



OPEN ACCESS

# Relationship between childhood socioeconomic position and adverse childhood experiences (ACEs): a systematic review

David Walsh ,<sup>1</sup> Gerry McCartney,<sup>2</sup> Michael Smith,<sup>3</sup> Gillian Armour<sup>2,4</sup>

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/jech-2019-212738>).

<sup>1</sup>Glasgow Centre for Population Health, Glasgow, UK

<sup>2</sup>Public Health Observatory team, NHS Health Scotland, Glasgow, UK

<sup>3</sup>Mental Health and Addictions Services, NHS Greater Glasgow and Clyde, Glasgow, UK

<sup>4</sup>Knowledge Services, NHS Health Scotland, Glasgow, UK

## Correspondence to

Dr David Walsh, Glasgow Centre for Population Health, Glasgow G40 2QH, UK; [david.walsh.2@glasgow.ac.uk](mailto:david.walsh.2@glasgow.ac.uk)

Received 31 May 2019

Revised 11 September 2019

Accepted 16 September 2019

Published Online First

28 September 2019

## ABSTRACT

**Background** 'Adverse childhood experiences' (ACEs) are associated with increased risk of negative outcomes in later life: ACEs have consequently become a policy priority in many countries. Despite ACEs being highly socially patterned, there has been very little discussion in the political discourse regarding the role of childhood socioeconomic position (SEP) in understanding and addressing them. The aim here was to undertake a systematic review of the literature on the relationship between childhood SEP and ACEs.

**Methods** MEDLINE, PsycINFO, ProQuest and Cochrane Library databases were searched. Inclusion criteria were: (1) measurement of SEP in childhood; (2) measurement of multiple ACEs; (3) ACEs were the outcome; and (4) statistical quantification of the relationship between childhood SEP and ACEs. Search terms included ACEs, SEP and synonyms; a second search additionally included 'maltreatment'. Overall study quality/risk of bias was calculated using a modified version of the Hamilton Tool.

**Results** In the ACEs-based search, only 6 out of 2825 screened papers were eligible for qualitative synthesis. The second search (including maltreatment) increased numbers to: 4562 papers screened and 35 included for synthesis. Eighteen papers were deemed 'high' quality, five 'medium' and the rest 'low'. Meaningful statistical associations were observed between childhood SEP and ACEs/maltreatment in the vast majority of studies, including all except one of those deemed to be high quality.

**Conclusion** Lower childhood SEP is associated with a greater risk of ACEs/maltreatment. With UK child poverty levels predicted to increase markedly, any policy approach that ignores the socioeconomic context to ACEs is therefore flawed.

**PROSPERO registration number** CRD42017064781.

## INTRODUCTION

There is substantial evidence of an association between different aspects of childhood adversity and increased risks of negative outcomes in later life.<sup>1 2</sup> This has been particularly influenced by the work of Felitti *et al* in the USA who used the phrase 'adverse childhood experiences' (ACEs) to describe multiple facets of such adversity.<sup>3 4</sup> The authors defined ACEs in terms of both direct child maltreatment (abuse and neglect) and a wider set of experiences related to family and household circumstances (termed 'household dysfunction'). The latter included living in an environment of adult domestic violence, mental illness or substance

misuse, experiencing parental separation or having an adult household member in prison.

The prevalence of such experiences in childhood is high: a study published in 2014 estimated that just under half the population of England had experienced at least one such adversity, with almost one in four having experienced two or more (although prevalence varied considerably across the different types of adversity, from 4% experiencing parental incarceration or drugs misuse to 23% experiencing parental separation).<sup>5</sup> Other research has suggested a similar overall prevalence rate of 46% for children in the USA.<sup>6</sup> Prevalence has been shown to be higher among particularly disadvantaged population groups such as the incarcerated<sup>7</sup> and the homeless.<sup>8</sup> The evidence of the impact of these childhood experiences on poor outcomes later in life is compelling. In one UK study, women who had experienced two or more adversities in childhood had an 80% higher risk of premature death when compared with women without a history of adversity, after adjustment for range of other risk factors.<sup>9</sup> A recent systematic review showed that compared with people with no experience of childhood adversity, individuals with four or more childhood adversities were at notably greater risk of a wide range of health problems including cancer, heart disease, respiratory disease, mental illness and self-harm.<sup>2</sup> The evidence shows that there is a 'graded relationship' between the number of adversities and risk of poor outcomes.<sup>3</sup> The causal pathways proposed to explain these associations include: increased likelihood of adopting harmful health behaviours; negative impacts on important social health determinants (eg, education, employment and income) in adulthood; and particular biological pathways linked to stress.<sup>1</sup> There is also some evidence that the risk of adverse outcomes among those who have experienced childhood adversity may be mitigated by some forms of childhood support such as access to a 'trusted adult'.<sup>10 11</sup>

Given this evidence, 'ACEs' have become a policy priority for many governments. Within the UK, there has been a particular focus on ACEs in policy and practice in Wales,<sup>12 13</sup> and they also featured prominently in the Scottish Government's 'Programme for Government' in 2017/2018<sup>14</sup> and 2018/2019.<sup>15</sup> The importance of embedding ACE awareness within practice has also been emphasised by the UK Government's Department of Health<sup>16</sup> and by UK Parliamentary Committees.<sup>17</sup> However, there is very little discussion in these



© Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

**To cite:** Walsh D, McCartney G, Smith M, *et al*. *J Epidemiol Community Health* 2019;**73**:1087–1093.

policy documents about the role of childhood socioeconomic conditions (eg, poverty) in both understanding the causes of, and addressing, ACEs. This is despite the fact that all 10 of the commonly measured ACEs<sup>4</sup> are very clearly social patterned. For example, rates of adult incarceration are notably higher in poorer areas,<sup>18</sup> and social gradients in substance misuse,<sup>19 20</sup> reported domestic violence<sup>21</sup> and child maltreatment are well known.<sup>22</sup> Given the importance of this to the current ACEs-focused policy and discussion, the aim of this study was to systematically review and synthesise the literature on the relationship between childhood socioeconomic position (SEP) and ACEs.

## METHODS

We searched the MEDLINE, PsycINFO, ProQuest Public Health Database and Cochrane Library databases. The initial search terms included 'adverse childhood experiences', 'socio-economic status' and a wide variety of synonyms for both (these included: adverse childhood experiences, negative childhood experiences, childhood adversity, childhood trauma—and versions/derivations of each; deprivation, poor, socioeconomic, poverty, disadvantage, inequality, unequal, low-income, low-wage, unemployed/ment, destitute, lack—and versions/derivations of each. See online appendix for details of full search strategy). Following the initial screening of the results, a second search of the all the same databases was undertaken to additionally include the term 'maltreatment'. Searches covered the period 1998 (when the first Felitti *et al*<sup>3</sup> paper was published) to 2018 (date of last search: May 2018). The full electronic search strategy is included within the online appendix. The grey literature was also searched by means of Google Advanced Searches, with the first 10 pages of results screened.

The four inclusion criteria for the review were:

1. The study includes measurement of social position in the early years or of the parental or household position.
2. The study includes measurement of multiple aspects of childhood adversity.
3. The aspects of childhood adversity are included as the outcome of interest in the study.
4. The study includes statistical quantification of the relationship between social position and childhood adversity.

Non-English language papers were excluded. The protocol for the review was registered with the international prospective register of systematic reviews: [https://www.crd.york.ac.uk/prospero/display\\_record.php?RecordID=64781](https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=64781).

Each paper was independently screened and critically appraised by two out of three reviewers (DW, GM and MS). Data extraction was undertaken by two authors (DW and GM) and checked by one other (DW, GM or MS). Risk of bias was judged by means of assessment of: the representativeness of the study population compared with the relevant general population (in terms of sampling frame, response bias and attrition rate); the validity and comprehensiveness of the measures of childhood social position and childhood adversity; the risk of overadjustment (ie, adjustment for measures that may be on the causal pathway: for example, ethnicity, other markers of SEP and other ACEs-related factors); and the consideration given to confounders.

Overall quality was judged by means of a modified version of the Hamilton Tool.<sup>23</sup> Six specific criteria were considered:

1. Demonstrable representativeness: the product of the response rate and the attrition rate was at least 70%, or the study was based on total population administrative data for the whole population.

2. The exposure (childhood SEP) was an individual or household measure (not area based).
3. The outcome (measures of childhood adversity) was measured at the individual level.
4. The analyses were not overadjusted (eg, for other SEP-related measures, ethnicity and adversity-related exposures).
5. Sufficient sample size (see next paragraph).
6. Where the outcome included maltreatment (eg, sexual or physical abuse), the measure was based on either an external assessment or was reported by the individual himself or herself and not by the perpetrator.

Quality scores were based on assigning a maximum of one point for each of criteria 1–4 and 6, and—for criterion 5—either one point for studies with a sample size of 200–1000 or two points for a sample size of more than 1000. Studies could therefore score a minimum of 0, and a maximum of 7, points. Studies with scores of 0–4 were assessed as *low quality*, 5 as *medium* and 6–7 as *high quality*.

Meta-analysis could not be undertaken because there was problematic variation in: the definitions of both the exposures (SEP) and outcomes (different aspects of childhood adversity); the number of outcomes considered (eg, risk of 1, 2, 3 or 4+ACEs); important characteristics of the populations (eg, age of child); and the statistical methodologies employed and the resulting measures presented.

## Patient and public involvement

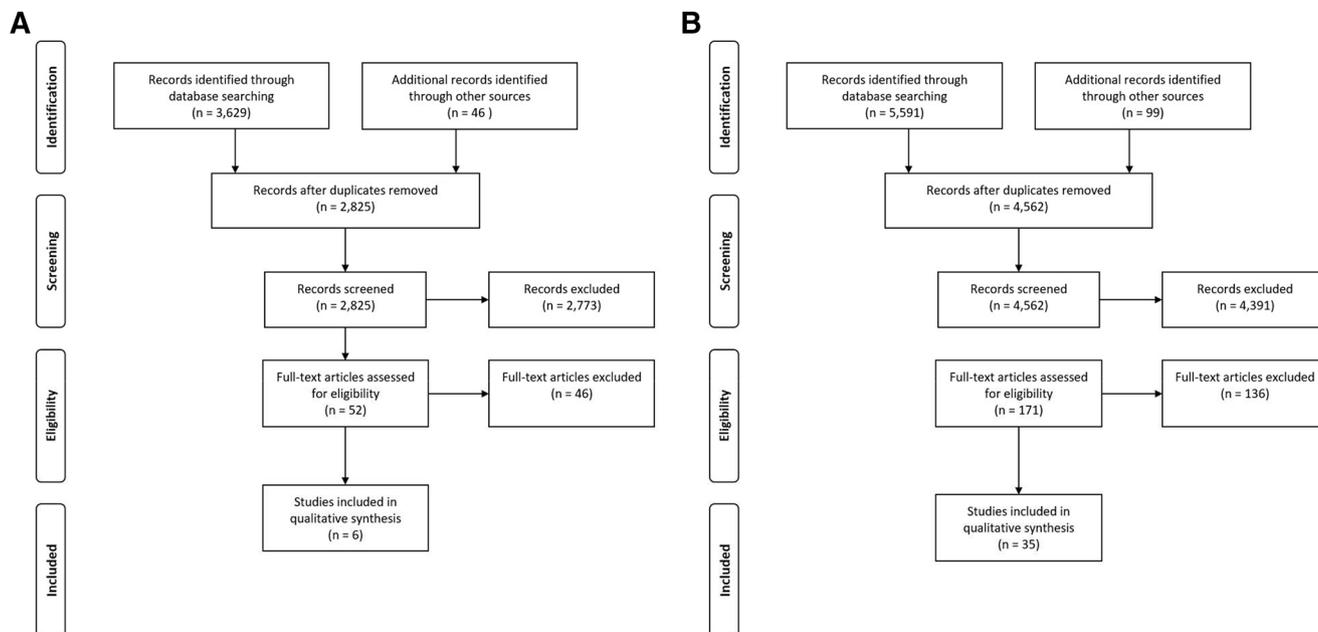
Patients or the public was not involved in this study.

## RESULTS

The process of searching and screening the literature suggested that there are two overlapping sets of relevant published research: one on the concept of 'ACEs' and another on the more specific topic of child maltreatment. For this reason, and because of the relevance of this to current policy discussions, the results of the two searches are reported separately.

Figure 1A presents the results of the initial search, that is, where ACEs were defined as the outcome. Of 2825 citations that were screened (including 46 from the grey literature), only six satisfied the inclusion criteria. Four other papers<sup>24–27</sup> were excluded because they included measures of childhood SEP in the outcome that therefore represented overadjustment. Figure 1B shows the results of the final search that included maltreatment as well as ACEs as the outcome. The total number of citations screened increased to 4562 (99 from the grey literature), of which 35 (including the six above) satisfied the inclusion criteria.

Table 1A,B lists the papers satisfying the inclusion criteria, with the online supplementary tables 1a and 1b summarising those papers in more detail. The following additional information is provided in the online supplementary tables: study population; childhood SEP measure(s) employed; age at which childhood SEP was measured; child adversity outcome(s) measured; age at which outcome(s) measured; and summary of key results. These details are included within the summary tables, rather than in the main part of the manuscript, for reasons of space. The six ACEs-based studies shown here in table 1A took place in Australia, Brazil, England, Malaysia and the USA (2) and were all based on an individual rather than ecological study design. In contrast, table 1B shows that the majority of maltreatment-based studies (16/29) were from the USA. The remaining studies were undertaken in Australia, England, Iran, Israel, the Netherlands and Switzerland. Approximately one-third (10/29) of the studies



**Figure 1** PRISMA flow diagram. (A) Adverse childhood experiences and socioeconomic position (and synonyms); (B) adverse childhood experiences and maltreatment and socioeconomic position (and synonyms). PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

were based on an ecological design (all except one of which were from the USA).

Overall, 18 out of 35 papers (including five of the six papers in table 1A) were categorised as *high quality*. Twelve were classed as *low quality*, and the remaining five were classed as *medium*. Meaningful statistical associations were observed between the exposure (childhood SEP) and the outcome (ACEs/maltreatment) in the vast majority of studies, including all except one of those deemed to be high quality. For example, of the high-quality studies, clear associations were shown in longitudinal birth cohorts in Brazil and Australia. In the Brazilian study, children in the lowest SEP category (based on maternal education) were more than six times more likely to experience four or more ACEs compared with those in the highest SEP category (and this is likely to be an underestimate as the analysis adjusted for other SEP measures including household income).<sup>28</sup> In Australia, children brought up in poverty were three times more likely to experience abuse, neglect or being witness to domestic violence compared with those who were not brought up in poverty.<sup>29</sup> A further Australian study—a large retrospective cohort of all children born in Western Australia over a 15 year period—showed that among non-Aboriginals, those born in the most disadvantaged neighbourhoods were more than 14 times more likely to experience neglect and abuse than those in the least disadvantaged areas.<sup>30</sup> It is also notable that within the UK, in a national sample of Scottish children, those living in households in the lowest quintile of household income were almost 12 times more likely to experience three or more ACEs by age 8 years compared with those in the highest quintile.<sup>31</sup> However, as the latter study was published shortly after the completion of the literature search, it is not included within the results tables.

In the remaining study assessed as *high quality* (by Anderson *et al*),<sup>32</sup> only very limited analyses of ACEs and childhood SEP were presented within an online supplementary online appendix. A narrow, binary measure of social class (non-manual vs manual, derived from the father's occupation) was used; the distribution of 'adverse psychosocial experiences' was compared between the two groups, with no 'significant' ( $p=0.17$ ) difference observed

(based on a two-tailed t-test). However, other more sophisticated statistical analyses of the same longitudinal data set (by Sidebotham *et al*<sup>33–35</sup> showed a clear relationship between a number of measures of childhood SEP and child maltreatment: the former included parental social class (defined by five categories), as well as parental education, parental employment and unemployment, housing tenure, overcrowding and car use.

All five studies classed as *medium quality* showed meaningful relationships between exposure and outcome, although two showed slightly mixed results for different measures of childhood SEP.<sup>36 37</sup>

As stated in the Methods, definitions of the both exposure variables and the outcome variables varied enormously. In terms of outcomes, of the six papers listed in online supplementary table 1a (which summarises in detail the results of the ACEs-based search), two included particular measures of maltreatment (abuse, including by a teacher, neglect and—in one case—witnessing domestic violence), two examined a set of 10 ACE measures similar to those employed in the original US analyses referred to in the Introduction,<sup>4</sup> one employed a subset of seven of those measures and one included an outcome defined as 'psychosocial adversity'. Online supplementary table 1b shows the considerable variety of definitions of 'child maltreatment'. Many of the ecological studies employed a 'standard' definition of 'child abuse and neglect', which was derived from administrative child surveillance/protection recording systems: this usually—but not always—referred to physical, sexual and emotional forms of abuse, as well as physical and emotional neglect. However, some studies' definitions of maltreatment omitted sexual abuse, some omitted emotional abuse, some additionally included witnessing domestic violence and others included further components such as educational neglect, medical neglect, family abduction or defined maltreatment in terms of hospitalisation records. Across all studies in online supplementary tables 1a and 1b, the choice of exposure (SEP) variables was equally inconsistent: among individual (rather than ecological) studies, measures of parental education ( $n=16$  studies), parental employment/unemployment ( $n=12$ ) and income ( $n=7$ ) were

**Table 1** Summary of included papers for childhood SEP and ACEs search (A) and for childhood SEP and ACEs/maltreatment search (B)**(A) Childhood SEP and ACEs**

Author and year	Country	Quality assessment criteria* and overall study quality	Individual/ecological study	Data source	Sample size
Ahmed <i>et al</i> 2015 <sup>57</sup>	Malaysia	1,2,3,5** (medium)	Individual	Cross-sectional survey	3509
Anderson <i>et al</i> 2017 <sup>32</sup>	England	2,3,4,5**,6 (high)	Individual	Longitudinal cohort	2221
Baglivio <i>et al</i> 2015 <sup>58</sup>	USA	1,2,3,4,5**,6 (high)	Individual	Administrative records	59 342
Doidge <i>et al</i> 2017 <sup>29</sup>	Australia	2,3,4,5**,6 (high)	Individual	Longitudinal birth cohort	2443
Mersky <i>et al</i> 2017 <sup>59</sup>	USA	2,3,4,5**,6 (high)	Individual	Cross-sectional survey	1241
Soares <i>et al</i> 2016 <sup>28</sup>	Brazil	1,2,3,5**,6 (high)	Individual	Longitudinal birth cohort	3951

**(B) Childhood SEP and ACEs/maltreatment**

Author and year	Country	Quality assessment criteria* and overall study quality*	Individual/ecological study	Data source	Sample size/no. of units of analysis†
Beimers and Coulton 2011 <sup>36</sup>	USA	2,3,5**,6 (medium)	Individual	Linked administrative records	18 023
Cherry and Wang 2016 <sup>60</sup>	USA	1,3,6 (low)	Ecological	Child maltreatment reporting system	50 US states
Curenton <i>et al</i> 2009 <sup>61</sup>	USA	2,3,4,6 (low)	Individual	Questionnaire-based interview	92
Doidge <i>et al</i> 2017 <sup>62</sup>	Australia	2,3,4,5**,6 (high)	Individual	Longitudinal birth cohort	2443
Eckenrode <i>et al</i> 2014 <sup>63</sup>	USA	1,3,4,6 (low)	Ecological	Child maltreatment reporting system	50 US states
Euser <i>et al</i> 2010 <sup>64</sup>	The Netherlands	2,3,4,5*,6 (medium)	Individual	Cross-sectional survey of 'sentinels'	858
Euser <i>et al</i> 2011 <sup>65</sup>	The Netherlands	2,3,4,5**,6 (high)	Individual	Cross-sectional survey of 'sentinels'	1121
Euser <i>et al</i> 2013 <sup>66</sup>	The Netherlands	2,3,4,5**,6 (high) (both data sources)	Individual	Two relevant sources: 1. Cross-sectional survey of 'sentinels'. 2. Cross-sectional survey of schoolchildren.	1. 1127 2. 1920
Freisthler 2004 <sup>67</sup>	USA	1,3,5*,6 (low)	Ecological	Social services administrative records	940 US 'census tracts'
Freisthler <i>et al</i> 2007 <sup>68</sup>	USA	1,3,5*,6 (low)	Ecological	Social services administrative records	940 US 'census tracts'
Frioux <i>et al</i> 2014 <sup>69</sup>	USA	1,3,4,6 (low)	Ecological	Social services administrative records	67 US counties
Herrenkhol and Herrenkhol 2007 <sup>70</sup>	USA	2,3,4,5*,6 (medium)	Individual	Longitudinal cohort	457
Hosseinkhani <i>et al</i> 2016 <sup>71</sup>	Iran	2,3,4,5**,6 (high)	Individual	Cross-sectional survey	1036
Johnson-Motoyama <i>et al</i> 2014 <sup>72</sup>	USA	1,2,3,5**,6 (high)	Individual	Linkage of birth records to child protection services data	1 909 155
Lee and Goerge 1999 <sup>73</sup>	USA	1,3,4,5**,6 (high)	Individual	Linked database of social services administrative records and birth registration data	1 257 149
Lo <i>et al</i> 2017 <sup>37</sup>	China (Hong Kong)	1,2,3,4,5* (medium)	Individual	Cross-sectional survey	392
Mersky <i>et al</i> 2009 <sup>74</sup>	USA	1,2,3,5**,6 (high)	Individual	Longitudinal cohort	1411
Nguyen 2013 <sup>75</sup>	USA	1,4,6 (low)	Ecological	Social services administrative records	58 US counties
O'Donnell <i>et al</i> 2010 <sup>30</sup>	Australia	1,3,4,5**,6 (high)	Individual	Linked administrative data	397 345
O'Donnell <i>et al</i> 2010 <sup>76</sup>	Australia	1,3,6 (Low)	Individual	Linked administrative data	Not stated
Palusci and Vandervort 2014 <sup>77</sup>	USA	1,3,5*,6 (low)	Ecological	Child maltreatment reporting system	213 US counties
Putnam-Hornstein <i>et al</i> 2013 <sup>78</sup>	USA	1,2,3,4,5**,6 (high)	Individual	Linkage of birth records to child protection services data	531 035
Raissan and Bullinger 2017 <sup>79</sup>	USA	1,3,6 (low)	Ecological	Child maltreatment reporting system	44 US states
Schick <i>et al</i> 2016 <sup>80</sup>	Switzerland	1,2,3,4,5**,6 (high)	Individual	Cross-sectional survey	6787
Schuck 2005 <sup>81</sup>	USA	1,3,6 (low)	Ecological	Social services administrative records	67 US counties
Sidebotham <i>et al</i> 2001 <sup>33</sup>	England	1,2,3,5**,6 (high)	Individual	Longitudinal cohort	14 138
Sidebotham <i>et al</i> 2002 <sup>34</sup>	England	1,2,3,4,5**,6 (high)	Individual	Longitudinal cohort	14 256
Sidebotham <i>et al</i> 2006 <sup>35</sup>	England	1,2,3,4,5**,6 (high)	Individual	Longitudinal cohort	14 256
Sulimani-Aidan and Benbenishty 2013 <sup>82</sup>	Israel	1,4,5*,6 (low)	Ecological	Child maltreatment reporting system	231 local authority areas

\*Quality assessment criteria: 1: representative; 2: individual/household level exposure; 3: individual-level exposure; 4: not overadjusted; 5\*: sample size 200–1000; 5\*\*: sample size >1000; and 6: maltreatment not reported by perpetrator. Numbers shown denote satisfied criteria (and therefore points allocated).

†Sample sizes are reported for all individual-based studies. Number of units of analysis (eg, 50 US states) are reported for area-based (ie, ecological) studies.

ACEs, adverse childhood experiences; SEP, socioeconomic position.

the most common, although various other measures (receipt of social security benefits, parental occupation, poverty assessment, housing-based variables and more) were also frequently used. A variety of area-based measures (eg, of child poverty rates or unemployment rates) were used in the ecological studies. Adding to this inconsistency of study design, which makes comparison of effect sizes highly problematic, the sample sizes in the individual studies also varied considerably, from under 1000 to in excess of 1 000 000. The vast majority (21 out of 25 individual-based studies) had a sample size in excess of 1000.

## DISCUSSION

### Statement of principal findings

There is a clear relationship between SEP in childhood and risk of experiencing ACEs and maltreatment. This appears robust across countries, measures of SEP and adversity and the age at which adversity is measured. There is substantially more research considering childhood SEP and child maltreatment, suggesting that the role of SEP in childhood is not integrated into the understanding of what causes ACEs.

### Strengths and weaknesses of the study

To our knowledge, this is the first systematic review of the relationship between childhood SEP and ACEs. Our review methods are transparent, reproducible and have a low risk of error or bias. Our search terms were similar to those used in a systematic review of ACEs and health outcomes,<sup>2</sup> and we additionally expanded those terms to ensure the larger maltreatment-based literature was included. Given that measures of maltreatment account for half of the 10 ACEs included in a number of studies,<sup>4</sup> this was an important addition.

The lack of a meta-analysis is a limitation but one that was difficult to overcome and highlights an important aspect of ACEs-related research: the lack of consistency in how ACEs are measured and analysed. Limiting the review to papers published since 1998 is another potential weakness: although this was appropriate for the ACEs-based research (which followed the original 1998 study),<sup>3</sup> it is likely to have been less suitable for the maltreatment literature and therefore may have omitted some earlier relevant studies. The exclusion of non-English language papers was made for pragmatic reasons and unfortunately is likely to have added to existing 'Anglophone bias' in research. Future work on the topic should address this limitation.

### Relevance to other studies

The lack of published research on the influence of childhood SEP on ACEs echoes others' concerns regarding the decontextualised manner in which childhood adversity is currently discussed, both within the wider research literature and in important policy documents. This has been highlighted with regard to both ACEs<sup>38 39</sup> and child maltreatment.<sup>22 40</sup> With regard to the former, one recent commentary highlighted the dramatic increase in published ACEs research in the last decade. Deeming this attributable to a diverse set of factors, it suggested that this sudden increase may well have 'contributed to the decontextualisation of ACEs from the wider socioeconomic landscape and to a mismatch regarding links with policy'.<sup>39</sup> In relation to maltreatment, a recent review by the Joseph Rowntree Foundation highlighted the 'lack of joined up thinking about poverty and child abuse and neglect in the UK',<sup>22</sup> while another paper argued, similarly, that the 'dominant discourse' in the UK is centred on 'individual pathology', which ignores poverty and instead blames individual families.<sup>40</sup> This is despite the fact that

the role of poverty in explaining higher risks of child maltreatment has been well established in many non-UK studies,<sup>22 40-42</sup> something echoed by the results reported here.

There is currently a debate as to whether poverty itself should be considered an 'adverse childhood experience'. This has been proposed by a number of authors<sup>43</sup> but dismissed by others as 'conceptually muddled' and potentially resulting in the importance of key socioeconomic determinants of health being overlooked.<sup>38</sup> This is clearly relevant to a broader discussion regarding the relationship between SEP and childhood adversity in the context of causal pathways between health-related exposures and outcomes. On the one hand, the evidence presented here demonstrates a clear relationship between SEP in childhood and ACEs/maltreatment, suggesting that low childhood SEP is a determinant of such adversity, and the longitudinal nature of many of the studies supports a causal association. This fits with the strong international evidence of the 'fundamental causes' of health inequalities being socioeconomic,<sup>44 45</sup> including the evidence of the importance of childhood socioeconomic conditions in explaining variation in outcomes across the life course.<sup>46-50</sup> On the other hand, some studies have shown that the relationship between ACEs and health outcomes persists even after adjustment for measures of SEP.<sup>9 39</sup> This suggests either residual confounding (the SEP variables included in the analyses being inadequate or poorly measured) or that the relationship between SEP and ACEs is much more complex and requires further research to fully unpick.

Finally, the relationship between childhood SEP exposures and adversity-related outcomes presented in this review is supported by previous research—principally in the maltreatment literature—which sought to explain the relevant causal pathways. The latter include variations of parental stress models, incorporating the direct effects of material deprivation, complex and circular interactions between the latter, structural inequality and other factors, all impacting on parenting capacity via processes related to poor mental health, stigma, psychological vulnerability and more.<sup>22 40</sup> There is also a body of research that has highlighted additional negative 'area effects' linked to issues including poor housing, negative physical environments, residential instability and social selection, which can exacerbate the effects of poverty on individuals.<sup>22 51 52</sup> The latter is relevant to the many ecological studies included in our review that showed clear associations between socioeconomic circumstances in childhood and adversity-related outcomes. It also has clear parallels with the vast 'health and place' literature.<sup>53 54</sup>

### Implications and future research

In the current narrative around childhood adversity and its links to a range of poor social and health outcomes, there is a clear need to fully understand the broader socioeconomic context. Thus, while policy and practice need to help those currently

#### What is already known on this subject

- ▶ Different aspects of childhood adversity ('adverse childhood experiences' (ACEs)) have been associated with increased risk of negative outcomes in later life.
- ▶ ACEs are a policy priority in many countries.
- ▶ Despite ACEs being highly socially patterned, the role of childhood socioeconomic position (SEP) in understanding and addressing them has been largely missing from the political discourse.

## What this study adds

- ▶ There is a clear relationship between low childhood SEP and increased risk of ACEs and maltreatment.
- ▶ Policy therefore needs to both help those currently affected by childhood adversity, but to prevent further adversity, it must also understand the relationship between SEP and ACEs and reduce socioeconomic inequality and poverty.

affected by childhood adversity, any policy approach that ignores that wider context is flawed. This is particularly important for UK policy makers to understand, given both the recent increases, and projected future rises, in levels of child poverty.<sup>55 56</sup> Future research should focus on understanding the relationship between SEP and ACEs and how children can be protected from adverse impacts. In addition, clarity is required around the conceptualisation of ACEs, given the many different ways they are defined, measured and analysed in the literature.

**Correction notice** This article has been corrected since it first published online. The postal code for the correspondence address has been corrected.

**Twitter** Gerry McCartney @gerrymccartney1

**Contributors** DW, GM and MS developed the research questions, methods and screened the citations. GA developed and implemented the search strategy. DW and GM critically appraised the included papers. DW drafted the manuscript. All authors critically revised the manuscript and approved the final draft. DW is guarantor for the study.

**Funding** All authors are salaried National Health Service employees.

**Competing interests** None declared.

**Patient consent for publication** Not required.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

## ORCID iD

David Walsh <http://orcid.org/0000-0002-3390-5039>

## REFERENCES

- 1 Allan M, Donkin A. *The impact of adverse experiences in the home on the health of children and young people, and inequalities in prevalence and effects*. London: UCL Institute of Health Equity, 2016.
- 2 Hughes K, Bellis MA, Hardcastle KA, *et al*. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *Lancet Public Health* 2017;2:e356–66.
- 3 Felitti VJ, Anda RF, Nordenberg D, *et al*. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the adverse childhood experiences (ACE) study. *Am J Prev Med* 1998;14:245–58.
- 4 CDC. Kaiser Permanente adverse childhood experiences (ACE) study. Available: <https://www.cdc.gov/violenceprevention/childabuseandneglect/acesstudy/about.html> [Accessed Mar 2019].
- 5 Bellis MA, Hughes K, Leckenby N, *et al*. National household survey of adverse childhood experiences and their relationship with resilience to health-harming behaviors in England. *BMC Med* 2014;12:72.
- 6 Sacks V, Murphey D, Moore K. *Adverse childhood experiences: national and State-level prevalence*. Bethesda, Maryland: Child Trends, 2014. [https://www.childtrends.org/wp-content/uploads/2014/07/Brief-adverse-childhood-experiences\\_FINAL.pdf](https://www.childtrends.org/wp-content/uploads/2014/07/Brief-adverse-childhood-experiences_FINAL.pdf)
- 7 Ford K, Barton E, Newbury A, *et al*. *Understanding the prevalence of adverse childhood experiences (ACEs) in a male offender population in Wales: the prisoner ACE survey*. Wrexham: Public Health Wales/Bangor University, 2019. [https://research.bangor.ac.uk/portal/files/23356885/PHW\\_Prisoner\\_ACE\\_Survey\\_Report\\_E.pdf](https://research.bangor.ac.uk/portal/files/23356885/PHW_Prisoner_ACE_Survey_Report_E.pdf)
- 8 Roos LE, Mota N, Affi TO, *et al*. Relationship between adverse childhood experiences and homelessness and the impact of axis I and II disorders. *Am J Public Health* 2013;103(Suppl 2):S275–S281.
- 9 Kelly-Irving M, Lepage B, Dedieu D, *et al*. Adverse childhood experiences and premature all-cause mortality. *Eur J Epidemiol* 2013;28:721–34.
- 10 Bellis MA, Hardcastle K, Ford K, *et al*. Does continuous trusted adult support in childhood impart life-course resilience against adverse childhood experiences - a retrospective study on adult health-harming behaviours and mental well-being. *BMC Psychiatry* 2017;17:110.
- 11 Bellis MA, Hughes K, Ford K, *et al*. Adverse childhood experiences and sources of childhood resilience: a retrospective study of their combined relationships with child health and educational attendance. *BMC Public Health* 2018;18:792.
- 12 Public Health Wales. Adverse childhood experiences (ACEs). Available: <http://www.wales.nhs.uk/sitesplus/888/page/88524> [Accessed Mar 2019].
- 13 Grey C, Woodfine L. *Adverse childhood experiences (ACEs) and housing vulnerability – report and evaluation of ACE-informed training for housing*. Cardiff: Public Health Wales, 2018. <http://www.wales.nhs.uk/sitesplus/documents/888/5%20ACE%20Informed%20Training%20for%20Housing.pdf>
- 14 Scottish Government. *A nation with ambition: the government's programme for Scotland 2017–2018*. Edinburgh: Scottish Government, 2018. <https://www.gov.scot/publications/nation-ambition-governments-programme-scotland-2017-18/>
- 15 Scottish Government. *Delivering for Today, Investing for Tomorrow: the Government's Programme for Scotland 2018–19*. Edinburgh: Scottish Government, 2018. <https://www.gov.scot/publications/delivering-today-investing-tomorrow-governments-programme-scotland-2018-19/>
- 16 Quigg Z, Wallis S, Butler N. *Routine enquiry about adverse childhood experiences. implementation pack pilot evaluation (final report)*. Liverpool: Liverpool John Moores University, 2018. <https://www.gov.uk/government/publications/routine-enquiry-about-adverse-childhood-experiences-implementation-pack-evaluation>
- 17 House of Commons Science and Technology Committee. *Evidence-Based early years intervention: eleventh report of session 2017–19*. London: House of Commons, 2018. <https://publications.parliament.uk/pa/cm201719/cmselect/cmsctech/506/506.pdf>
- 18 Houchin R. *Social exclusion and imprisonment in Scotland: a report*. Glasgow: Glasgow Caledonian University, 2005. <https://www.scotpho.org.uk/media/1108/social-exclusion-and-imprisonment-in-scotland.pdf>
- 19 ISD Scotland. *Drug-Related Hospital statistics Scotland 2016/17*. Edinburgh: ISD Scotland, 2017. <https://www.isdscotland.org/Health-Topics/Drugs-and-Alcohol-Misuse/Publications/2017-09-26/2017-09-26-DRHS-Report.pdf>
- 20 ISD Scotland. *Drug-Related Hospital statistics Scotland 2016/17*. Edinburgh: ISD Scotland, 2017. Available from: <https://www.isdscotland.org/Health-Topics/Drugs-and-Alcohol-Misuse/Publications/2017-11-21/2017-11-21-ARHS-Report.pdf>
- 21 Murray K. 2014/15 Scottish crime and justice survey: partner abuse, 2016. Available: <https://www.gov.scot/publications/scottish-crime-justice-survey-2014-15-partner-abuse/> [Accessed Mar 2019].
- 22 Bywaters P, Bunting L, Davidson G, *et al*. *The relationship between poverty, child abuse and neglect: an evidence review*. York: Joseph Rowntree Foundation, 2015. <https://www.jrf.org.uk/report/relationship-between-poverty-child-abuse-and-neglect-evidence-review>
- 23 Effective Public Health Practice Project. *Quality assessment tool for quantitative studies*. Hamilton, Ontario: McMaster Evidence Review and Synthesis Centre (MERS), 1998.
- 24 Benjet C, Borges G, Medina-Mora ME, *et al*. Descriptive epidemiology of chronic childhood adversity in Mexican adolescents. *J Adolesc Health* 2009;45:483–9.
- 25 Caballero TM, Johnson SB, Buchanan CRM, *et al*. Adverse childhood experiences among Hispanic children in immigrant families versus US-Native families. *Pediatrics* 2017;140:e20170297.
- 26 Kerns CM, Newschaffer CJ, Berkowitz S, *et al*. Brief Report: Examining the Association of Autism and Adverse Childhood Experiences in the National Survey of Children's Health: The Important Role of Income and Co-occurring Mental Health Conditions. *J Autism Dev Disord* 2017;47:2275–81.
- 27 Slopen N, Shonkoff JP, Albert MA, *et al*. Racial disparities in child adversity in the U.S.: interactions with family immigration history and income. *Am J Prev Med* 2016;50:47–56.
- 28 Soares ALG, Howe LD, Matijasevich A, *et al*. Adverse childhood experiences: prevalence and related factors in adolescents of a Brazilian birth cohort. *Child Abuse Negl* 2016;51:21–30.
- 29 Doidge JC, Higgins DJ, Delfabbro P, *et al*. Risk factors for child maltreatment in an Australian population-based birth cohort. *Child Abuse Negl* 2017;64:47–60.
- 30 O'Donnell M, Nassar N, Leonard H, *et al*. Characteristics of non-Aboriginal and Aboriginal children and families with substantiated child maltreatment: a population-based study. *Int J Epidemiol* 2010;39:921–8.
- 31 Marryat L, Frank J. Factors associated with adverse childhood experiences in Scottish children: a prospective cohort study. *BMJ Pediatrics Open* 2019;3:e000340.
- 32 Anderson EL, Heron J, Ben-Shlomo Y, *et al*. Adversity in childhood and measures of aging in midlife: findings from a cohort of British women. *Psychol Aging* 2017;32:521–30.
- 33 Sidebotham P, Golding J, ALSPAC Study Team. Child maltreatment in the "children of the nineties" a longitudinal study of parental risk factors. *Child Abuse Negl* 2001;25:1177–200.

- 34 Sidebotham P, Heron J, Golding J. Child maltreatment in the "Children of the Nineties": deprivation, class, and social networks in a UK sample. *Child Abuse Negl* 2002;26:1243–59.
- 35 Sidebotham P, Heron J. Child maltreatment in the "children of the nineties": A cohort study of risk factors. *Child Abuse Negl* 2006;30:497–522.
- 36 Beimers D, Coulton CJ. Do employment and type of exit influence child maltreatment among families leaving temporary assistance for needy families? *Child Youth Serv Rev* 2011;33:1112–9.
- 37 Lo CKM, Tung KTS, Chan KL, et al. Risk factors for child physical abuse and neglect among Chinese young mothers. *Child Abuse Negl* 2017;67:193–206.
- 38 Taylor-Robinson DC, Straatmann VS, Whitehead M. Adverse childhood experiences or adverse childhood socioeconomic conditions? *Lancet Public Health* 2018;3:e262–3.
- 39 Kelly-Iving M, Delpierre C. A critique of the adverse childhood experiences framework in epidemiology and public health: uses and misuses. *Social Policy and Society* 2019;18:445–56.
- 40 Gupta A. Poverty and child neglect – the elephant in the room? *Families, Relationships and Societies* 2017;6:21–36.
- 41 Pelton LH. The role of material factors in child abuse and neglect. In: Melton GB, Barry FD, eds. *Protecting children from abuse and neglect: foundations for a new national strategy*. New York: Guilford Press, 1994.
- 42 Pelton LH. The continuing role of material factors in child maltreatment and placement. *Child Abuse Negl* 2015;41:30–9.
- 43 Braveman P, Heck K, Egarter S, et al. Economic hardship in childhood: a neglected issue in ACE studies? *Matern Child Health J* 2018;22:308–17.
- 44 Link BG, Phelan JC. McKeown and the idea that social conditions are fundamental causes of disease. *Am J Public Health* 2002;92:730–2.
- 45 Scott S, Curnock E, Mitchell R, et al. *What would it take to eradicate health inequalities? Testing the fundamental causes theory of health inequalities in Scotland*. Glasgow: NHS Health Scotland, 2013.
- 46 Pearce A, Dundas R, Whitehead M, et al. Pathways to inequalities in child health. *Arch Dis Child* 2019;104:998–1003.
- 47 Cooper K, Stewart K. *Does Money Affect Children's Outcomes? An update*. London: Centre for Analysis of Social Exclusion (CASE), London School of Economics, 2017.
- 48 Strand BH, Kunst A. Childhood socioeconomic position and cause-specific mortality in early adulthood. *Am J Epidemiol* 2007;165:85–93.
- 49 Melchior M, Moffitt TE, Milne BJ, et al. Why do children from socioeconomically disadvantaged families suffer from poor health when they reach adulthood? A life-course study. *Am J Epidemiol* 2007;166:966–74.
- 50 McCartney G, Collins C, Mackenzie M. What (or who) causes health inequalities: theories, evidence and implications? *Health Policy* 2013;113:221–7.
- 51 Freisthler B, Merritt DH, LaScala EA. Understanding the ecology of child maltreatment: a review of the literature and directions for future research. *Child Maltreat* 2006;11:263–80.
- 52 Coulton CJ, Crampton DS, Irwin M, et al. How neighborhoods influence child maltreatment: a review of the literature and alternative pathways. *Child Abuse Negl* 2007;31:1117–42.
- 53 Pickett KE, Pearl M. Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review. *J Epidemiol Community Health* 2001;55:111–22.
- 54 Macintyre S, Macciver S, Sooman A, Area SA. Area, class and health: should we be focusing on places or people? *J Soc Policy* 1993;22:213–34.
- 55 Joseph Rowntree Foundation. *UK poverty 2018*. York: Joseph Rowntree Foundation, 2018. <https://www.jrf.org.uk/report/uk-poverty-2018>
- 56 Reed H, Stark G. *Forecasting child poverty in Scotland*. Edinburgh: Scottish Government, 2018. <https://www.gov.scot/publications/tackling-child-poverty-delivery-plan-forecasting-child-poverty-scotland/pages/0/>. (Accessed March 2019).
- 57 Ahmed A, Wan-Yuen C, Marret MJ, et al. Child maltreatment experience among primary school children: a large scale survey in Selangor state, Malaysia. *PLoS One* 2015;10:e0119449.
- 58 Baglivio MT, Wolff KT, Epps N, et al. Predicting adverse childhood experiences: the importance of neighborhood context in youth trauma among delinquent youth. *Crime & Delinquency* 2017;63:166–88.
- 59 Mersky JP, Janczewski CE, Topitzes J. Rethinking the measurement of adversity: moving toward second-generation research on adverse childhood experiences. *Child Maltreat* 2017;22:58–68.
- 60 Cherry R, Wang C. The link between male employment and child maltreatment in the U.S., 2000–2012. *Child Youth Serv Rev* 2016;66:117–22.
- 61 Curenton SM, McWey LM, Bolen MG. Distinguishing maltreating versus nonmaltreating at-risk families: implications for foster care and early childhood education interventions. *Families in Society* 2009;90:176–82.
- 62 Doidge JC, Higgins DJ, Delfabbro P, et al. Economic predictors of child maltreatment in an Australian population-based birth cohort. *Child Youth Serv Rev* 2017;72:14–25.
- 63 Eckenrode J, Smith EG, McCarthy ME, et al. Income inequality and child maltreatment in the United States. *Pediatrics* 2014;133:454–61.
- 64 Euser EM, van IJzendoorn MH, Prinzie P, et al. Prevalence of child maltreatment in the Netherlands. *Child Maltreat* 2010;15:5–17.
- 65 Euser EM, van IJzendoorn MH, Prinzie P, et al. Elevated child maltreatment rates in immigrant families and the role of socioeconomic differences. *Child Maltreat* 2011;16:63–73.
- 66 Euser S, Alink LRA, Pannebakker F, et al. The prevalence of child maltreatment in the Netherlands across a 5-year period. *Child Abuse Negl* 2013;37:841–51.
- 67 Freisthler B. A spatial analysis of social disorganization, alcohol access, and rates of child maltreatment in neighborhoods. *Child Youth Serv Rev* 2004;26:803–19.
- 68 Freisthler B, Bruce E, Needell B. Understanding the Geospatial relationship of neighborhood characteristics and rates of maltreatment for black, Hispanic, and white children. *Soc Work* 2007;52:7–16.
- 69 Frioux S, Wood JN, Fakeye O, et al. Longitudinal association of county-level economic indicators and child maltreatment incidents. *Matern Child Health J* 2014;18:2202–8.
- 70 Herrenkohl TI, Herrenkohl RC. Examining the overlap and prediction of multiple forms of child maltreatment, stressors, and socioeconomic status: a longitudinal analysis of youth outcomes. *J Fam Violence* 2007;22:553–62.
- 71 Hosseinkhani Z, Nedjat S, Aftatouni A, et al. Socioeconomic inequality and child maltreatment in Iranian schoolchildren. *East Mediterr Health J* 2015;21:819–27.
- 72 Johnson-Motoyama M, Putnam-Hornstein E, Dettlaff AJ, et al. Disparities in reported and substantiated infant maltreatment by maternal Hispanic origin and nativity: a birth cohort study. *Matern Child Health J* 2015;19:958–68.
- 73 Lee BJ, Goerge RM. Poverty, early childbearing, and child maltreatment: a multinomial analysis. *Child Youth Serv Rev* 1999;21:755–80.
- 74 Mersky JP, Berger LM, Reynolds AJ, et al. Risk factors for child and adolescent maltreatment: a longitudinal investigation of a cohort of inner-city youth. *Child maltreatment* 2009;14:73–88.
- 75 Nguyen LH. The relationship between unemployment and child maltreatment: a county-level perspective in California. *Child Youth Serv Rev* 2013;35:1543–55.
- 76 O'Donnell M, Nassar N, Leonard H, et al. Monitoring child abuse and neglect at a population level: patterns of hospital admissions for maltreatment and assault. *Child Abuse Negl* 2010;34:823–32.
- 77 Palusci VJ, Vandervort FE. Universal reporting laws and child maltreatment report rates in large U.S. counties. *Child Youth Serv Rev* 2014;38:20–8.
- 78 Putnam-Hornstein E, Needell B, King B, et al. Racial and ethnic disparities: a population-based examination of risk factors for involvement with child protective services. *Child Abuse Negl* 2013;37:33–46.
- 79 Raissian KM, Bullinger LR. Money matters: does the minimum wage affect child maltreatment rates? *Child Youth Serv Rev* 2017;72:60–70.
- 80 Schick M, Schonbucher V, Landolt MA, et al. Child maltreatment and migration: a population-based study among immigrant and native adolescents in Switzerland. *Child maltreatment* 2016;21:3–15.
- 81 Schuck AM. Explaining Black-White disparity in maltreatment: poverty, Female-Headed families, and urbanization. *Journal of Marriage and Family* 2005;67:543–51.
- 82 Sulimani-Aidan Y, Benbenishty R. Child maltreatment reports in Israel: the intersection between community socioeconomic characteristics and ethnicity. *American Journal of Orthopsychiatry* 2013;83:29–36.