STOP THE COWARD PUNCH CAMPAIGN

RESEARCH PROGRAM 2023/24: Part 2

The economic cost of assault injuries for Coward Punch survivors in Australia

June 2024

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Ethics

This project was approved by the Victorian Institute of Forensic Medicine Research and Ethics Committees (RAC28/2019, RAC1300 and EC23/2019).

Research Team

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INTRODUCTION

Coward punch assaults (CPA) are violent and often unprovoked assaults involving a single, powerful punch to the head, usually without warning. These attacks can result in serious injuries that have enduring impacts on the lives of victims, offenders, their families and friends, and the wider community.

Our previous research examined the survivors of CPA between 1990 and 2020 around Australia using judicial sentencing reviews. We found significant physical, psychological and behavioural impairments, that were often irreversible and life-altering. This study aimed to estimate the economic healthcare costs associated with these CPA survivors, to better understand the financial burden to government and the wider community from these preventable acts of violence. While we identified 346 CPA survivors, the economic analysis focused on 241 individuals where the health outcomes were most comprehensively documented.

This report outlines a program of work examining the economic impact of assault injuries of 241 CPS survivors in Australia between 1990 and 2020. This included costs incurred in the first year after the initial CPA, as well as potential long-term healthcare costs such as for the treatment of initial injuries, rehabilitation and long-term care, in addition to societal costs such as productivity losses and carer costs. The majority (n=174) experienced *serious* injuries typically resulting in hospital admission, with the remaining 67 *non-serious* cases undergoing acute medical care without hospital admission[1]. The mean age of all survivors was only 30 years, with males comprising most victims (89%).

We have estimated the total societal costs for survivors of CPA over one year to be A$13,397,522, or a one-year average cost of A$55,591 per CPA survivor. When the lifetime costs for lost work productivity and carer time are added to the one-year costs, the total cost increases to A$38,098,256 or an average lifetime cost per survivor of A$158,084. This is almost double the equivalent cost for a stroke survivor in Australia, highlighting the considerable health care and societal costs associated with these preventable injuries.

[1] Butchart et al. Manual for estimating the economic costs of injuries due to interpersonal and self-directed violence. World Health Organisation and the Centres for disease control and prevention. 2008. URL: https://www.who.int/publications/i/item/9789241596367

METHODS FOR ESTIMATING HEALTHCARE AND SOCIETAL COSTS

An activity-based costing approach was employed to calculate the economic impact of assault injuries among the 241 cases of CPA survivors by considering the available range of costs incurred from the initial incident up to a year, as well as potential long-term costs. These costs included healthcare costs such as costs for the treatment of the initial injuries, rehabilitation and long-term care, as well as societal costs such as productivity losses and carer costs.

To ensure consistency, historical unit costs were adjusted using the health price index from Australian Institute of Health and Welfare (AIHW), accounting for inflation over time.[1] Future costs were discounted to their present value using a discount rate of 3%.[2] This method allowed for an accurate assessment of the net present value (NPV) of the economic impact of CPA injuries over the survivor's lifetime, with all costs presented in Australian dollars (A$) for the financial year 2020-21.

HEALTHCARE COSTS

Treatment costs

Healthcare costs include the costs associated with medical treatment administered to address injuries sustained during the assault. This incorporates ambulance callout and assistance, emergency department (ED) visits, diagnostic procedures, inpatient hospital stays, surgical interventions, intensive care unit (ICU) stays and medications.

To estimate the costs associated with ambulance and air ambulance services, national data from the Productivity Commission's report on government services were utilised.[3] The unit cost for both ambulance and air ambulance services was calculated by dividing the total national expenditure by the total number of incidents, amounting to A$1,076 per call out. This approach provided a standardised measure of costs across different regions and states. However, it is important to note that each Australian state has different ambulance costs.

Our data source did not capture all ED visits directly. To address this limitation, we implemented specific inclusion criteria to identify potential ED cases. These criteria were

based on the assumption that the use of ambulance services and diagnostic imaging typically preceded or coincided with ED visits in non-hospitalised patients. Therefore, survivors who met all three criteria were considered to have incurred an ED visit. To estimate the costs associated with ED visits, injury cases for survivors who visited the ED were classified using the Australian Emergency Care Classification (AECC) code.[4] Unit costs were applied based on the emergency care summary table provided by the National Hospital Cost Data Collection (NHCDC).[5] Each injury classified by its AECC was matched with the corresponding unit cost from the NHCDC table. The NHCDC summary provides comprehensive cost data, including average costs for different types of emergency care services.

The injuries and procedures performed on each survivor admitted to a hospital was categorised and assigned a code from the Australian Refined Diagnosis-Related Group (AR-DRG).[6] The NHCDC public sector cost weights for AR-DRG, which outlines the average cost per DRG of each cost bucket within the hospital, were used to calculate the total hospital admission costs.[5] The cost buckets consist of, but are not limited to, emergency department, ward, pathology and imaging, operating room, critical care, specialised services and pharmacy.

Rehabilitation

Expenses associated with physical therapy, occupational therapy, speech therapy and other inpatient or outpatient rehabilitation interventions are accounted for in healthcare costs as part of the recovery process following assault injuries. Rehabilitation costs were calculated based on the assumption that all rehabilitation activities occurred within one year following the assault injury.

Injuries were categorised as either brain or orthopaedic injuries. The inpatient rehabilitation costs were calculated with reference to data sourced from the Independent Hospital Pricing Authority (IHPA).[7] For each Australian National Subacute Non-Acute Patient (AN-SNAP) classification related to brain injury and orthopaedic injury, the associated cost weights were identified and were averaged to determine the price for each admitted rehabilitation episode. The average cost weights were then multiplied by the IHPA National Efficient Price per single cost weight (A$5,320) to obtain the cost for each admitted rehabilitation episode.[8] Hence, the derived unit cost for brain injury and orthopaedic injury inpatient rehabilitation were A$44,661 and A$17,256 respectively.

Each survivor that used outpatient rehabilitation services was assigned a cost derived from the weighted average costs for non-admitted rehabilitation services from the NHCDC.[5] These costs include various therapies such as occupational therapy, physiotherapy and pulmonary rehabilitation amounting to A$253 per separation.

Productivity losses

Productivity losses represent the income or earnings that the survivors forego due to their inability to work or their reduced work capacity during recovery periods. Inability to work or absenteeism was calculated based on number of weeks of missed work reported by the survivor multiplied by the average weekly wage rate of A$1,394 from the Australian Bureau of Statistics (ABS) plus 30% on-costs. cost.[9] It was assumed that all survivors who reported an impact on employment were working full-time.

Reduced work capacity or presenteeism was calculated to assess the economic impact of impaired productivity among survivors who returned to work following an assault injury. Specific data on the percentage of capacity worked by the survivors was not available. Therefore, the capacity worked was sourced from literature, specifically from a study by Silverberg (2017), which used the Lam Employment Absence and Productivity Scale – Productivity subscale (LEAPS-P) to assess productivity in patients returning to work after a major traumatic brain injury.[10,11] The study reported an average LEAPS-P score of 2.2 out of 12. To calculate the rate of loss in work capacity, the score of 2.2 was divided by 12, resulting in an 18% loss of capacity. This 18% loss capacity rate was then multiplied by the number of weeks worked with impairment by the survivors. The resulting figure was subsequently multiplied by the average weekly wage rate from ABS.[9]

Carer costs

Carer costs associated with providing care and support to survivors with assault injuries were also calculated. This may include hiring professional caregivers, admission to a residential care facility or compensating family members who take on caregiving responsibilities instead of being in the workforce. There are various methods to calculate the unit cost for family carers, including the replacement cost method.[12] However, in this study, we used the human capital approach, where the time lost by the carer is valued at the market wage rate. For residential nursing care, unit costs were determined using the average daily cost for permanent (A$334) and respite (A$357) residents by

Australian National Aged Care Classification (AN-ACC) category, sourced from the IHPA Residential Aged Care Costing Study Report.[13] Additionally, the cost of domestic care was sourced from the Department of Health Victoria as an average per hour rate of property maintenance under the Home and Community Care Program for Younger People.[14] These unit costs were then multiplied to the reported number of days in a week of caregiving reported and extrapolated to one year.

Long-term care costs

Long-term care costs incurred over the person's lifetime due to the lasting effects of assault injuries were also included. These include ongoing medical care, respite care and other support needed for managing disabilities or chronic pain resulting from injuries. However, due to the limitations of the data, only long-term absenteeism cost and carer costs for survivors with permanent disabilities were explored. Considering the loss of productivity, absenteeism costs were calculated by determining the difference between the average age people intend to retire in Australia (65 years) and the age of the survivor at the time of the incident.[15] For survivors with missing age the average age of 30 years was applied. This difference was then multiplied by the average wage rate and discounted at a rate of 3% if employment was halted permanently. For ongoing caregiving costs, carer costs were extrapolated up to the average life expectancy in Australia (83 years) and discounted to a present value for the reference year of 2020-2021.[16]

RESULTS

The study included 241 CPA survivors, classified into 174 with *serious* injuries and 67 with *non- serious* injuries. *Serious* injuries were defined as nonfatal injuries resulting in hospital admission, while *non-serious* injuries were nonfatal injuries requiring acute medical care but no hospital admission. The mean age of all survivors was 30 years, with *serious* and *non-serious* injury groups having mean ages of 30 and 31 years, respectively. Female participants comprised 11% of the total sample, with a distribution of 9% in the *serious* injury group and 16% in the *non-serious* injury group (Table 1).

Injury mechanisms were categorised into two types. Type 1 injuries (40.83% of cases) involved a punch delivered to the head causing a fall to the ground and altered sensorium or neurologic changes. Type 2 injuries (59.17% of cases) involved a punch followed by a fall to the ground and additional blow(s) to the head, face or neck.

Before the incident, full-time employment was reported by 4.15% of participants (4.6% *serious*, 2.99% *non-serious*). Employment impacts included temporary impairment (2.9%), permanent impairment (4.98%), temporarily halted (15.35%) and permanently halted (3.32%). The *serious* injury group experienced more significant employment impacts compared to the *non-serious* injury group.

Table 1. Survivor characteristics (Frequency and (%))

	All participants (N=241)	***Serious* (N=174)**	***Non-serious* (N=67)**
Age, years, mean (SE)	30 (1.36)	30 (1.37)	31 (4.92)
Sex, Female	27 (11.20)	16 (9.20)	11 (16.42)
Mechanism of Injury			
- **Type 1**	98 (40.83)	75 (43.10)	23 (34.33)
- **Type 2**	142 (59.17)	98 (56.32)	44 (65.67)
Employment (Prior)			
- **Full-time**	10 (4.15)	8 (4.60)	2 (2.99)
- **Part-time**	1 (0.41)	1 (0.57)	0
- **Casual**	2 (0.83)	2 (1.15)	0
- **Self-employed**	3 (1.24)	3 (1.72)	0

• **Unemployed**	1 (0.41)	1 (0.57)	0
Impact on employment			
• **Impaired (temporary)**	7 (2.90)	7 (4.02)	0
• **Impaired (permanent)**	12 (4.98)	11 (6.32)	1 (1.49)
• **Halted (temporary)**	37 (15.35)	32 (18.39)	5 (7.46)
• **Halted (permanent)**	8 (3.32)	8 (4.60)	0
Relation to perpetrator			
• **Familial/ Romantic**	22 (9.13)	14 (8.05)	8 (11.94)
• **Known**	46 (19.09)	39 (22.41)	7 (10.45)
• **Unknown**	173(71.78)	121 (69.54)	52 (77.61)
Incident location			
• **Public**	197(81.74)	145 (83.33)	52 (77.61)
• **Private**	42 (17.43)	28 (16.09)	14 (20.90)

The results shown in Table 2 highlight the significant differences in healthcare utilisation between *serious* and *non-serious* injury cases, emphasising the extensive medical and supportive care needs associated with *serious* injuries.

Table 2. Number of survivors with healthcare utilisation by cost category and severity of injury

	All participants (N=241)	***Serious* (N=174)**	***Non-serious* (N=67)**
Items	**N (%)**	**N (%)**	**N (%)**
Ambulance*	78 (32.37)	68 (39.08)	10 (14.93)
Emergency Department visits	20 (8.30)	1 (0.57)	19 (28.36)
Hospital admissions*	175 (72.61)	169 (97.13)	6 (8.96)
ICU admissions*	18 (7.47)	18 (10.34)	0
Diagnostics (Imaging)*	239 (99.17)	174 (100)	65 (97.01)
Surgery*	120 (49.79)	117 (67.24)	3 (4.48)
Dental procedure*	13 (5.39)	13 (7.47)	0
Inpatient Rehabilitation	18 (7.47)	18 (10.34)	0

Outpatient Rehabilitation	4 (1.66)	4 (2.30)	0
Medication	33 (13.69)	29 (16.67)	4 (5.97)
Care accessed (Outpatient)			
• **Mental Health**	18 (7.47)	13 (7.47)	5 (7.46)
• **GP**	8 (3.32)	4 (2.30)	4 (5.97)
• **Specialists**	5 (2.07)	5 (2.87)	0
• **Allied health**	6 (2.49)	4 (2.30)	2 (2.99)
• **Carer***	9 (3.73)	9 (5.17)	0

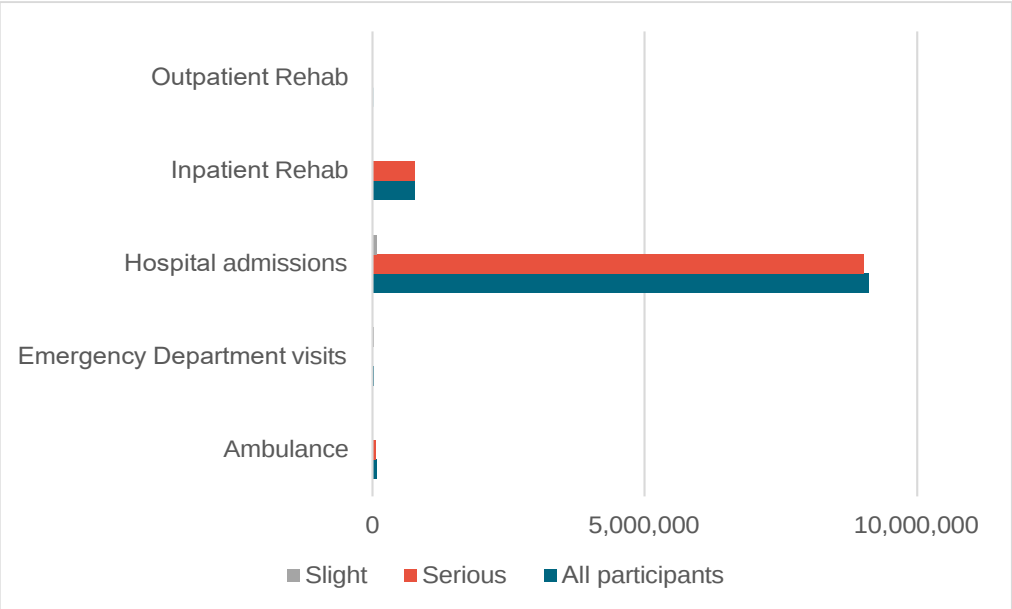
Note: data on ED visits for hospitalised participants were assumed to be included in the hospitalisation.

*Significant difference between severity of injury using chi2

Healthcare costs

The total healthcare costs for the 241 survivors over one-year post-incident amounted to A$9,998,845. These costs were significantly higher for those with *serious* injuries (A$9,879,521) compared to *non-serious* injuries (A$119,324).

Figure 1. Total healthcare costs for one year post incident, by cost category and severity of injury

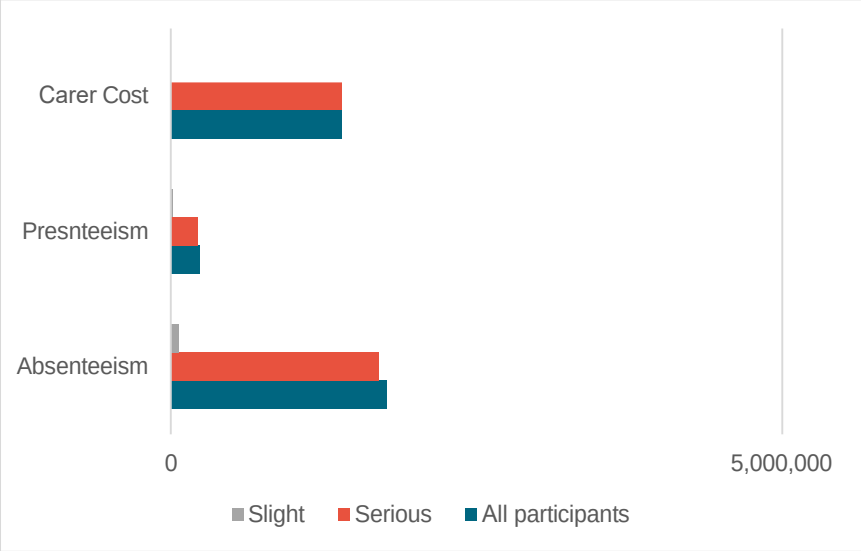


- Ambulance services: Total costs of A$85,881, with A$74,871 for *serious* injuries and A$11,010 for *non-serious* injuries.
- Emergency Department visits: Total cost of A$21,880, predominantly from *non-serious* injuries ($20,399) compared to *serious* injuries (A$1,481).
- Hospital admissions: Total cost of A$9,113,577, with *serious* injuries accounting for A$9,025,662 and *non-serious* injuries A$87,915.
- Inpatient rehabilitation: Total cost of A$776,493, all attributed to *serious* injuries.
- Outpatient rehabilitation: Total cost of A$1,014, all attributed to *serious* injuries.

Societal costs

The total societal costs, including health care costs, productivity losses and carer costs, amounted to A$13,397,522, with *serious* injuries at $13,195,991 and *non-serious* injuries at A$201,531.

Figure 2. Total societal costs for one year post incident, by cost category and severity of injury



- Absenteeism: Total cost of A$1,765,209, with *serious* injuries at $1,699,965 and *non- serious* injuries at A$65,244.
- Presenteeism: Total cost of A$234,878, with *serious* injuries at $217,915 and *non- serious* injuries at A$16,963.
- Carer costs: Total cost of A$1,398,590, all attributed to *serious* injuries.

Carer Type	N	Total Cost
Family	**4**	**$376,965**
Residential nursing care	**8**	**$1,012,714**
Domestic care	**1**	**$8,911**

Long-term costs

Long-term costs were primarily related to productivity losses and carer costs, with a total of

$9,352,338 for absenteeism and A$15,348,396 for carer costs.

In summary, the societal cost for survivors of CPA over one year is estimated at a total of A$13,397,522. The estimated average cost per survivor is A$55,591.

Including the long-term costs for CPA survivors results in a total societal cost of $38,098,256. The estimated average cost per survivor is A$158,084.

Cost by jurisdiction

By extrapolating the costs per CPA survivor in the first year after the assault, as well as potential lifetime costs, we estimated the costs by jurisdiction for the full 346 survivors documented in our previous study. Given the highest proportion of CPA survivors resided in New South Wales, this state had the highest costs incurred for CPA survivors between 1990 and 2020, estimated to be

$16,282,652. This was followed by Western Australia and Queensland.

Figure 3. Total healthcare and societal costs for CPA survivors by state (n=346)

Note: In two cases, the jurisdiction was not specified.

DISCUSSION

To the best of our knowledge this is the first analysis to quantify the cost of CPA in Australia and internationally. We have estimated the total societal costs for survivors of CPA over one year at A$13,397,522 or a one-year average cost of A$55,591 per CPA survivor. When the lifetime costs for lost work productivity and carer time are added to the one-year costs, the total cost increases to A$38,098,256 or an average lifetime cost per survivor of A$158,084. These estimates highlight the considerable health care and productivity costs associated with these preventable injuries.

Comparing these values to other prevalent health conditions may assist in putting these costs in context. The estimated average societal cost for a person experiencing a stroke during the first 12 months was A$34,562 and over a life time was A$81,005.[17] Both these costs are presented as 2020 Australian dollars, converted from 1997 Australian dollars using a cost converter.[18] The estimated societal cost attributed to chronic obstructive pulmonary disease (COPD) was estimated at A$9,200 per person with COPD per year.[19] Both the stroke and COPD costs are somewhat lower than our estimates for CPA survivors, potentially due to the greater impacts on work productivity for the CPA survivors. The CPA survivors have an average age of 30, while the population experiencing stroke had an average age of 73 and would be retired. For COPD, an estimated 62% of the population affected are aged over 60. Chronic pain is a condition noted as a leading cause of disease burden, with total societal costs in Australia estimated to be A$22,588 per person with chronic pain in 2018.[20] It is important to note that making direct comparisons of cost-of-illness estimates from different studies should be done cautiously due to the different methods and cost categories included.

While this analysis has provided a conservative estimate of the health care and societal costs associated with CPA in Australia, this analysis is also subject to limitations. The main limitation is the data utilised for the calculation of costs. Since the data was extracted from narrative legal records, there was a lack of consistency in reporting healthcare use, work productivity impacts and carer time. This required a number of assumptions to be made to facilitate cost estimates. We were also unable to estimate all long-term costs of medications, medical visits, diagnostics and other health care expenditures due to the limited data available. This therefore is an underrepresentation of the total long-term healthcare costs for CPA survivors. Future work to collect this type

of data through a survey of CPA survivors or a method to standardise reporting in legal records would greatly improve the cost estimates.

It is also important to note that this economic analysis did not include the costs of premature mortality from a CPA, or judicial costs associated with criminal or civil proceedings in the prosecution of a CPA perpetrator. These figures are likely to substantially inflate the overall costs of CPA in Australia.

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SUPPLEMENTARY MATERIALS

Table S1. Total costs for one year post incident, by cost category and severity of injury

Item	All participants (N=241)	*Serious* (N=174)	*Non-serious* (N=67)
Ambulance	$85,881	$74,871	$11,010
Emergency Department visits	$21,880	$1,481	$20,399
Hospital admissions	$9,113,577	$9,025,662	$87,915
Inpatient Rehab	$776,493	$776,493	$0
Outpatient Rehab	$1,014	$1,014	$0
Total Health sector cost	**$9,998,845**	**$9,879,521**	**$119,324**
Absenteeism	$1,765,209	$1,699,965	$65,244
Presenteeism	$234,878	$217,915	$16,963
Carer Cost	$1,398,590	$1,398,590	$0
Total Societal cost	**$13,397,522**	**$13,195,991**	**$201,531**

Note: Total societal cost includes health sector costs, productivity loss (absenteeism and presenteeism) and carer cost.

Table S2. Total first year and lifetime costs (healthcare and societal) of CPA survivors by state of all 346 documented survivors

Jurisdiction	N	First year costs	Lifetime costs
Australian Capital Territory	30	$1,667,730	$4,742,520
New South Wales	103	$5,725,873	$16,282,652
Northern Territory	17	$945,047	$2,687,428
Queensland	55	$3,057,505	$8,694,620
South Australia	28	$1,556,548	$4,426,352
Tasmania	7	$389,137	$1,106,588
Victoria	47	$2,612,777	$7,429,948
Western Australia	57	$3,168,687	$9,010,788
*All Australia**	*46*	*$19,234,486*	*$54,697,064*

*Note: In two cases, the jurisdiction was not specified.