

The effect of child abuse on long term health and wellbeing: evidence from Australia

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Background

- In 2010 CHERE participated in an economic evaluation of **Brighter Futures**, an intervention program for vulnerable families with children at risk of abuse and/or neglect.
- In addition to estimating the cost effectiveness of the program in the short run, we sought to undertake a **cost-benefit analysis**, including the **long term benefits (costs avoided) of preventing child abuse**.
- We found existing relevant, quantifiable evidence on the impact of early intervention programs on education, crime and justice and labour force outcomes.
- However, we found limited Australian evidence of the **long run health impacts and costs of child abuse**

Aims

To directly estimate the long run health impact of child abuse using Australian unit record data:

- Initially, to estimate the total adult health care cost of physical childhood abuse, as an input into our cost benefit analysis of the Brighter Futures program.

Evolved into our current paper:

1. To compare the **effects of different types of abuse on long term health and health care costs.**
2. To extend the analysis to indicators of self harm, including **drug and alcohol problems and suicide attempts.**

Data

National Survey of Mental Health and Wellbeing (2007)

- Expanded confidentialised unit record file, remote accessed via the Australian Bureau of Statistics.
- National sample of **8841 Australians aged from 16 to 85**.
- Questions on **physical and sexual abuse**, including **age first abused**
- Questions on **health care utilisation – used to derive costs**
- Weighted using p-weights and replicate weights to enable population estimates and correct standard errors to be calculated (accounting for the probability of selection and sampling design).

Methods: *Long term health conditions and costs*

- Similar to Tang et al (2006)* we estimate four models:
 1. Negative binomial regression of the **number of current physical health conditions** on childhood abuse (physical only, sexual only or combined physical and sexual abuse)
 2. Negative binomial regression of the **number of current mental health conditions** on childhood abuse
 3. OLS regression of the **square root of total health care costs in last 12 months** on childhood abuse
 4. Include the **number of physical and mental health conditions** as explanatory variables **in the health care cost equation.**

* Tang et al (2006) *The influence of child abuse on the pattern of expenditures in Women's adult health service utilization in Ontario, Canada, Social Science and Medicine* 63

Descriptive statistics: *all persons aged 16 to 85*

| Type of childhood abuse | Mean number of physical conditions | Mean number of mental conditions | Mean total annual health care costs |
|-------------------------|------------------------------------|----------------------------------|-------------------------------------|
| Not abused | 1.5 | 0.3 | \$368 |
| Physical only (5.9%) | 2.1 | 0.6 | \$517 |
| Sexual only (7.2%) | 2.4 | 0.8 | \$811 |
| Combined (2.4%) | 2.8 | 1.8 | \$2,224 |

| Type of childhood abuse | Attempted suicide | Alcohol abuse/harmful use | Alcohol dependence | Drug abuse/harmful use | Drug dependence |
|-------------------------|-------------------|---------------------------|--------------------|------------------------|-----------------|
| Not abused | 2% | 20% | 3% | 6% | 2% |
| Physical only | 7% | 40% | 10% | 17% | 8% |
| Sexual only | 9% | 27% | 6% | 10% | 4% |
| Combined | 33% | 42% | 19% | 26% | 12% |

Results: *health conditions*

Negative binomial regression models of number of physical and mental health conditions

| Variable | Model 1: physical health conditions | | Model 2: mental health conditions | |
|---------------------|-------------------------------------|---------|-----------------------------------|---------|
| | I.R.R. (s.e.) | p-value | I.R.R. (s.e.) | p-value |
| Physical abuse only | 1.41 (0.09) | 0.000 | 1.49 (0.20) | 0.004 |
| Sexual abuse only | 1.44 (0.09) | 0.000 | 2.12 (0.23) | 0.000 |
| Combined abuse | 1.75 (0.18) | 0.000 | 3.04 (0.48) | 0.000 |

Control variables: age, sex, marital status, remoteness, social support, SES, witness to domestic violence as a child, parents' physical and mental health and AoD problems.

Results: *health care costs*

OLS regressions of the square root of total health care costs in the last 12 months

| | Model 3: Sqrt health costs (without health conditions) | | Model 4: Sqrt health costs (with health conditions) | |
|-----------------------|---|---------|--|---------|
| Variable | | p-value | | p-value |
| Physical abuse only | 1.74 (0.80) | 0.033 | 0.13 (0.72) | 0.860 |
| Sexual abuse only | 4.84 (1.06) | 0.000 | 2.13 (0.95) | 0.028 |
| Combined abuse | 15.32 (3.36) | 0.000 | 8.97 (2.68) | 0.001 |
| # physical conditions | | | 1.58 (0.13) | 0.000 |
| # mental conditions | | | 4.13 (0.54) | 0.000 |

Control variables included as previously.

- The effect of physical abuse on health costs is completely mediated by physical and mental health conditions
- Approximately half of the effect of sexual abuse and combined abuse on health care costs occurs through the number of physical and mental health conditions

Adding age interactions:

Physical or mental health conditions:

- Abuse variables*current age (continuous and dummy): not significant – suggests **persistent effects over lifetime**
- **Combined abuse commencing at ages 12 to 17**: more than doubles the number of mental health conditions relative to those abused at younger ages (IRR=5 vs IRR=2)

Health care costs:

- Abuse variables*current age: **combined abuse and aged>44** is significant ($p=0.023$) and negative in model 3, **reducing the effect of combined abuse on health costs by 75%**

Residual correlations?

Dependent variables in models 1 and 2 (physical and mental conditions) are explanatory variables in model 4 (health costs)

- This relationship is assumed to be recursive, i.e. the direction of causation is one way (current health conditions cause current health care costs).
- However, the **residuals may be correlated** due to capturing the same **unobserved effects**.
- Tested using Roodman's (2009) Conditional Mixed Processes (CMP) command, which allows simultaneous multi-equation estimation of recursive models which have a uni-directional causal relationship.
- **Correlations between the residuals were statistically insignificant.**

Is the relationship between childhood abuse and current health conditions spurious?

To control for childhood circumstances which may affect both abuse and health, our models include proxies for childhood circumstances:

- witness to domestic violence as a child
- whether parents have any chronic conditions
- whether parents have alcohol or drug problems
- whether parents have other mental health problems

What about unobserved heterogeneity?

- Cross sectional data so can't use panel techniques
- We use a finite mixture model to test whether there are different coefficients for two latent classes of people in our models:
 - 35.5% of people have a mean of 1.11 physical conditions.
64.5% have a mean of 2.14 physical conditions.
 - Both classes have an increase in conditions due to sexual or combined abuse. For the 'better health' class, physical abuse does not have a significant impact on current physical health ($p=0.116$).
 - 92.5% of people have a mean of 0.23 mental health conditions.
7.5% have a mean of 2.19 mental health conditions.
 - For the larger 'mentally healthier' group, all types of childhood abuse significantly impact on the number of mental health conditions. For the 'unhealthy' group, physical abuse is not statistically significant.

Endogeneity bias?

Endogeneity of abuse and health?

- Sensitivity analysis: removing people first abused at age 0-5 (the age at which US evidence suggests abuse of the disabled commences) does not impact on the coefficients of abuse

Endogeneity of other explanatory variables (income, education, occupation, social support)?

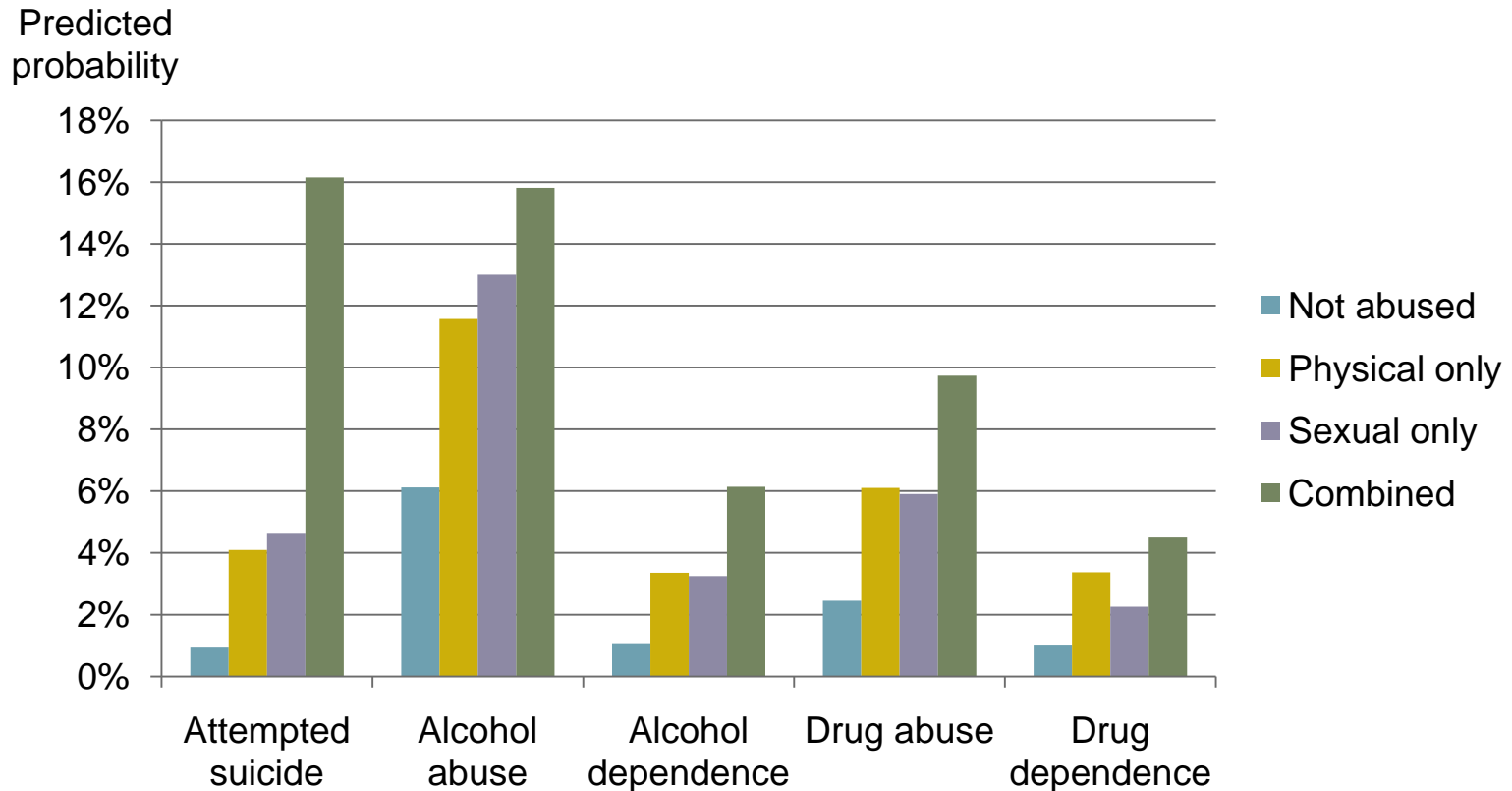
- Sensitivity analysis removing these variables, does not impact on the coefficients of abuse

Methods for extended analysis: *self harm*

Probit models of the relationship between childhood abuse and self harm:

- Ever attempted suicide
- Alcohol abuse/harmful use
- Alcohol dependence
- Drug abuse/harmful use
- Drug dependence

Results of extended analysis: *self harm*



Other characteristics set to median values: age cohort 30to44, married, female, lives in a major city, median equiv. income quintile, has a diploma or certificate, occupation clerical/admin or sales, has social support, did not witness domestic violence as a child, parents do not have physical or mental health or drug and alcohol problems

Conclusions and implications

The evidence suggests that interventions to prevent child abuse in Australia will have **long run benefits** for health and wellbeing and external effects including:

- Reduced costs to health system (indirect via conditions and direct)
- Reduced social costs (suicide and substance misuse)

The magnitude of the effects of childhood abuse **vary by the type of abuse**

- Ignoring this will bias cost-benefit estimates
- Combined abuse has the largest effect on all health and wellbeing indicators

Thank you !

| | Original specification | | Drop SES variables | | Drop support variable | | Exclude if income is missing | | Exclude if abused at ages 0 to 5 | | Restrict to people aged 20 and over | |
|----------------|------------------------|----------------|--------------------|----------------|-----------------------|----------------|------------------------------|----------------|----------------------------------|----------------|-------------------------------------|----------------|
| Model 1 | IRR | <i>p</i> value | IRR | <i>p</i> value | IRR | <i>p</i> value | IRR | <i>p</i> value | IRR | <i>p</i> value | IRR | <i>p</i> value |
| Physical abuse | 1.41 | 0.000 | 1.42 | 0.000 | 1.43 | 0.000 | 1.38 | 0.000 | 1.44 | 0.000 | 1.39 | 0.000 |
| Sexual abuse | 1.44 | 0.000 | 1.46 | 0.000 | 1.45 | 0.000 | 1.44 | 0.000 | 1.48 | 0.000 | 1.43 | 0.000 |
| Combined | 1.75 | 0.000 | 1.80 | 0.000 | 1.82 | 0.000 | 1.79 | 0.000 | 1.60 | 0.001 | 1.75 | 0.000 |
| Model 2 | IRR | <i>p</i> value | IRR | <i>p</i> value | IRR | <i>p</i> value | IRR | <i>p</i> value | IRR | <i>p</i> value | IRR | <i>p</i> value |
| Physical abuse | 1.49 | 0.004 | 1.52 | 0.002 | 1.643 | 0.003 | 1.58 | 0.002 | 1.61 | 0.002 | 1.45 | 0.010 |
| Sexual abuse | 2.12 | 0.000 | 2.13 | 0.000 | 2.178 | 0.000 | 2.13 | 0.000 | 2.16 | 0.000 | 2.06 | 0.000 |
| Combined | 3.04 | 0.000 | 3.19 | 0.000 | 3.118 | 0.000 | 2.92 | 0.000 | 3.28 | 0.000 | 2.74 | 0.000 |
| Model 3 | Coef. | <i>p</i> value | Coef. | <i>p</i> value | Coef. | <i>p</i> value | Coef. | <i>p</i> value | Coef. | <i>p</i> value | Coef. | <i>p</i> value |
| Physical abuse | 1.74 | 0.033 | 1.80 | 0.027 | 2.01 | 0.014 | 1.89 | 0.036 | 2.50 | 0.003 | 1.57 | 0.079 |
| Sexual abuse | 4.84 | 0.000 | 5.00 | 0.000 | 4.88 | 0.000 | 5.37 | 0.000 | 4.59 | 0.000 | 4.85 | 0.000 |
| Combined | 15.32 | 0.000 | 15.74 | 0.000 | 15.96 | 0.000 | 13.86 | 0.000 | 14.31 | 0.002 | 15.18 | 0.000 |
| Model 4 | Coef. | <i>p</i> value | Coef. | <i>p</i> value | Coef. | <i>p</i> value | Coef. | <i>p</i> value | Coef. | <i>p</i> value | Coef. | <i>p</i> value |
| Physical abuse | 0.13 | 0.860 | 0.12 | 0.863 | 0.24 | 0.729 | 0.17 | 0.831 | 0.71 | 0.363 | 0.01 | 0.994 |
| Sexual abuse | 2.13 | 0.028 | 2.19 | 0.025 | 2.12 | 0.029 | 2.66 | 0.013 | 1.85 | 0.057 | 2.15 | 0.032 |
| Combined | 8.97 | 0.001 | 9.09 | 0.001 | 9.21 | 0.001 | 7.76 | 0.006 | 7.33 | 0.029 | 9.17 | 0.002 |

Model 1: number of physical conditions: Two class model

Note that IRRs can be calculated by taking the exponent of the coefficients

| component1 | Coefficient | SE | P value | component2 | Coefficient | SE | P value |
|-------------------|-------------|-------|---------|-------------------|-------------|-------|---------|
| PHYSICAL ABUSE | 0.232 | 0.148 | 0.116 | PHYSICAL ABUSE | 0.303 | 0.058 | 0.000 |
| SEXUAL ABUSE | 0.451 | 0.120 | 0.000 | SEXUAL ABUSE | 0.263 | 0.047 | 0.000 |
| COMBINED | 0.806 | 0.162 | 0.000 | COMBINED | 0.451 | 0.077 | 0.000 |
| AGE30to44 | 0.191 | 0.177 | 0.279 | AGE30to44 | 0.451 | 0.047 | 0.000 |
| AGE45to59 | 0.939 | 0.159 | 0.000 | AGE45to59 | 0.808 | 0.046 | 0.000 |
| AGE60to74 | 1.994 | 0.200 | 0.000 | AGE60to74 | 0.864 | 0.065 | 0.000 |
| AGE75to85 | 2.020 | 0.181 | 0.000 | AGE75to85 | 1.017 | 0.063 | 0.000 |
| REG_MARRIED | 0.164 | 0.081 | 0.043 | REG_MARRIED | -0.059 | 0.032 | 0.065 |
| FEMALE | 0.059 | 0.080 | 0.457 | FEMALE | 0.187 | 0.032 | 0.000 |
| QUINTILE | 0.008 | 0.032 | 0.806 | QUINTILE | -0.052 | 0.013 | 0.000 |
| EDUCATION | -0.118 | 0.077 | 0.124 | EDUCATION | 0.008 | 0.032 | 0.802 |
| OCCUPATION | -0.021 | 0.031 | 0.488 | OCCUPATION | -0.040 | 0.011 | 0.000 |
| INCOME_MISSING | -0.448 | 0.133 | 0.001 | INCOME_MISSING | 0.003 | 0.042 | 0.952 |
| SUPPORT | 0.560 | 0.364 | 0.124 | SUPPORT | -0.289 | 0.096 | 0.003 |
| SECTION of STATE | -0.054 | 0.051 | 0.283 | SECTION of STATE | 0.026 | 0.020 | 0.208 |
| WITNESSED FIGHTS | 0.126 | 0.118 | 0.288 | WITNESSED FIGHTS | 0.062 | 0.047 | 0.187 |
| PARENT CHRONIC | 0.004 | 0.089 | 0.968 | PARENT CHRONIC | 0.119 | 0.032 | 0.000 |
| PAERENT AoD or MH | 0.432 | 0.123 | 0.000 | PAERENT AoD or MH | 0.172 | 0.041 | 0.000 |
| _constant | -1.212 | 0.508 | 0.017 | _constant | 0.410 | 0.168 | 0.015 |

Model 2: number of mental health conditions: Two class model

Note that IRRs can be calculated by taking the exponent of the coefficients

| component1 | Coefficient | SE | P value | component2 | Coefficient | SE | P value |
|------------------|-------------|-------|---------|------------------|-------------|-------|---------|
| PHYSICAL ABUSE | 0.815 | 0.138 | 0.000 | PHYSICAL ABUSE | 0.166 | 0.187 | 0.374 |
| SEXUAL ABUSE | 0.947 | 0.105 | 0.000 | SEXUAL ABUSE | 0.509 | 0.111 | 0.000 |
| COMBINED | 1.393 | 0.152 | 0.000 | COMBINED | 0.725 | 0.152 | 0.000 |
| AGE30to44 | 0.083 | 0.095 | 0.385 | AGE30to44 | 0.146 | 0.105 | 0.164 |
| AGE45to59 | -0.140 | 0.110 | 0.202 | AGE45to59 | 0.225 | 0.104 | 0.031 |
| AGE60to74 | -1.164 | 0.166 | 0.000 | AGE60to74 | -0.307 | 0.132 | 0.020 |
| AGE75to85 | -2.215 | 0.396 | 0.000 | AGE75to85 | -0.833 | 0.195 | 0.000 |
| REG_MARRIED | -0.809 | 0.094 | 0.000 | REG_MARRIED | -0.454 | 0.079 | 0.000 |
| FEMALE | 0.131 | 0.083 | 0.113 | FEMALE | 0.071 | 0.078 | 0.359 |
| QUINTILE | -0.097 | 0.033 | 0.004 | QUINTILE | -0.056 | 0.030 | 0.068 |
| EDUCATION | -0.074 | 0.077 | 0.342 | EDUCATION | 0.013 | 0.074 | 0.864 |
| OCCUPATION | -0.044 | 0.029 | 0.133 | OCCUPATION | -0.064 | 0.027 | 0.017 |
| INCOME_MISSING | -0.140 | 0.119 | 0.242 | INCOME_MISSING | 0.161 | 0.105 | 0.127 |
| SUPPORT | -0.708 | 0.293 | 0.016 | SUPPORT | -0.561 | 0.171 | 0.001 |
| SECTION of STATE | 0.052 | 0.053 | 0.333 | SECTION of STATE | -0.030 | 0.053 | 0.570 |
| WITNESSED FIGHTS | 0.395 | 0.110 | 0.000 | WITNESSED FIGHTS | 0.115 | 0.109 | 0.292 |
| PARENT CHRONIC | 0.072 | 0.082 | 0.383 | PARENT CHRONIC | -0.089 | 0.085 | 0.299 |
| PARENT_AoD | 0.050 | 0.140 | 0.724 | PARENT_AoD | 0.205 | 0.139 | 0.140 |
| PARENT MENTAL H | 0.930 | 0.091 | 0.000 | PARENT MENTAL H | 0.180 | 0.129 | 0.161 |
| _constant | -0.322 | 0.462 | 0.486 | _constant | 1.660 | 0.341 | 0.000 |