COST OF ADVERSE CHILDHOOD EXPERIENCES (ACES) – A SYSTEMATIC REVIEW

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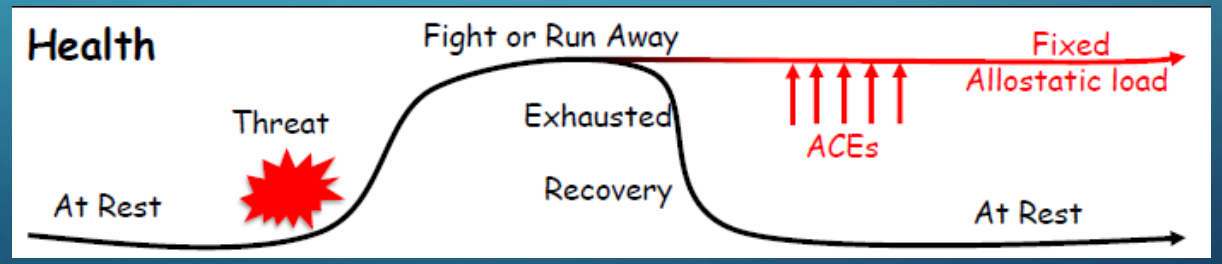
INTRODUCTION

- Adverse Childhood Experiences (ACEs) are prevalent in our society.
- They are defined by ten distinct experiences that can occur in childhood:
  - Physical abuse
  - Emotional abuse
  - Sexual abuse
  - Emotional neglect
  - Physical neglect
  - Parental separation
  - Incarceration
  - Drugs/alcohol misuse
  - Poor mental health of parent
  - Mother treated violently

INTRODUCTION – CONTD.

- ACEs affect the life course health of individuals both in a direct and indirect way
- Stress can lead to the body entering 'fight, flight or freeze' mode
- Repeated exposure to toxic stress causes the body to produce too much cortisol and enter a state of 'fixed allostatic load'



INTRODUCTION – CONTD.

- There is an association between ACEs and many types of diseases.
- The top five physical diseases, in terms of number of deaths, were identified as:
    - Cancer
    - Respiratory disease
    - Heart disease
    - Stroke
    - Liver disease
- In addition and in the interest of looking at mental as well as physical health the two categories of mental health and dementia will be added

QUESTIONS

- The questions asked in this systematic review are as follows:
- What are the lifetime costs associated with diseases that are partly caused by ACEs?
- Where do these costs fall (i.e. NHS, society)
- What is the proportion of costs that are direct (i.e. healthcare costs) and indirect (i.e. productivity losses)
- Can we take costs from international sources and extrapolate them to the UK?
- Can we take costs from one type of e.g. cancer and extrapolate them to other types to get the total cost of a particular disease?

AIM

- This aim of this systematic review is twofold:
- First it looks at odds ratios of the seven disease types that link ACEs with these diseases. We then calculate the likelihood of how much of a particular disease is caused by certain ACEs.
- Second it attempts to gather the evidence base for the cost of illness of the five main diseases (plus mental health and dementia) in the UK that can be said to be partly caused by ACEs.
- The aim then is to calculate, using population attributable fractions (PAFs) the element of the costs of illnesses that are attributable to ACEs.

METHODS

- Campbell and Cochrane Economic Methods Group (Shemilt et al 2008) design, methods and processes has been followed.

- Systematic review split into two streams of evidence:
  - Odds ratios/relative risk ratios for diseases partly caused by ACE
  - Cost of illness studies for each of the diseases

METHODS – CONTD.

- Inclusion criteria:
- Stream 1: any study that discusses the relative risk/odds ratios of how ACEs can partly cause those diseases identified here, time frame for the studies considered is not limited as the relationship between ACEs and the diseases is not considered to have changed much over time, studies from areas outside Europe and the US are included in this review as the likelihood of ACEs causing these diseases is not considered to be vastly different based on geographical area, systematic reviews are included as they give an idea of other studies that may have been overlooked in this search
- Stream 2: any study that discusses the costs of those diseases identified here, time frame for the studies from 2008 to 2017, grey literature

METHODS – CONTD.

- Exclusion criteria:
  - Stream 1: does not include any RCTs or other trials of interventions to reduce the prevalence of these diseases
  - Stream 2: does not include any RCTs or other trials of interventions to reduce the prevalence of these diseases but merely the economic costing of these diseases, systematic reviews are excluded due to the volume of information liable to be included in them, studies from areas outside Europe and the US are also excluded as are those that are not in the English language

SEARCH METHODS

- The university librarian was consulted in order to define the search terms, in terms of Medical Subject Heading (MeSH) keywords and to help identify relevant databases.

- The databases used were PubMed and JSTOR

SEARCH METHODS – CONTD.

- The following search terms were designed for the first stream
- Adverse childhood experience AND disease type (e.g. cancer)

- The following search term was used for stream 2:
- Cost of illness AND disease type (e.g. cancer)
- Burden of illness AND disease type (e.g. cancer)
- Cost* of disease AND disease type (e.g. cancer)
- Economic burden of disease AND disease type (e.g. cancer)

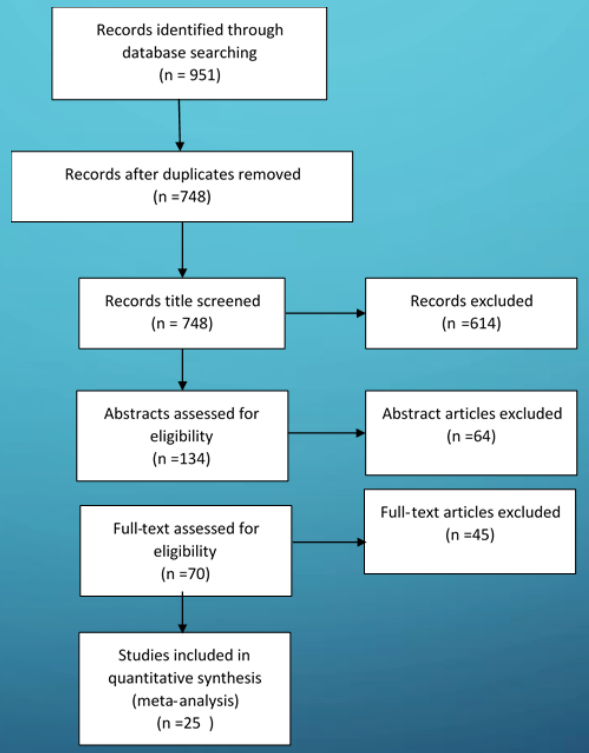
DATA EXTRACTION

- Data extraction forms designed for this review were used in order to extract data for inclusion in the results section of the review.
- Stream 1: For the first stream odds ratios, relative risk ratios, hazard ratios and prevalence ratios are extracted from meta-analyses and displayed in tables.
- Stream 2: Cost of illness were extracted for the first stream from relevant studies and put into tables for comparison. Any international data has been converted into GBP and inflated to 2016 figures.

RESULTS – STREAM 1

- We identified 748 papers after removing duplicates.
- After screening titles 134 papers were agreed upon by both reviewers to be included in the abstract screening.
- Following the screening of abstracts a total of 70 papers were considered for full text screening of which 25 papers were included for data extraction.

PRISMA FLOWCHART



RESULTS – STREAM 1 CONTD.

- Cancer
  - Odds ratios are shown for different types of ACEs and for different ACE counts.
  - These range from 0.93 for physical abuse and colorectal cancer, which means that suffering from physical abuse makes it *less likely* that this will lead to colorectal cancer to 2.4 for sexual abuse and cervical cancer meaning that sufferers of sexual abuse are *more likely* to develop cervical cancer.
- Respiratory disease
  - Only one study was found that related to respiratory disease and was based on COPD in the US.
  - It reported prevalence ratios and these ranged from 1.3 for verbal abuse to 1.69 for sexual abuse.

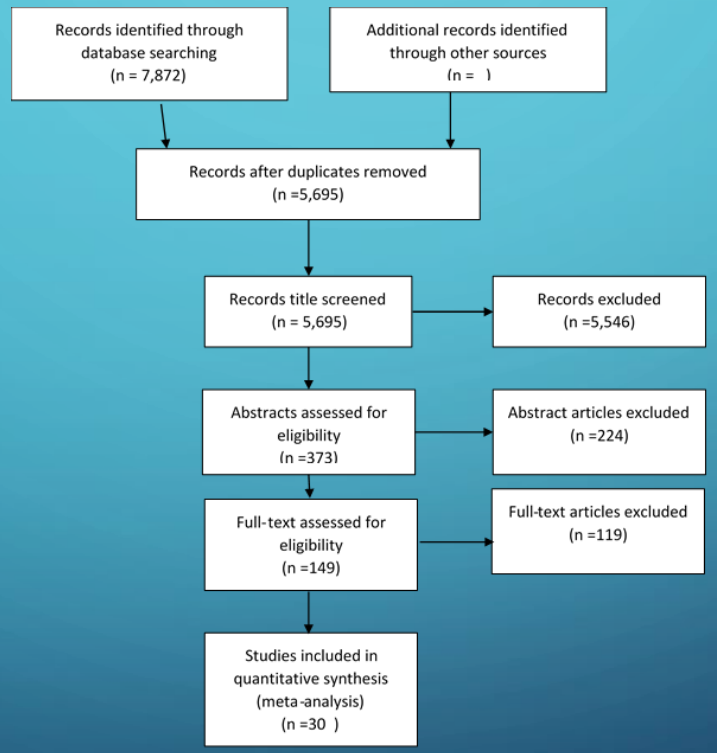
RESULTS – STREAM 1 CONTD.

- Heart disease
  - No studies found
- Stroke
  - One study was found for stroke, which reported the odds ratio of emotional abuse affecting the likelihood of stroke at 1.097.
- Liver disease
  - There was one paper identified for liver disease which reported odds ratios from 1.1 for 1 ACE to 1.8 for 6-8 ACEs.
- Mental health
  - Twelve studies were included
  - The odds ratios reported range from 0.92 for the relationship between domestic violence and mental distress to 15.47 for the relationship between sexual abuse and psychosis.
- Dementia
  - No studies found

RESULTS – STREAM 2

- We identified 5,695 papers after removing duplicates.
- After screening titles 373 papers were agreed upon by both reviewers to be included in the abstract screening.
- Following the screening of abstracts a total of 149 papers were considered for full text screening of which 30 papers were included for data extraction.
- The median cost for all diseases was £12,736 per person per year

PRISMA FLOWCHART



RESULTS – STREAM 2 CONTD.

- Cancer
  - The highest annual cost was in Sweden for breast cancer at £46,312 per person per year while the lowest cost was for the same disease, breast cancer, in the US at £1,543 per person per year.
- Respiratory disease
  - Only one study was found that related to the costs of respiratory disease and was based on COPD cost in Finland. It reported a cost per person per year of £499.
- Heart disease
  - Costs for heart failure range from £1,829 to £18,405 per person per year.

RESULTS – STREAM 2 CONTD.

- Stroke
  - Four studies were identified reporting costs that range from £15,035 to £143,208.
  - Indirect costs make up a large proportion of these costs indicating that suffering stroke disproportionately affects labour productivity.
- Liver disease
  - Unfortunately there were no papers on the costs of liver disease that passed the inclusion criteria for this review.
- Mental health
  - Psychotic disorders had the greatest per patient yearly cost at £28,776
- Dementia
  - Out of five studies for dementia the highest cost was £30,321 per person per year

NEXT STEPS

- The costs gleaned from stream 2 will then be applied to the population attributable fraction (PAF) calculated with information from stream 1 in order to arrive at the costs of these diseases that are attributable to ACEs.
- The PAF formula is as follows:

$$PAF = (P(RR-1))/(1+P(RR-1))$$

where P = percentage of ACE endorsed in the sample and RR= relative risk ratio

- Where papers only report odds ratios these will be converted to relative risk using the following formula (Grant 2014):

$$RR = OR / (1 - p + (p \times OR))$$

where p is equal to the risk in the control group (Zero ACEs)

THANK YOU

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