Crime Reports program is less than 25 years (http://law.jrank.org/pages/473/Age-Crime-Age-crime-patterns-U-S.html) which supports our decision to set 20 years as the average age of crime commission. We recognize others might choose a slightly younger or older average age.

6.2%, the present value of future special education costs associated with CSA is estimated to be $3760 (2015 dollars) per victim.

2.3.7. Suicide death costs

Cutajar et al. (2010) compared suicide and accidental fatal overdose deaths among CSA victims and nonvictims ages 15 to 64 years in Australia. Although many studies have reported increased risk of attempted or completed suicide associated with CSA in the U.S., Cutajar's was the only study we could locate that reported sufficiently detailed relative risk information over the long-term term as needed for lifetime costing. The mean age at time of suicide for CSA victims was 31.1 years and CSA victims had significantly higher relative risks (RR) for suicide than the comparison group. The authors reported an overall risk of suicide from CSA of 0.7% for women and 0.9% for men. However, rates for Australia may not reflect aggregate mortality and mental health in the U.S. population, so we adjusted these estimates. We first estimated the "lifetime" risk for suicide over from 11 through 64 years among the general U.S. population by estimating the fraction of intentional self-harm deaths relative to all deaths (Murphy, Xu, & Kochanek, 2013), a cumulative risk of 0.127% for males and 0.035% for females. Applying Cutajar's RR of increased suicide risk for female CSA (38.46) yields a lifetime risk of suicide associated with CSA of 1.357%; for male victims, a corresponding RR of 14.20 yields a lifetime risk of suicide of 1.809%. Thus, we assume that the *relative* risk of suicide associated with CSA is the same in the U.S. as in Australia, but that the baseline risk of suicide is higher in the U.S. (Note that an unknown portion of the overall suicide count in our U.S. mortality statistics includes CSA victims, which may inflate our estimates somewhat). For costing, the CDC WISQARS (http://www.cdc.gov/injury/wisqars) reports an average cost per fatal suicide for adults at age 31 years (including medical costs and lost productivity) of $1,965,928 (in 2010 dollars) for male victims and $1,419,072 (in 2010 dollars) for female victims. Combining the added risk and cost, we estimate the present value of future suicide death costs associated with CSA to be $35,925 (2015 dollars) per victim for males and $20,387 (2015 dollars) per victim for females.

2.3.8. QALY loss costs

Health-related quality of life losses are clearly important for CSA and child maltreatment more generally (Corso, Edwards, Fang, & Mercy, 2008), but appropriate valuation of the quality of life loss is still difficult at this time and economists do not agree on the value of a QALY in dollar terms, or even the validity of attempting such an estimate (Johnson, 2009). Nevertheless, we believed it important to include estimated QALY as these pertain to CSA; we report this category separately from the estimated total burden associated with CSA. Using data from a study of adults who reported adverse childhood experiences and current health status, Corso and colleagues (Corso et al., 2008) found that males and females who experienced CSA have a marginal decrease of 1.113 and 1.173 quality-adjusted life years, respectively, compared with persons who did not experience CSA. (These totals represent the sum of annual decrements from ages 19–76 years for men and 19–81 years for women, based on average U.S. life expectancy (Arias, 2014)). To estimate the dollar value of these losses, we used a literature review of the willingness to pay value of a QALY (Ryen & Svensson, 2015). The median estimated value from 24 studies and 383 estimates was 24,226 Euros (2010 price level) per QALY. Adjusted as $32,164 in 2010 U.S. dollars, we estimate the QALY losses associated with CSA as $38,904 (in 2015 U.S. dollars) for male victims and $41,001 (in 2015 U.S. dollars) for female victims.

2.4. Average lifetime cost per victim of fatal child maltreatment

Approximately 85% of all fatalities were children younger than 5 years old (USDHHS, 2017). According to the CDC "WISQARS Cost of Injury Module", for children aged 0–4, the average cost per case for a fatal assault was $20,015 for male victims and $20,916 for female victims (in 2010 dollars) in medical costs, and $1,344,550 for male victims and $1,017,354 for female victims (in 2010 dollars) for lost productivity. Adjusted to 2015 dollars, the medical costs and productivity losses associated with fatal CSA are $21,751 and $1,461,182 for male victims, and $22,730 and $1,105,604 for female victims, respectively.

3. Results

Table 1 presents the average lifetime cost of nonfatal CSA per victim in 2015 dollars for new cases occurring in 2015. Discounted at 3%, we estimated the average total lifetime cost per female victim of nonfatal CSA to be $282,734. The cost for female victims includes discounted present values of $14,357 in childhood health care costs, $9882 in adulthood medical costs, $223,581 in productivity losses, $8333 in child welfare costs, $2434 in violence/crime costs (including costs associated with assault, robbery, burglary, and theft), $3760 in special education costs, and $20,387 in suicide death costs. Not included in the total above, we also estimate an additional loss of qualify of life equivalent to $41,001.

Table 1 also presents the average lifetime cost for nonfatal CSA per male victim. However, for this estimate, we lacked adequate estimates of productivity losses. Recognizing this significant limitation and discounted at 3%, we estimated the average lifetime cost per male victim of nonfatal CSA to be $74,691 (in 2015 dollars). The cost for male victims includes discounted present values of $14,357 in childhood health care costs, $9882 in adulthood medical costs, $8333 in child welfare costs, $2434 in violence/crime costs (including costs associated with assault, robbery, burglary, and theft), $3760 in special education costs, and $35,925 in suicide death costs. Additionally, we estimated $38,904 in lost quality of life, measured in QALYs.

For fatal CSA, the average lifetime cost per death was estimated to be $1,128,334 for female victims and $1,482,933 for male victims (both in 2015 dollars). The cost for female victims includes $22,730 in medical costs and $1,105,604 in productivity losses, while the cost for male victims includes $21,751 in medical costs and $1,461,182 in productivity losses.

Table 2 presents the total lifetime economic burden of CSA in 2015 based on the baseline estimate of 40,387 new cases of nonfatal

Table 1
The average lifetime cost per victim of nonfatal child sexual abuse.

Source of Cost	References	Average Lifetime Cost per Victim (in 2015 dollars)	
		Female	Male
Child health care costs	Brown et al. (2017)	$14,357	$14,357
Adult health care costs	Bonomi et al. (2008)	$9882	$9882
Productivity losses	Robst (2008); Proctor et al. (2016)	$223,581	–
Child welfare costs	DeVooght et al. (2008)	$8333	$8333
Violence/crime			
Assault	Currie and Tekin (2012); Lochner & Moretti, 2004	$1389	$1389
Robbery		$909	$909
Burglary		$113	$113
Theft > $50		$23	$23
Special education costs	Jonson-Reid at al. (2004) Reynolds et al. (2002)	$3760	$3760
Suicide deaths	Cutajar et al. (2010) CDC WISQARS (2014)	$20,387	$35,925
Total		$282,734	$74,691
Additional Costs			
Quality of life losses, measured in QALYs	Corso et al. (2008); Ryen and Svensson (2015)	$41,001	$38,904

Table 2
Total lifetime costs of child sexual abuse, 2015, United States (based on substantiated cases of child sexual abuse).

Source of Cost	Total Lifetime Costs (in 2015 dollars)		
	Female	Male	Total
Nonfatal			
Incidence (cases)	30,290	10,097	40,387
Child health care costs	$434,886,632	$144,966,997	$579,853,629
Adult health care costs	$299,325,148	$99,778,343	$399,103,492
Productivity losses	$6,772,276,872	$0	$6,772,276,872
Child welfare costs	$252,419,367	$84,142,567	$336,561,933
Violence/crime			
Assault	$42,063,448	$14,021,612	$56,085,060
Robbery	$27,533,136	$9,178,015	$36,711,151
Burglary	$3,418,901	$1,139,671	$4,558,572
Theft > $50	$685,859	$228,627	$914,486
Special education costs	$113,879,927	$37,961,229	$151,841,156
Suicide deaths	$617,536,368	$362,730,618	$980,266,986
Total	$8,564,025,658	$754,147,679	$9,318,173,337
Fatal			
Incidence (cases)	17	3	20
Medical costs	$386,416	$65,254	$451,669
Productivity losses	$18,795,263	$4,383,546	$23,178,809
Total	$19,181,679	$4,448,800	$23,630,478
Total costs (including both fatal and nonfatal cases)	$8,583,207,337	$758,596,479	$9,341,803,815
QALY loss	$1,241,923,138	$392,812,187	$1,634,735,326

CSA (30,290 cases of female victims and 10,097 cases of male victims). For these cases, the aggregate lifetime costs were estimated to be $9.34 billion: $8.6 billion for female victims and $758 million for male victims. The lower number for male victims reflects, again, the significant limitation of inadequate data pertaining to male victim productivity losses. Of the total costs associated with nonfatal CSA cases, childhood health care costs accounted for $580 million, adulthood medical costs accounted for $399 million, productivity losses accounted for $6.8 billion (female victims only), child welfare costs accounted for $337 million, violence/crime costs accounted for $98 million, special education costs accounted for $152 million, and suicide death costs accounted for $980 million. If included, losses in QALYs also account for an additional $1.6 billion.

The aggregate lifetime costs associated with the estimated 20 deaths resulting directly from CSA were estimated to be $23.6 million, with medical costs accounting for $452 thousand and lost productivity accounting for $23.18 million (Table 2). In combination, the fatal and nonfatal costs associated with new cases of fatal and nonfatal CSA in 2015 were approximately $9.3 billion.

4. Discussion

The present study builds upon earlier work that has estimated the economic burden associated with child maltreatment in general (Fang et al., 2012) and CSA in particular (e.g., Miller et al., 1996). In this study, we utilized an incidence-based approach to estimate the lifetime economic burden specific to CSA. Estimating 20 new cases of fatal and 40,387 new substantiated cases of nonfatal CSA

that occurred in 2015, the lifetime economic burden of CSA is approximately $9.3 billion. We further estimated that the lifetime cost for victims of fatal CSA is on average $1,128,334 and $1,482,933 per female and male victim, respectively. For female victims of nonfatal CSA, we estimated an average lifetime cost of $282,734 per victim. For male victims of nonfatal CSA, there was insufficient information on productivity losses (addressed under Limitations), contributing to a lower average estimated lifetime cost of $74,691 per male victim. With the exception of male productivity losses, these estimates were based on robust, replicable incidence-based costing methods, which improve upon past estimates as we discuss next. The availability of accurate, up-to-date estimates will contribute to policy analysis, facilitate comparisons with other public health problems, and support future economic evaluations of CSA-specific policy and practice.

In a recent study, Fang et al. (2012)) utilized similar methods and included many of the same cost categories (i.e., child and adult health, productivity losses, child welfare costs, criminal justice costs, and special education costs) to identify the costs associated with child maltreatment in general. Their findings indicated an average lifetime cost of $210,000 (updated to $228,229 in 2015 dollars) per victim of nonfatal child maltreatment. This per victim cost is 19% lower than our estimated lifetime cost per female victim of nonfatal CSA, a difference attributable primarily to our higher estimated productivity losses ($223,581 vs. $144,360 [$156,882 in 2015 dollars]) and our inclusion of additional costs pertaining to suicide deaths ($20,387). If the estimated value of QALY losses ($41,001) are included in the total, our estimate would be approximately 29% greater. With respect to differences in productivity losses, the current study relied upon economic outputs specific to CSA generated by Robst (2008) whereas Fang et al. (2012) relied upon economic outputs for nonspecific child maltreatment generated by Currie and Widom (2010). Consequently, Fang et al. (2012)) used $5000 in their calculation of lifetime productivity losses whereas we utilized $8271 in ours. Regarding suicide and quality of life cost estimates, Fang and colleagues did not have sufficient information on the magnitude or cost of reduced quality of life attributable to child maltreatment to include an estimate of either in their analyses (Fang et al., 2012). We also note that Fang and colleague's lifetime estimate of approximately $210,000 per victim is nearly 50% higher than our lifetime estimate per male victim of nonfatal CSA; this difference is due to our inability to estimate productivity losses for male victims of nonfatal CSA.

Given substantial differences between our methods and those utilized in prior CSA cost studies, direct comparison of results is impossible. However, in the interest of comprehensiveness, we make some cautious contrasts between our results and those from the earlier U.S. based CSA cost study. As summarized in our introduction, Miller and colleagues (Miller et al., 1996) estimated the cost attributed to each CSA victim as approximately $125,000. Updated to 2015 dollars, this is approximately $158,535, or slightly more than half of our estimate of $282,734 for female victims of nonfatal CSA. Differences in computation of productivity losses appear to account for most of this discrepancy, with Miller and colleagues attributing just $2100 ($2663 in 2015 dollars) in productivity losses per victim as compared to our estimate of $223,581 in productivity losses (female victims only). Miller and colleagues relied upon narrow estimates of lost hours of work and earnings due to medical problems associated with victimization and adjusted these short-term loss estimates to estimate long-term productivity losses by body part and by injury. By comparison, we estimated productivity losses using the human capital approach and basing our calculations on the average earnings losses produced by Robst (2008) thorough assessment of economic consequences of CSA. We believe our productivity loss estimates provide a more accurate picture of the true economic impact of CSA on female victims. Despite estimating a lower per-victim lifetime cost, Miller and colleagues reported higher annual losses of approximately $23 billion (updated to $29.2 billion in 2015 dollars) in comparison to our estimated annual economic burden of $9.3 billion in losses attributable to CSA. This difference is due to discrepancies in estimated new CSA cases. Specifically, Miller and colleagues estimated 185,000 new CSA victims for 1990 whereas we estimated 40,387 new CSA victims for 2015. There are two likely reasons for this difference. First, rates of CSA have declined markedly since peaking in early 1990s and thus we would expect to see reductions in new case estimates ranging from approximately 40–60% between the time periods of the two cost studies (Finkelhor, Jones, Shattuck, & Seito, 2013; Sedlak et al., 2010). Second, the two cost studies relied on different sources to estimate new cases. Miller and colleagues utilized National Incidence Study (NIS) survey data which relies upon surveys of child protection services (CPS) investigators and other "sentinels" in a representative sampling of counties to obtain an estimate of all cases of child abuse and neglect, including investigated and noninvestigated cases (Sedlak et al., 2010). We relied upon National Child Abuse and Neglect Data System (NCANDS), which obtains a full census of all cases reported to CPS agencies (IOM & NRC, 2012). Because it is based solely on reported cases, NCANDS provides a more conservative estimate of new CSA cases, relative to NIS estimates. In summary, relative to the earlier CSA cost study, our findings offer a more contemporaneous evaluation of the cost of CSA that incorporates both a more comprehensive assessment of productivity losses as well as a more conservative estimate of new cases.

5. Limitations

Despite several strengths described above, we also note some significant limitations of this study. First among these was our inability to identify sufficient high quality data on the economic impact of nonfatal CSA on male victims. The absence of estimated productivity losses likely results in an artificially low estimate of the per-victim cost for male victims of nonfatal CSA. The choice we faced was to omit male victims of nonfatal CSA or move forward with an obviously imperfect and incomplete estimate. By retaining male victims in this economic analysis, we hope to both highlight the need for more research on male victims and to provide a starting place from which more complete estimates may be generated when the requisite data on economic impact becomes available in the future.

Second, as previously noted, appropriate valuation of the quality of life loss is still difficult at this time. While QALYs are a common framework in economic evaluation for measuring such impacts, economists do not agree on the value of a QALY in dollar terms or even the validity of attempting such an estimate (Johnson, 2009). We used a conservative figure for this based on a published literature review (Ryen and Svensson (2015) and we report QALY estimates separately in the tables and not in the main

estimates because of the uncertainty around this figure. Moreover, even if the value of the QALY was fixed, the amount of QALYs associated with CSA and child maltreatment has only been reported in very few published studies to date. Nevertheless, given the importance of QALYs to nonfatal burden in chronic disease, mental health, and other public health applications, we felt it was appropriate to include a dimension of impact that clearly has some value to individuals and society.

Third, our estimate of the total lifetime economic burden of CSA is likely to be substantially underestimated. As indicated, in order to get a baseline estimate of new or incident cases of CSA in 2015 we relied on new cases reported to child protection agencies via the NCANDS. It is widely recognized, however, that a substantial proportion of CSA never comes to the attention of child protection agencies (IOM & NRC, 2012). The total lifetime estimate, therefore, should be considered a conservative, minimum estimate.

6. Conclusion

The national economic costs of child maltreatment have been estimated in numerous studies (Daro, 1988; Fang et al., 2012; Fromm, 2001; Gelles & Perlman, 2012; Miller et al., 1996; Wang & Holton, 2007) and highlighted in numerous reports (e.g., Florence, Brown, Fang, & Thompson, 2013; IOM & NRC, 2014; Pew Commission on Children in Foster Care, 2008). In combination with the social costs of child maltreatment, these economic costs contributed to the rationale for supporting the development, evaluation and dissemination of effective prevention policy and practice. As a result, the U.S. now focuses broadly on proven and promising child maltreatment prevention policies and practices targeted primarily toward new and expecting parents and young children (IOM & NRC, 2014).

The U.S. has not, however, focused broadly on the prevention of CSA (Letourneau et al., 2014, Letourneau, Schaeffer, Bradshaw, & Feder, 2017; McMahon & Puett, 1999; Mendelson & Letourneau, 2015; Mercy, 1999). Despite the obvious appeal of preventing sexual harm from occurring in the first place, many people view CSA as uniquely unpreventable (Volmert, Fond, & O'Neil, 2015) and, therefore, most efforts involve after-the-fact criminal justice interventions that target known offenders. These interventions aim to limit the recidivism risk posed by people convicted of sex crimes by, for example, retaining them indefinitely in maximum security sex offender-specific civil commitment facilities, by tracking their whereabouts via sex offender registration and public notification schemas, and by limiting their access to children via residence, employment, and education restrictions based on proximity to places where children congregate (Letourneau & Levenson, 2010; Letourneau & Shields, 2015). These interventions have been ineffective (Belzer, 2015; Lafond, 1998; Socia, 2014; The Council of State Governments, 2010; Zgoba, Witt, Dalessandro, & Veysey, 2008). Even if these criminal justice interventions were effective, they would have minimal effects on preventing new cases of abuse because most cases of CSA – as many as 95% - are committed by first-time offenders (Sandler, Freeman, & Socia, 2008) and because most adjudicated sex offenders – as many as 80% - never reoffend sexually (Hanson, Harris, Letourneau, Helmus, & Thornton, 2018). It is hoped that a credible, comprehensive and current estimate of the national financial burden of CSA will bring attention to the high but unmet potential of CSA prevention programming and serve as a benchmark against which to evaluate cost-effectiveness of subsequent prevention efforts.

Sources of funding: This work was supported by the Moore Center for the Prevention of Child Sexual Abuse, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD.

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