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Title: Adverse childhood experiences and healthcare costs in adult life

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Abstract

Adverse childhood experiences have been associated with poor health and detrimental health behaviors later in life, as well as increased use of health services. The current study aims to present the prevalence of adverse childhood experiences and examine the healthcare costs associated with primary, allied, and specialist healthcare services. The Australian Longitudinal Study on Women's Health is a general health survey of four nationally representative age cohorts. The current study uses 20 years of survey and administrative data (1996-2015) from the cohort born 1973-78. Overall, 41% of women indicated at least one category of childhood adversity. The most commonly reported type of childhood adversity was having a household member with a mental illness (16%), with the most commonly reported ACES category being psychological abuse (17%). Women who had experienced adversity in childhood had higher healthcare costs than women who had not experienced adversity. The healthcare costs associated with experiences of adversity in childhood fully justify a comprehensive policy and practice review. Childhood adversities encompass neglect, abuse and trauma, family dysfunction and instability, and chronic poverty. Adverse childhood experiences have been associated with detrimental health behaviors later in life, such as smoking (Edwards, Anda, Gu, Dube, & Felitti, 2007), alcohol abuse (Strine et al., 2012), substance abuse (Choi, DiNitto, Marti, & Choi, 2017; Dube et al., 2003), and obesity (Williamson, Thompson, Anda, Dietz, & Felitti, 2002). Previous studies also draw a link between adverse childhood experiences and poor physical health outcomes in adulthood, including heart disease (Almuneef, Qayad, Aleissa, & Albuhairan, 2014; Dong et al., 2004; Loria, Ho, & Pollock, 2013), respiratory disease (Almuneef et al., 2014), sexually transmitted infections (Almuneef et al., 2014; Hillis, Anda, Felitti, Nordenberg, & Marchbanks, 2000), autoimmune disease (Dube et al., 2009), cancer (Bellis et al., 2015), diabetes (Bellis et al., 2015), gastrointestinal problems (Goodwin, Hoven, Murison, & Hotopf, 2003), and disability (Schussler-Fiorenza Rose, Xie, & Stineman, 2014). Not surprisingly, a recent UK study has pointed to the increased use of health services among adults who report adverse childhood experiences (Bellis et al., 2017).

In Australia, the final report by the Royal Commission into the Institutional Responses to Child Sexual Abuse has drawn attention to the often catastrophic outcomes of abuse and adversity in childhood in Australia (Royal Commission into Institutional Responses to Child Sexual Abuse, 2017). Further, the Human Rights Commission has highlighted the need to further examine the impact of adverse experiences in childhood, such as witnessing violence between parents (Australian Human Rights Commission, 2015). There has been growing demand to quantify the long-term societal and individual financial burden of adverse childhood experiences (Bowlus, McKenna, Day, & Wright, 2003) in order to motivate policy makers to support early interventions. Given the link with adverse health behaviors and health outcomes, the long-term healthcare costs associated with adverse childhood experiences are of particular interest. General practitioners (or family doctors) provide primary care in Australia and are often the first-line point of contact for people with a history of abuse or maltreatment, providing a conduit through referral procedures to other specialised health professionals and support services. To date, information about adversity in childhood and later use of primary health services has been limited, and in particular, has not been generalizable to the population (Coles, Lee, Taft, Mazza, & Loxton, 2015). Much of the evidence has used hospital, clinical or selected community samples that were not necessarily nationally representative (Coles et al., 2015).

The current study aims to present the prevalence of adverse childhood experiences among a broadly representative national sample of Australian women, and will examine the healthcare costs associated with primary, allied, and specialist healthcare services. The analysis involves linking national administrative healthcare data from a 20 year period (1996-2015) to a large cohort of Australian women born 1973-78 who have indicated whether or not they have experienced adversity in childhood. It is expected that adversity in childhood will be associated with increased healthcare costs.

Method

Participants and study design

The Australian Longitudinal Study on Women's Health (ALSWH) collects selfreported longitudinal data from four nationally representative age cohorts with respect to their health and wellbeing, as well as their social environment, work, family, and health behaviors (see <u>www.alswh.org.au</u> for further details). This paper focuses on data collected from participants born 1973-78, who first completed a baseline survey in 1996, when aged 18-23 (n=14,247). These women were subsequently invited to complete ongoing follow-up surveys, commencing in 2000 and thereafter every three years. While the first surveys were entirely paper-based, the option of an online survey was introduced in 2012.

Survey measurements

Unless otherwise specified, all self-reported survey data were measured at Survey 7 (2015), when participants were aged 37-42 years old.

Adverse childhood experiences

The Adverse Childhood Experiences Scale (ACES) was first published as an instrument comprising two major themes (abuse to the individual, and household dysfunction) with a total of seven categories measured across 17 items. Questions about individual childhood abuse experiences asked about: (i) psychological abuse (2 items); (ii) physical abuse (2 items); and (iii) childhood sexual abuse (4 items). From a childhood household dysfunction perspective, there were questions that asked about exposure to: (iv) substance abuse (2 items); (v) mental illness within the home (2 items); and (vi) criminal behavior (1 item). In the original ACES, witnessing a mother being treated violently (4 items) was also included. However, feedback from the ALSWH pilot survey indicated that participants wanted father-equivalent questions for this category, so four equivalent items were added, leading to eight items that measured household intimate partner violence (IPV).

Therefore, the seventh ALSWH survey for the 1973-78 cohort participants included seven categories measuring adverse childhood experiences, with 21 individual items.

Demographics

For each participant, residential postcode was classified according to the proximity to major infrastructure services using ARIA+ scores, and were subsequently grouped into: Major Australian cities; Inner regional areas; Outer regional areas; and Remote/Very remote areas. Highest qualification was grouped into four categories: Year 10 or less; Year 12 or equivalent; Vocational/Certificate/Diploma (where vocational includes a trade qualification or apprenticeship); and University degree or higher. The question, 'How do you manage on the income you have available?' had five response options which were collapsed into Difficult some of the time/Difficult all the time/Impossible versus Not too bad/Easy. Current relationship status was defined as Partnered (married/defacto) versus Not partnered (separated/divorced/widowed/never married).

Health behaviors

Current smoking status was classified into: Never smoked; Ex-smoker; and Current smoker. Alcohol consumption status was determined using several questions about drinking frequency and quantities (Jonas, Dobson, & Brown, 2000), and was categorised into the following three groups: Non-drinker/Rarely drinks; Low risk drinker; and Risky/High risk drinker.

Health status

The 36-item Short Form Survey (SF-36) was used to ascertain health-related quality of life. In keeping with scoring for this scale, final scores were standardised to range from 0-100, with higher scores reflecting better health (McHorney, Ware, & Raczek, 1993; Ware & Sherbourne, 1992). For this study, the general health and mental health subscales were included to provide an indication of overall wellbeing.

Health service use data

All Australian citizens and permanent residents are covered by the national health insurance scheme, Medicare. ALSWH data are routinely linked with participants' Medicare data on an annual basis. Medicare provides free treatment in all public hospitals and refunds for health services listed on the Medicare Benefits Schedule (MBS) up to a set fee, with any remaining charge to be paid by the patient (out-of-pocket costs). Medicare coexists with private health insurance, with the latter offering fee coverage for private hospital services and, while in hospital, some out-of-pocket costs (Australian Government Private Health Insurance Ombudsman, 2018).

The Better Access to Mental Health Care initiative was introduced in November 2006 to improve management and treatment of mental health issues within the community, by subsidising access to mental health professionals and team-based mental health care. As a part of the Better Access to Mental Health initiative, Medicare subsidies and rebates were made available to patients to cover, or contribute towards, the cost of some mental health services provided by family doctors (primary care providers), psychiatrists (specialists), psychologists and appropriately trained social workers and occupational therapists (allied healthcare providers).

This paper utilises the MBS dataset, which includes records of consultations with primary care providers, specialists, and allied healthcare providers. The MBS dataset includes costs for each service item, comprising the total cost, the government benefit paid and the out-of-pocket cost for each service claimed. MBS data were extracted by matching eligible participants' name, birthdate and Medicare number with the MBS claims data. For this study, the linked MBS data covered the time period from 1 January 1996 to 31 December 2015. For each participant, total annual costs were calculated for primary, specialist (excluding obstetricians), and allied healthcare.

Statistical analyses

The prevalence of each scale item and each category for the ACES was calculated. Descriptive characteristics according to ACES status were calculated in terms of demographics, health behaviors and health status. Due to the low number of women experiencing a household member being incarcerated (1.72%), this category was excluded from further analyses. Mean annual costs were calculated and plotted across time (19962015), according to six of the ACES categories. Analyses were conducted using SAS software version 9.4.

Results

From the 1973-78 cohort, 6,907 women completed Survey 7 in 2015, with 6538 women (94.7%) eligible for linkage with the MBS data. Of these eligible women, 6,222 women (95.2%) completed the ACES questions, defining the sample set for this study. Overall, 2537 women (40.8%) indicated at least one category of childhood adversity, with prevalence of the specific items and categories provided in Table 1. The most commonly reported type of childhood adversity was having a household member with mental illness (16.1%), with the most commonly reported ACES category being psychological abuse (17.36%).

[Table 1]

Table 2 shows the demographic characteristics of women who did and did not have any experiences of adversity in childhood. Women who had experienced adverse events during childhood were less likely to have a university degree or higher, more likely to have difficulty managing on their available income, less likely to be partnered and more likely to by a current smoker than women who had not experienced adversity during childhood. Women who had experienced adversity in childhood had mean general health scores that were 6.5 points lower, and mental health scores that were 5.97 points lower, than women who reported no adversity during childhood.

[Table 2]

Figure 1 shows the mean total annual costs per participant paid for primary care services from 1996 until 2015, with women who had experienced childhood adversity having higher healthcare costs than those who had not experienced adversity in childhood. Mean

annual healthcare costs for primary care ranged from 117AUD in 1996 to 272AUD in 2015 for women who had not experienced adversity. There was little difference in primary healthcare costs between the types of adversity experienced in 1996, with annual costs being around 150AUD. However, some differences emerged over time. Women who experienced household mental illness in childhood had mean annual primary healthcare costs of 324AUD in 2015 and women who had experienced physical abuse in childhood had the highest primary healthcare costs in 2015, at 389AUD.



Figure 1: Total mean annual costs per woman for primary healthcare by category of ACE from 1996-2015.

Figure 2 shows the total annual mean costs per participant paid for allied health services from 1996 until 2015. The differences between women who had and had not experienced adversity in childhood were small from 1996-2008. However, after 2008, the differences between women who had and had not experienced adversity in childhood were large, with costs increasing for women who had experienced adversity during childhood and costs largely plateauing for women who had not experienced adversity in childhood. Mean annual healthcare costs for allied health ranged from 75AUD in 1996 to 305AUD in 2015 for women who had not experienced adversity. There was little difference in allied health costs between the types of adversity experienced, with costs being around 100AUD in 1996 and 420AUD in 2015.



Figure 2: Total mean annual costs per woman for allied healthcare by category of ACE from 1996-2015.

Figure 3 shows the total annual mean costs per participant paid for specialist services from 1996 until 2015. Overall costs were less for specialist care (maximum 221AUD) compared with primary (maximum 398AUD) and allied care (maximum 420 AUD). Overall, women who had not experienced adversity during childhood tended to have lower specialist healthcare costs than women who had experienced adversity in childhood, with this difference becoming more apparent from 2008 onwards. Mean annual healthcare costs for specialists ranged from 32AUD in 1996 to 117AUD in 2015 for women who had not experienced adversity in childhood. There was little difference in specialist costs between the types of adversity experienced in 1996, with costs being around 40AUD. However, some differences emerged over time. Women who experienced household mental illness in childhood had the lowest mean annual specialist costs of 148AUD in 2015 and women who had experienced psychological abuse in childhood had the highest specialist costs in 2015, at 221AUD.



Figure 3: Total mean annual costs per woman for specialist healthcare by category of ACE from 1996-2015.

Discussion

In this broadly representative national sample of women born 1973-78, 41% reported any adversity in childhood. This expands on past research that has examined prevalence for aspects of adversity in childhood, such as abuse or witnessing IPV. Of the sample, 9% had witnessed IPV, which was higher than the prevalence found in a sample of men and women aged 23-24 years (4%), the only other study we found that had assessed witnessing of parental IPV in Australia (Price-Robertson, Smart, & Bromfield, 2010). Even then, the ACES offered a more comprehensive assessment of witnessing different forms of IPV, which is likely the main reason for the higher prevalence found in the current study. Other forms of household dysfunction were reported by 17% of the women in our study. To our knowledge, this is the first representative study to examine the prevalence of growing up with household mental illness or substance use in Australia.

With regard to abuse during childhood, 8% of the sample reported physical abuse and 17% reported psychological abuse. Figures for physical abuse are comparable to those reported in a systematic review that found 10% of Australian females (adults and children) reported physical abuse during childhood (Moore et al., 2015). However, the current study found a much higher prevalence of psychological abuse (17%) than this review, which indicated only 9% of females reported emotional abuse. By contrast, Price-Robertson et al. (2010) found 17% of women aged 23-24 years reported emotional abuse, in agreement with the current study. Childhood sexual abuse was reported by 16% of the ALSWH sample and no other study was found that measured sexual abuse in a similar manner. Penetrative sexual abuse was reported by 6% of females in a systematic review, with 22% of females reporting non-penetrative sexual abuse in childhood (Moore et al., 2015). The current study measured contact abusive behaviors only, with the measure of sexual assault (4%) and attempted sexual assault (5%) being reported by a similar percentage of women to the percentage reporting penetrative sexual abuse in the systematic review. Overall, these results offer further population based evidence about the extent of child abuse that has been experienced by women in Australia.

As expected, women who experienced any adversity during childhood had higher primary, allied and specialist healthcare costs in adulthood, when compared with costs for women who did not experience adversity in childhood. This is not surprising, given the poorer general and mental health related quality of life also recorded for those with (as opposed to those with no) childhood adversities. These results are in keeping with the Blue Knot Foundation Report (Kezelman, Hossack, Stavropoulos, & Burley, 2015), that estimated the burden of disease attributable to child abuse and neglect as 7.7 billion AUD (in 2007) and health system costs for 2007 of between 91 million and 1.3 billion AUD for 2007. However, the current results offer further insight into the precise differences in costs for primary, allied and specialist services between those who do and do not have childhood histories of adversity across the first 20 years of adulthood.

Healthcare costs increased overtime and as women aged, from 18-23 years at the start of the study period, to 37-42 years in 2015. For primary and specialist care, women who did not experience childhood adversity had lower healthcare costs than those who did. This was not as apparent for allied health, where a distinction between groups was not clear until after 2008. In December 2006, the Australian Government introduced the Better Access to Mental Health initiative, which provides subsidised allied health services to those needing psychological healthcare. It is likely that this policy change led to increasing use and therefore increased costs of services as the scheme was taken up. Differences between those who had and had not experienced adversity ranged from \$26 to \$126 per person in that year. To access the Better Access to Mental Health initiative or specialists, patients need to have a referral from their general practitioner. The increasing separation in healthcare costs between those with and without adversity may in part be due to women seeking referrals under the Better Access to Mental Health initiative.

It is likely that, as women age, the impact of adverse health behaviour starts to manifest in chronic health problems that would also be reflected in increased healthcare costs. Other research has demonstrated the links between adversity in childhood and smoking (Edwards et al., 2007), alcohol abuse (Strine et al., 2012), substance abuse (Choi et al., 2017; Dube et al., 2003), and obesity (Williamson et al., 2002), all of which are related to chronic disease and poorer health-related quality of life. There is an urgent need to identify the factors that might help those who have grown up with adversity to avoid or reduce poor health behaviors.

With regard to allied health practitioners, those who experienced abuse had the highest allied healthcare costs, compared with other adversities. This possibly reflects a higher need for psychology services among these groups. Although the results show increased costs, this likely reflects the success of the Better Access to Mental Health initiative in meeting the needs of women who have experienced childhood adversity. Further research is needed to determine the efficacy of the initiative in improving mental health-related quality of life for women who have experienced childhood adversity.

The current study has demonstrated that all forms of childhood adversity, including household dysfunction, witnessing IPV, and child abuse involve higher healthcare costs than the absence of such adversities among a broadly representative sample of Australian adult women over the first 20 years of adult life. The strengths of the study include the size of the sample, use of administrative (Medicare) data, and use of a well validated self-report tool to measure adversity in childhood (Felitti et al., 1998). Despite these strengths, the current analysis was the baseline analysis for this work and as such, has not adjusted for potentially confounding variables. The sample represents women born 1973-78 only and is over-representative of women from English speaking backgrounds and of women with a tertiary education, as is often the case with survey-based studies. Nevertheless, the results are powerful evidence of the far reaching implications of childhood adversity. Future research will be conducted to tease out the complex associations between different types of abuse, and the efficacy of service use in improving the quality of life of those who have experienced adversity in childhood.

We recommend sufficient funding for early health and health behavior interventions for those who have experienced adversity in childhood, comprehensive training for primary healthcare workers in identifying and assessing the needs of those who have experienced adversity in childhood, and increased recognition of the very long term impact of adversity in childhood at the population level. The healthcare costs associated with adversity in childhood fully justify a comprehensive policy and practice review. Table 1: The percentage (number) of the ALSWH 1973-78 cohort who reported experiencing

ACEs

	N =	N = 6222	
	Yes	No	
	% (n)	% (n)	
Psychological abuse	17.36 (1080)	82.64 (5142)	
Swear, insult, put down	14.29 (889)	85.71 (5333)	
Made afraid	11.17 (695)	88.83 (5527)	
Physical abuse	7.96 (495)	92.04 (5727)	
Push, grab, shove, slap	6.80 (423)	93.20 (5799)	
Injured by hitting	5.18 (322)	94.82 (5900)	
Sexual abuse	15.57 (969)	84.43 (5253)	
Touched/fondled	14.50 (902)	85.50 (5320)	
Forced to touch	7.34 (457)	92.66 (5765)	
Attempted sexual assault	4.79 (298)	95.21 (5924)	
Sexual assault	3.50 (218)	96.50 (6004)	
Household substance abuse	16.69 (1039)	83.30 (5183)	
Live with alcoholic	15.06 (937)	84.94 (5285)	
Live with illicit drug user	4.34 (270)	95.66 (5952)	
Household IPV	9.2% (572)	90.80 (5650)	
Parent pushed, grabbed etc	8.08 (503)	91.92 (5719)	
Parent hit, kicked, bitten	4.24 (264)	95.76 (5958)	
Hit repeatedly	2.93 (182)	97.07 (6040)	
Threatened with/hurt by a weapon	2.59 (182)	97.07 (6040)	
Household mental illness	16.96 (1055)	83.04 (5167)	
Household member mentally ill	16.10 (1002)	83.90 (5220)	
Household member attempt suicide	4.39 (273)	95.61 (5949)	
Household member incarcerated	1.72 (107)	98.28 (6115)	

Table 2: Demographics, health behavior, and health of the ALSWH 1973-78 cohort in 2015

(aged 37-42 years) by any experience of adversity in childhood

	No ACEs	Any ACEs
Domographics	70 (II)	70 (II)
Area of residence		
Area of resuence		
Major cities	58.98 (2112)	57.99 (1441)
Inner regional	26.84 (961)	27.12 (674)
Outer regional	12.01 (430)	12.35 (307)
Remote/very remote	2.19 (78)	1.77 (44)
Missing	(104)	(52)
Highest qualification		
Year 10 or less	4.34 (159)	6.30 (159)
Year 12 or equivalent	9.61 (352)	10.02 (253)
Vocational/Certificate/Diploma	24.84 (910)	31.05 (748)
University degree or higher	61.21 (2242)	52.63 (1329)
Missing	(22)	(12)
Ability to manage on available income		
Difficult / impossible	10.16 (373)	19.90 (504)
Not too bad / easy	89.84 (3297)	80.10 (2029)
Missing	(15)	(4)
Relationship status		
Partnered	82.96 (3043)	75.37 (1909)
Not partnered	17.04 (625)	24.63 (624)
Missing	(17)	(4)
Health behaviors		
Smoking status		
Never smoked	68.49 (2517)	52.98 (1341)
Ex-smoker	24.05 (884)	32.95 (834)
Current smoker	7.46 (274)	14.07 (356)
Missing	(10)	(6)
Alcohol consumption	(10)	(*)
Non-drinker/Rarely drinks	32.88 (1211)	37.08 (940)
Low risk drinker	61.06 (2249)	55.07 (1396)
Risky drinker/High risk drinker	6.05 (223)	7.85 (199)
Missing	(2)	(2)
Health status		
SF-36 General Health subscore (range 0-100)		
N	3671	2529
Mean	75.03	68.53
Median [Q1, Q3]	77 [67, 87]	72 [55, 82]
SF-36 Mental Health subscore (range 0-100)		
N	3680	2536
Mean	74.11	68.14
Median [O1, O3]	76 [68, 84]	72 [56, 80]

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