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Does Money Affect Children's Outcomes? An update

CASEpaper 203

ISSN 1460-5023

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

STICERD
Suntory and Toyota International Centres for Economics and Related Disciplines
Research at LSE

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CASE/203
July 2017

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Editorial note

Kerris Cooper is a researcher at CASE and a doctoral candidate in the Department of Social Policy at the London School of Economics. Kitty Stewart is an Associate Director at CASE and Associate Professor in the Department for Social Policy at the London School of Economics. We are very grateful to the Joseph Rowntree Foundation for funding this updated review and to Tammy Campbell, Tania Burchardt, Eleni Karagiannaki and many others at CASE for helpful comments.

Abstract

This report provides an update to *Does Money Affect Children's Outcomes?: A Systematic Review*, published in October 2013. Using systematic search approaches, we review the literature examining the relationship between household financial resources and children's outcomes, focusing on OECD countries and on the last fifty years. We include studies looking at children's health, cognitive development and social, emotional and behavioural development, as well as studies on relevant intermediate outcomes, including the home environment and maternal mental health and health behaviours. Studies are only included if they use methods that allow us to reach conclusions about causal relationships: this includes randomised controlled experiments, quasi-experimental situations, and longitudinal studies tracking both financial resources and outcomes over time. The update adds 27 new studies to the 34 in the original review, and slightly expands the country coverage, although the evidence base remains heavily US-focused. The studies provide strong evidence that income has causal effects on a wide range of children's outcomes, especially in households on low incomes to begin with. We conclude that reducing income poverty can be expected to have a significant impact on children's environment and on their development.

Key words: poverty, income, disadvantage, child development, children's outcomes.

JEL number: D31, I31 I32 I38, H53

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1. Introduction

This report provides an update to *Does Money Affect Children's Outcomes?: A Systematic Review*, published in October 2013 (Cooper and Stewart, 2013). The original review sought to assess all the available evidence from OECD and EU countries on whether household financial resources themselves make a difference to children's health, education and social and behavioural development. While there is a vast amount of evidence demonstrating that children from low income households tend to have worse outcomes, much less is known about how far this relationship can be described as causal, rather than simply reflecting other related factors, such as parental education. The review aimed to fill this gap by evaluating evidence of changes in income (usually increases in income but also decreases) and whether these income changes have an impact on children's outcomes.

The outcomes of interest included children's physical health, social, behavioural and emotional development, cognitive development and school achievement, as well as intermediate outcomes that are important for child outcomes, such as maternal mental health, parenting behaviours, the home learning environment and material hardship. Following systematic searches of evidence published between 1988 and 2012, over 77,000 studies were identified and of these just 34 met the inclusion criteria and were reviewed.

The weight of the evidence suggested that money *in itself* does matter for children's outcomes; poorer children have worse outcomes in part because they are poor and not just because of other factors that are associated with low income. Of the 34 studies included, the vast majority (29) found significant positive effects. The evidence relating to children's cognitive development and school attainment was strongest and most abundant, followed by the evidence on social, emotional and behavioural development. There was more mixed evidence on physical health, and fewer studies on intermediate outcomes such as parenting and maternal mental health. Effects from the most robust studies were found to be comparable in size to effect sizes for spending on school or early education interventions: an increase in income of US$1000 in the year 2000 (roughly £860 in 2017 prices) is associated with an improvement in children's cognitive outcomes of between 5-27% of a standard deviation[1]. They indicated that increases in household income would not eliminate differences in outcomes between low-income children and others but could be expected to contribute to substantial reductions in those differences.

We also sought to explain *why* income matters for children's outcomes - what are the mechanisms through which it operates. We found evidence for both of the dominant theories: the Investment Model suggests that money affects children's outcomes via parents' ability to invest in goods and services that contribute to healthy child development, such as a home environment that facilitates learning through books, educational toys and a quiet space to study; extracurricular activities and trips out; a healthy diet, sports clubs and good quality housing. The Family Stress Model describes the emotional pathways through which money

[1] See Cooper and Stewart (2013) for a full discussion of how these effect sizes were calculated and the assumptions calculations were based on, as well as how this compares to spending on schools.

can affect children's outcomes. Managing with low financial resources can be stressful and have a negative impact on parents' mental health; this then has a negative effect on parenting (for example more harsh discipline) which is detrimental for children's outcomes. These theories are not mutually exclusive and indeed we not only found evidence for both these types of mechanisms but also that the pathways are not entirely separate but interact with each other.

Since the original report was published in 2013 the question of how much money matters has remained important in public and policy discourses in the UK. In 2016 the Child Poverty Act was effectively abolished, removing the targets for Government to reduce child poverty and replacing the income-based poverty measures with "life chances" indicators capturing household worklessness and children's educational attainment at age 16. Following campaigning from charities and academics, the Government committed to continue to publish the income-based child poverty measures, although they are no longer required to report them to parliament. The latest data show child poverty rising from 2012-13 to 2015-16, as a freeze in benefits, cuts to housing support and the benefit cap took effect (DWP, 2017). Additional reforms, including a new two child limit for universal credit claims from April 2017, along with the continued benefit freeze, are expected to lead to a further rise in poverty; the Institute for Fiscal Studies predict a 50% increase in relative child poverty between 2014-15 and 2020-21 (Brown and Hood, 2016). At the same time, government has continued to express commitment to the principle of social mobility, and to a "Britain where advantage is based on merit not privilege, talent not circumstance, hard work not background" (May, 2016).

The relationship between income and children's life chances is also of policy significance outside of the UK, particularly in the US which has higher levels of income inequality as well as bigger gaps in children's outcomes than other rich countries (Bradbury et al 2015). The question of how far money affects children's opportunities to thrive and succeed is therefore as important today as ever. Given the growing body of research in this area, this seems an important time to update the evidence base.

2. Methodology

This updated review has been conducted in line with the methodology of the original report. In order to reach robust and unbiased conclusions we took a systematic approach to conducting the review. This meant using clearly defined search terms and retaining or discarding studies based on pre-decided inclusion criteria.

We sought to update the areas for which we already had evidence[2], conducting systematic searches for studies related to the following outcomes:

[2] We found no evidence relating to children's subjective wellbeing and social inclusion in the original report and did not search for these outcomes in this update.

1. Children's educational achievement and cognitive development
2. Children's social and behavioural outcomes
3. Children's physical health
4. Intermediate outcomes that can be thought of as potential mechanisms for transmitting the disadvantage of low income into poor outcomes for children. These include:
    - Parenting and the home learning environment
    - Maternal mental health
    - Maternal health behaviours (for example smoking during pregnancy)
    - Food sufficiency
    - Expenditure (on children's items and other goods likely to benefit children)

We conducted searches to find new material published since 2012 (as the original searches completed included evidence published from 1988 to 2012) and used the same databases: Econlit, SocIndex, IBSS (International Bibliography of the Social Sciences), British Education Index, PsychInfo and Medline. One significant difference from the original review is that this time we took the top 2,000 search results, ordered by relevance (largely driven by the frequency of the search terms included), rather than exporting all search results. This was necessary given time and resource constraints. It should not have compromised the unbiased approach to evidence inclusion, but does mean that the post-2012 evidence base may be less comprehensive than that prior to 2012. To reduce the chance that we missed out studies we checked all studies meeting our full inclusion criteria for references to other relevant studies published from 2012. We included both peer-reviewed journal articles and 'grey literature' (working papers) from 2012 onwards, adding to a strategy in the original review that had included both types of literature from 2009 onwards but only peer-reviewed studies prior to that date. This was an attempt to reach a balance between ensuring only high quality studies were included, without excluding more recent studies still in the review process. Excluding grey literature always carries a risk of publication bias. We think this is likely to be limited in our case as 'money does not matter' is an interesting and publishable finding in itself.

We used the same search template as in the original report, with some minor changes, including additional search terms to make the searches more comprehensive. Search terms are included in Appendix 1.

In-line with the original review, studies were only retained if they met the following criteria:

- Studies had to have an abstract written in English
- Studies had to relate to an OECD or EU country
- Studies had to have the stated aim of testing the effect of financial resources, which could include measures of income or wealth/assets

- Financial resources had to be measured at individual or household level (i.e. not at the level of the neighbourhood)
- Financial resources had to be measured during childhood and the outcomes had to be related to outcomes during childhood or intermediate outcomes that relate to outcomes in childhood[3]
- Studies had to use one of the following methods: randomised controlled trials (RCTs); quasi-experimental approaches; or analysis of longitudinal data tracking changes in financial resources and outcomes over time within the same household (we refer to these as observational studies).[4]

The last criterion is a crucial one. Establishing causal relationships is very difficult in social science, and it is clear that observed associations between household income and children's outcomes could reflect a wide range of associated factors, including parental education, parental aspirations, approaches to parenting, and genetic inheritance, among other things. While many studies are able to control for a large number of observed characteristics, they cannot adjust for differences between households that are not captured in the data. Our three chosen methods offer the best opportunity of identifying true causal effects – the effect an increase in financial resources in a given household would have on children in that household. RCTs do this by randomly assigning individuals to a treatment group (the group receiving a boost to income) or control group who are identical to the treatment group in all important ways other than the change in income (or at least any differences are random). Therefore changes in outcomes can confidently be attributed to the income change itself, rather than to other unobserved differences between households. Quasi-experimental studies replicate this treatment and control comparison by making use of an exogenous event (external to the household) which results in some households receiving more income than others, where the likelihood of receiving the additional income is either not associated with characteristics of the households, or where the characteristics associated with receiving additional income are known and can be controlled for. Different approaches can then be used to estimate the effect of the change in income by comparing outcomes with a quasi-control group – a group that is similar but did not receive an increase income[5]. For example, several studies make use of variations in the Earned Income Tax Credit in the US, exploiting the fact that benefits were increased for some family types but not others (e.g. households

[3] This included outcomes measured at age 18, such as height, weight and IQ captured at entry to military service. We also included high school graduation and college entry decisions.

[4] In the original study we described four types of methods: 1) randomised controlled trials 2) natural experiments 3) other studies that use exogenous variation in income such as instrumental variable approaches 4) studies that use longitudinal data and measure changes in income and outcomes within households, thereby holding time invariant unobservable characteristics constant. In this updated review we have simplified the categorisation of different methods, recognising that many of the 'instrumental variable' studies could also be described as natural experiments and the distinctions between these four methods are not so clear cut.

[5] This can be done for example by using difference-in-difference or regression discontinuity designs or instrumental variables.

with two or more children), and/or that increases were more generous in some states than others.

Finally, longitudinal observational studies have no control group, but reduce the risk that unobserved differences between households drive results by concentrating on changes *within* households as income changes over time. These studies cannot, however, control for unobserved changes over time in household circumstances that may accompany income changes: for example, an increase in labour market income may be the result of an improvement in parental health which has its own effects on child outcomes. This, and the risk of measurement error in capturing income in household survey data, make these studies weaker than the experimental approaches, even though their external validity (generalisability) may be greater than for localised RCTs. These issues are discussed at greater length in the original review.

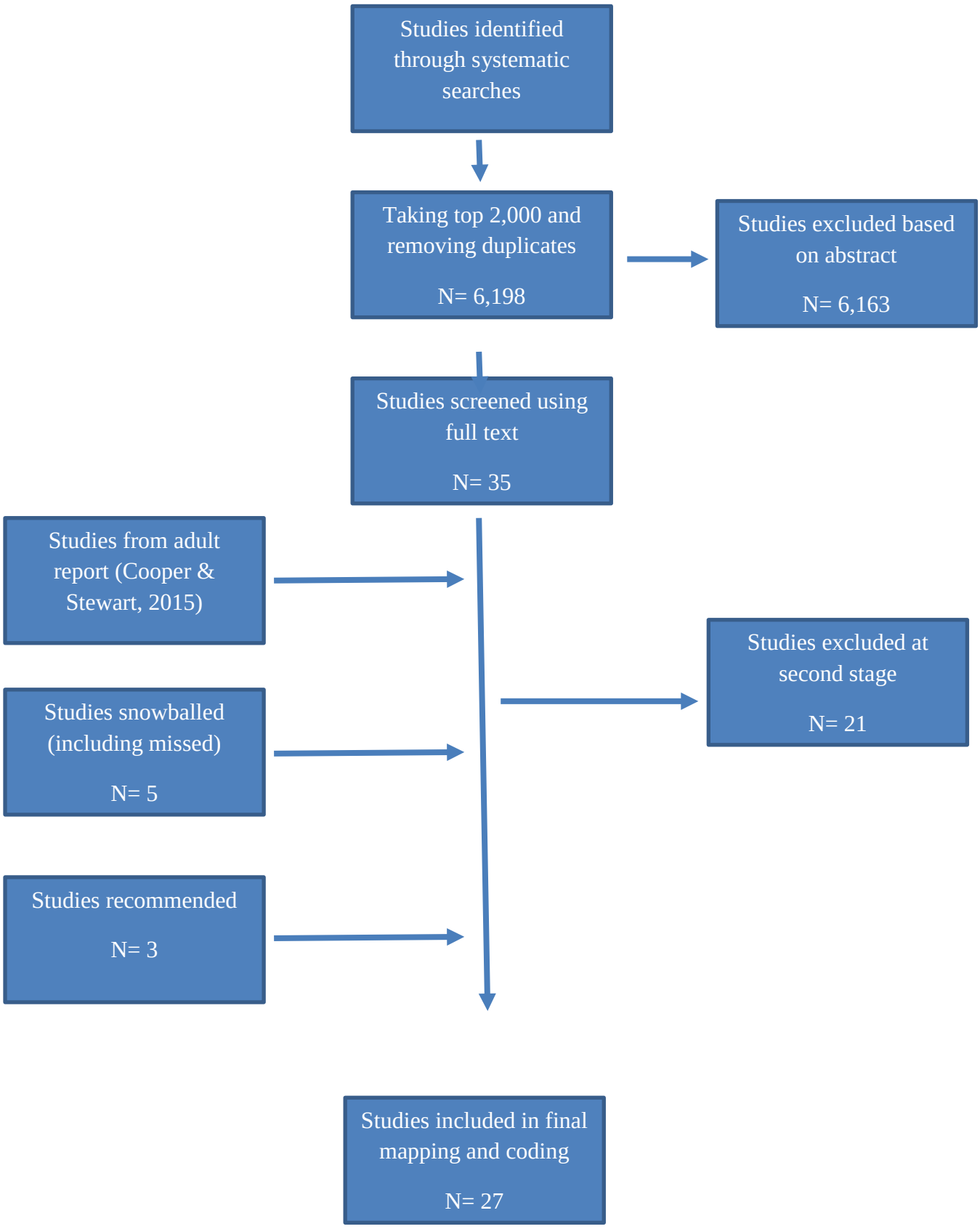
In terms of evaluating the results of the studies we decided to make three changes to our original approach. Firstly, it was decided that studies which found significant effects for sub-groups within the overall sample would be described as finding a significant effect. Originally we only described results as significant if the results for the whole sample were significant because we were erring on the side of caution, taking a conservative approach to what we would count as finding an effect. However, given that some studies only focus on low income samples to begin with, we have decided it is more consistent to describe significant effects found for sub-samples within a broader overall sample. Secondly, it was decided that studies would only be described as finding a significant effect if results were significant at the level of 5%; this is the conventional standard and allows for consistency in comparing studies (as some studies only report results as significant at 5%). This step was not taken in the original, which meant that one study was described as having significant results when they were significant at 10%. Together these two decisions resulted in re-categorisations of four of the studies from the original report but did not change the overall findings from the original report.[6]

Thirdly, we added an additional inclusion criteria: studies had to examine the impact of money on children's outcomes in recent times (the last fifty years). The searches uncovered two studies which were only recently published but which focus on boosts to income many decades ago: Aizer et al. (2016) examine the long-term effects of the first form of cash assistance in the US, the Mother's Pension Programme in the early twentieth century, while Bleakley and Ferrie (2016) analyse the impact of winning Georgia's Cherokee Land lottery in the 1830s. These two studies highlight the potential for researchers to make use of historical data to track the effects of such income shocks even in the past, but are limited in terms of

[6] Allowing for significant results for sub-groups, three studies previously coded as 'no effect' were recoded as finding positive effects for behavioural outcomes (Dooley and Stewart, 2007), health (Milligan and Stabile, 2011), and educational outcomes (Violato, et al 2011). Using 5% significance as the cut off for significant results resulted in one study on behavioural outcomes being recoded from 'positive' to 'no effect' (Morris and Gennetian, 2003).

what they can reveal about the impact of income today. They are based on the impact of money from a much earlier time period than all other studies and so they were excluded.

Figure 1*:* Flow diagram of new searches and studies included/excluded



3. The new evidence

After completing all systematic searches and taking the top 2,000 search results with duplicates removed, 6,198 abstracts were reviewed, as shown in Figure 1. Of these, 35 studies passed the first stage of screening and were reviewed in more detail. Upon further examination 21 of these did not meet the full inclusion criteria and were excluded. The 16 studies that did meet the inclusion criteria were coded. To minimise the likelihood of missing relevant studies due to them not appearing in the top 2,000 search results, the 16 coded studies were checked for any references to other causal studies that were within the search period. This enabled us to identify five additional studies. We also checked results from systematic searches we conducted for a related review on adult outcomes (Cooper and Stewart, 2015); this led to five further studies[7]. Finally, three studies were recommended to us (one of these did not show up in our search results because it did not include any terms in the abstract which related to 'children' (Loopstra and Tarasuk, 2013) and the other two were published after searches were conducted (Wickham et al, 2017; Fitzsimons et al, 2017). This left us with a total of 27 new studies – almost as many as the original systematic review which includes 34.

As with the original review, the majority of the evidence on whether income has a causal effect comes from the US (15 out of the 27 new studies), but there is now some evidence from countries previously not represented: a single study each from Sweden, Germany and Australia. There is therefore more evidence from other countries, though it still heavily skewed towards the US, as Table 1 shows.

[7] These were studies related to maternal smoking (Averett and Wang, 2013), birthweight (Hoynes, Miller and Simon, 2015), college enrolment (Lovenheim. 2011; Lovenheim and Reynolds, 2013) and expenditure (Raschke, 2012).

Table 1: New studies by country

Country	*Original studies*	*New studies*	*Total*
Australia		1	1
Canada	2	1	3
Germany		1	1
Mexico	1	2	3
Norway	4	2	6
Sweden		1	1
UK	4	4	8
US	22	15	37
US and Canada	1		1
Total	**34**	**27**	**61**

In terms of the type of evidence, there is an encouraging shift towards more evidence coming from quasi-experiments in the new studies (contributing 18 of the 27 studies, as shown in Table 2), and fewer longitudinal observational studies. This is something we highlighted as an important consideration for future research, given that studies that rely purely on longitudinal data to track random changes in income and outcomes within households are likely to underestimate the effect of income.[8]

Table 2: New studies by method used

Method	*Original studies*	*New Studies*	*Total*
Randomised Controlled Trial	5	1	6
Quasi-experiment	15	18	33
Observational	14	8	22
Total	**34**	**27**	**61**

[8] This is mainly because of the likelihood of measurement error in the income variables. In addition, these studies tend to look for effects across the whole income distribution, and we know that the effect of income is greatest at the bottom of the distribution. See the original review, Cooper and Stewart, 2013 for detailed discussion.

Some of these studies provided more evidence from quasi-experiments already represented in the original report. For example, Manley, Fernald and Gertler (2015) add to the evidence on the conditional cash transfer in Mexico, *Oportunidades*, by exploiting different amounts received by families with different characteristics (payments differed depending on age and gender of children, while the same conditions applied to all). Six new studies make use of changes in the US Earned Income Tax Credit (EITC) which favoured some family types more than others (Hamad and Rehkopf, 2015; Hoynes, Miller and Simon, 2015; Averett and Wang, 2013; Cowan and Tefft, 2012; Boyd-Swan et al., 2016; Chia, 2013) adding to the three studies from the original review that examined changes in the EITC (Dahl and Lochner, 2012; Evans and Garthwaite, 2010; Strully, Rehkopf and Xuan, 2010).

Aside from new evidence on 'old' experiments, recent years have also seen studies exploiting new experimental or quasi-experimental situations. Cancian, Yang and Slack (2013) look at a randomised controlled trial of a welfare programme in Wisconsin which examined effects on reported child abuse and neglect; Cesarini et al. (2016) make use of three different lotteries in Sweden to analyse the effect of winning on a number of outcomes; and Komro et al. (2016) exploit changes in minimum wages across states and over time in the US to look at income effects on infant mortality and birth weight.

The sheer number of new studies since 2012 indicates that this is an expanding area of research. We found almost as many new studies published from 2012 to early 2017 as were published between 1988 and 2012. The question of whether and how far money matters appears to be moving up the research agenda, and we may expect to see more studies contributing to this evidence base in the years to come.

In terms of the types of outcomes measured, previous evidence was most heavily focussed on cognitive development. The spread of outcomes measured is a little more even in the updated evidence, with roughly the same number of studies focussed on health and on potential mechanisms (intermediate outcomes) as on cognitive and schooling outcomes (see Table 3).

Table 3: New studies by outcomes measured

Nature of outcome(s) measured	***Original studies***	***New studies***	***Total***
Cognitive development and school achievement	21	9	30
Social, behavioural and emotional development	9	7	16
Physical health	8	9	17
*Potential mechanisms**	11	13	24

N.B. Some studies measured multiple outcomes.
*Potential mechanisms include parenting, maternal mental health, food insufficiency, parental health and health behaviours and expenditure.

4. Findings from the expanded evidence base

Our original 34 studies gave a strong indication of the importance of household financial resources for a range of children's outcomes. The evidence relating to cognitive development and school achievement was the clearest and most abundant, followed by the evidence on social and behavioural development. We also found positive effects on intermediate outcomes, including maternal mental health, parenting and the home environment. Evidence about the impact of income on children's physical health was more mixed.

The new evidence base both supports and extends this picture. Overall, 21 of the 27 new studies found income had a positive effect on all the outcomes they looked at (though not necessarily on all measures of each outcome), while just one (Chia, 2013) found no significant effects at all. Four studies had mixed results, which means they found significant effects of income on some of the outcomes they measured (such as effects on health but not education), with one of these identifying a mix of positive and negative effects (Cesarini et al., 2013). One study finds only what we consider to be negative effects: Blow et al (2012) find a high share of unanticipated increases in Child Benefit were spent on alcohol by middle and higher income parents, though no effects were found for parents on lower incomes (and households with no-one in work were not included in the analysis).

Table 4 summarises the full set of results, including both new and original studies. The vast majority of studies find positive effects on at least some of the outcomes looked at, around three quarters of studies finding positive effects on all outcomes (though not necessarily all measures of each outcome).

Because several studies analyse the same quasi-experiment or the same dataset, albeit often looking at different outcomes, there is a risk of double-counting or giving too much weight to the same few examples. The most extreme example was noted above: nine of the 61 studies analyse the effects of the Earned Income Tax Credit in the US. We therefore also present Table 5, which counts all studies using either the same experiment or (for observational studies) the same dataset as one observation. As can be seen from comparing Tables 4 and 5, grouping studies by case reduces the total number of observations from 61 to 34 but does not alter conclusions about the direction of the evidence. In all but two out of 34 'cases' there are positive effects on some outcomes, with positive effects on all outcomes in more than two-thirds of cases.

A full list of studies grouped by event or dataset, with a summary of outcomes and results, can be found in Appendix 2 (online).[9]

[9] In Table 5, we have erred on the side of grouping studies. For example, Cooper and Luengo-Prado (2015), Lovenheim (2011) and Lovenheim and Reynolds (2013) are grouped as one case as they all investigate the effects of local variations in house price inflation on teenagers' college choices in the US, though Lovenheim and Reynolds (2013) use NLSY97 data and the other two studies each use different years of the PSID.

Table 4: Summary of results, treating each study as one observation

Type of study	***Mixed***	***Negative***	***No effect***	***Positive***	***Grand Total***
Randomised controlled trials	1		1	4	6
Quasi-experiments	6	1	3	23	33
Observational studies	3		1	18	22
Total	**10**	**1**	**5**	**45**	**61**

Note: 'Mixed' results show positive effects on some but not all types of outcome (e.g. positive effects on educational but not health outcomes).

Table 5: Summary of results, treating each 'case' as one observation

Type of study	***Mixed***	***Negative***	***No effect***	***Positive***	***Grand Total***
Randomised controlled trials	1			2	3
Quasi-experiments	5	1	1	12	19
Observational studies	2			10	12
Total	**8**	**1**	**1**	**24**	**34**

Note: See Appendix 2 (online) for more detail on grouping of studies. 'Mixed' results show positive effects on some but not all types of outcome. When grouped by 'case', results are positive overall even where there are mixed or insignificant results in one study, if other studies have found significant positive effects for that type of outcome. On the other hand, results can become mixed overall when there are positive results from some of the individual studies, as we now have evidence from the event for more types of outcome. (For example, between them, studies on the group of US welfare-to-work RCTs find positive effects on education, behaviour, maternal depression and domestic abuse but no effect on home environment or parenting.)

Table 6 breaks the evidence base down by children's outcomes. The evidence on cognitive development and school achievement continues to look strong, with 24 of the 30 studies identifying positive effects, against 5 finding no effect and one study finding a negative effect. The picture for behavioural outcomes is slightly more mixed with one third of the studies finding no effect, although still the majority find significant positive effects. The

results for children's physical health are now stronger and more consistent than in the previous review, with 14 out of 18 studies finding significant positive effects, although one study finds a mixture of positive and negative effects. The results are strongest overall for intermediate outcomes, which includes studies that measure maternal mental health, parenting, expenditure patterns and the home learning environment – 21 of the 24 studies find significant positive effects of income.

Appendix 3 (online) provides a list of studies that look at each outcome, along with more detail on outcome measures and results. Here we provide a brief overview of the central findings by outcome.

Table 6: Summary of results by outcomes

Studies measuring	***Negative***	***No effect***	***Positive***	***Mixed****	***Total***
Child outcomes:					
Cognitive development and school achievement	1	5	24	0	30
Social, behavioural and emotional development	0	4	12	0	16
Physical health	0	3	13	1	17
Potential mechanisms:					
Parenting/home environment		1	5		6
Maternal mental health		1	6		7
Maternal health behaviours		3	6		9
Food sufficiency			4		4
Expenditure	1		2	1	4
All evidence on mechanisms	*1*	*1*	*21*	*1*	*24*

*'Mixed' indicates a mix of positive and negative results within the outcome category. Studies are classified simply as positive if they found a mix of positive and insignificant results within the outcome category (and similarly studies finding a mix of negative and insignificant results are classified as negative).

4.1 Cognitive outcomes

Thirty studies in total look at cognitive or educational outcomes – the largest body of evidence, as in the original review. Nine of these are new, with eight of the nine finding

positive effects on at least some of the measures looked at. Of these eight positives, two investigate the *Oportunidades* cash transfer program in Mexico, which was represented by a single study in the original report. Fernald et al. (2009) and Manley et al. (2015) identify effects on a wider set of cognitive (and health) measures, including at a later time point when children are older (Fernald et al., 2009; Manley et al., 2015).[10] The remaining six look at new datasets or make use of new quasi-experimental situations. Using longitudinal survey data for Australia, Khanam and Nghiem (2016) track children over time to find that changes in income in the household are associated with improvements in a multiple different test scores including literacy and maths; while Elstad and Bakken (2015) find positive significant household income effects on grade point average in Norway at 16, comparing children to their siblings. Morrissey et al. (2013) look at whether moves into low income as captured by free school lunch eligibility affect school engagement and outcomes, and find negative effects on attendance and punctuality but not on grade point average.

Three further studies look at the impact of housing wealth – the only studies of the full 61 to explore the effects of assets rather than income. These studies all link local house prices to two different US panel datasets, and find that the growth rate in housing prices in the area where a child lives as a teenager appears to affect choices regarding college entry. Lovenheim (2011) finds faster growth is associated with a higher chance of college entry for children of homeowners; while Lovenheim and Reynolds (2013) also identify effects on the prestige of the college attended, with evidence that housing equity makes more difference to choices for students from lower-income households. Cooper and Luengo-Prado (2015) look at outcomes for children of renters as well as home-owners: they find faster housing price growth is associated with a greater likelihood both of college enrolment and of enrolment in a top performing college for the children of home-owners, while for the children of renters, higher growth means a *lower* likelihood of college enrolment.

Just one of the nine new studies finds no positive effect. Cesarini et al (2016) looks at the effects of three contemporary lotteries in Sweden, and finds no effect of household lottery wins on children's test scores and if anything a small *negative* effect on cognitive skills for boys joining the armed forces at 18.

Putting these nine new studies together with the original 21, we find the balance of evidence points at least as strongly as before to the effects of household income on children's cognitive development and schooling outcomes (see 'headcount' in Table 4, and Table A1 for detail). The body of evidence covers a wide range of outcome measures. They point to wide-ranging effects of income that operate on children's engagement and attendance, affect their test scores, and later influence their option set or decision making process at key educational transitions.

It is interesting to note that there are no areas which consistently find no effect of income: all outcomes have positive effects from some studies (see Table A1 for details). The absence of

[10] Fernald et al (2009) should have showed up in our searches for the original review; it is not clear why it did not.

an income effect may in some cases be because of the nature of the income change: Cesarini et al. is unusual in looking at large changes in income resulting from a lottery win, and it has been argued that lottery wins may be treated differently to other more day-to-day income changes from wages or social security benefits (see Doherty et al, 2006). (It may alternatively be that Sweden is unique.) Or it may be because of methodology: as noted in the original review, Løken (2010) found no effect of the 1970s Norwegian oil-based income boom on years of education obtained, but Løken et al. (2012) found the oil boom had indeed had an impact when they used a methodology which allowed for effects to be larger at the bottom of the distribution.

This last highlights a general point, which is a repeated theme in the sections below: nearly all studies which find no effects are looking for them across the full income range (all but Fernald et al., 2009). Yet if a boost to (or a drop in) income makes most difference in households at the bottom of the income distribution – and there is good reason to think that this would be the case, as we set out in the original review, and as testified by several studies included here, shown in Table A1 – then studies looking across the full population may well fail to identify significant results. This is because the positive effect at the bottom of the distribution is diluted below the significance threshold when averaged across the whole distribution.

4.2 Social and behavioural outcomes

In total there are sixteen studies which measure the impact of income on children's social, emotional and behavioural development, and just seven of these are new studies (see Table A2 for the full list of studies). Just over half of these new studies (four of the seven) use quasi-experiments, with three using situations already covered in the original systematic review. Two make use of the conditional cash transfer programme in Mexico, *Oportunidades* (Manley et al, 2015; Fernald et al., 2009) and one uses variations in the US EITC (Hamad and Rehkopf, 2015). One study makes use of a new experimental situation, exploiting lottery wins in Sweden (Cesarini et al., 2016). Finally, three studies are observational, tracking changes in income and children's outcomes within the same household over time in Norway (Zachrisson and Dearing, 2015) and the UK (Wickham et al, 2017; Fitzsimons et al, 2017).

Of the seven new studies, five find positive effects of income on behavioural problems as measured by the Strengths and Difficulties Questionnaire (SDQ), Behavioural Problems Index (BPI) and the Child Behaviour Checklist. Two find no effect on behavioural problems as measured by the SDQ (Fernald and Gertler, 2015) and an armed forces psychological assessment (Cesarini et al, 2016). One of these is based on the conditional cash transfer programme *Oportunidades* in Mexico, although Fernald et al (2009) use the same cash transfer programme and find a significant positive effect on behavioural problems as measured by the SDQ when they consider longer-term effects. The second new study to find no effect is that by Cesarini et al. (2016) on Swedish lotteries; as noted above, it may be that

lottery wins have a different effect on households than increases in income from other sources.

Taking the old and new evidence together as a whole, the majority of studies (twelve of the sixteen) find income does have an effect on social and behavioural outcomes, with four studies finding no effect. As well as the two new studies mentioned above, Morris and Gennetian (2003) find no effect of income from the Minnesota Family Investment Program on problem behaviour, (although they find a marginally significant increase in positive social behaviour at 10% level of significance)[11], and Violato et al. (2011) find no effect on behavioural problems measured by the SDQ. The latter is an observational study and controls for factors likely to be mechanisms, including maternal depression and parenting behaviours, so tells us only that there is no measurable income effect operating through other pathways.

As was the case for cognitive and schooling outcomes, several studies find a non-linear effect, with bigger effect sizes for households at the bottom of the income distribution, meaning additional income matters more in households with less to start with. Four of five studies testing for non-linear effects find one. Two of the four studies finding no effects are looking for them across the whole distribution, though two are focused on low-income samples only (Morris and Gennetian, 2003; Manley et al, 2015).

4.3 Health outcomes

Seventeen of the studies in our full evidence base measure the impact of income on children's physical health, and nine of these are from the updated review, so the evidence on health outcomes has more than doubled since the original report (see table A3 for details of all health studies). All nine of the new studies take a quasi-experimental approach, with the exogenous variation in income coming from a number of different sources: two use the conditional cash transfer in Mexico, *Oportunidades*, as discussed above; two (one from the UK and one from the US) use variation in local labour markets (Kuehnle, 2014; Mocan et al, 2015); one uses changes in minimum wage across different US states (Komro et al, 2016); and one uses lottery winnings (Cesarini et al, 2016). Two of the studies use benefit levels to test the effect on children's outcomes, both looking at the Earned Income Tax Credit (Hoynes et al, 2012; Chia, 2013). Finally, one study uses the Alaska Permanent Fund, a payment made to all residents of Alaska in the early 1980s to redistribute some of the money gained from auctioning off drilling rights (Chung, Ha and Kim, 2016).

Of the new studies the majority (seven of the nine) find significant positive effects of income on child health, with just one (Chia, 2013) finding no effect and one (Cesarini et al., 2016)

[11] In the original report this was described as being positive but we have adjusted this to 'no effect' in this report because the effects are only significant at the level of 10% and the conventional level of significance used in studies is stricter at 5%. The number of studies from the original report remains as two however; this is because the study by Dooley and Stewart (2007) has been recoded here as positive as there was a positive significant result for one measure of behavioural problems – the measure self-reported by the child.

finding mixed effects including some negative effects. Cesarini et al. (2016)'s study of lotteries in Sweden finds that the risk of obesity falls for lottery winners, but there is no effect on drug prescriptions for allergy, asthma and ADHA, while hospitalisations *increase* for children in the first few years after the lottery win. Chia (2013) finds no effect of variations in the Earned Income Tax Credit (EITC) on obesity or the risk of being overweight. Note that two other health studies make use of changes in EITC (Strully et al., 2010 and Hoynes et al, 2015) and both find significant positive effects on birthweight, which is perhaps more responsive to changes in income than weight during childhood.

Taking the evidence as a whole, a substantial majority of the studies find significant positive effects of income on health (although not necessarily on every measure of health). Three studies find no effect and one study finds both positive and negative effects, as discussed above.[12] The studies measure a number of different child health outcomes. There is most evidence pointing to significant income effects on birthweight and other neonatal outcomes, with somewhat more mixed results on weight and general health in later childhood, and no evidence of income effects on asthma, wheezing and other respiratory diseases. However, the latter may simply indicate a paucity of studies: only three studies focus on these outcomes, and all three look for effects across the full distribution. Many of the health studies (7 of 17) focus on low income samples, while of those that look at the whole income distribution and explore non-linearities, five out of six find that income has a greater impact for those at the lower end of the distribution.

4.4 Studies examining potential mechanisms between income and children's outcomes

In total 24 studies examine the effect of income on what we have called intermediate outcomes – these can be thought of as potential mechanisms through which income affects children's outcomes. The studies are summarised in Table A4, grouped by the types of mechanisms they measure. The evidence comes from a range of different methods. Three studies make use of randomised controlled trials (two of welfare programmes in the US and one from a conditional cash transfer in the US). Fifteen use quasi-experiments, including six studies examining Earned Income Tax Credits (EITC) in the US; five analysing wider welfare reform in the US or variation in child benefits in the UK, Germany and Canada; one study which considers the effects of casino profits in an Eastern Cherokee reservation (Akee et al., 2010); one on lottery winnings (Cesarini et al., 2016); one on the Alaska Permanent Fund (Chung, Ha and Kim, 2016); and one using skill-biased technology shocks (Mocan et

[12] Note that in the original review, Milligan and Stabile (2011) was coded as having no effect for health, because results are only significant for a low education sample. In this review we have changed the classification to positive, on the grounds that many studies focus on a low income sample exclusively. We make clear in the study tables where effects are only found for sub-groups.

al., 2015). There are also five observational studies which track changes in income and outcomes within households.

Just over half (13) of the studies are new, from the recent searches. Most provide additional evidence of positive effects of income on parenting and the home environment, maternal mental health, maternal health behaviours and food sufficiency. However, the new studies also bring some mixed evidence, with one study finding no effect (this is Cesarini et al.'s lottery study again, which finds no effect of lottery wins in Sweden on smoking during pregnancy). The new evidence also includes one study which finds *negative* effects: Blow, Walker and Zhu (2012) analyse variation in child benefit in the UK and find unanticipated increases to be associated with increased spending on women's clothes for mothers and alcohol for couples. However, their sample excludes families in receipt of means-tested benefits, and even within the sample negative effects are significant only for the third or two-thirds of families with higher incomes. This leads the authors to suggest that this is not necessarily evidence that parents prioritise spending on themselves over spending on their children, but rather that parents fully insure children against income shocks so that unanticipated changes in income do not affect spending on children (children's needs are already met).

The only other negative findings for intermediate outcomes come from another study on expenditure included in the original review: Kaushal, Gao and Waldfogel (2007) find variation in benefit levels in the US lead to increased spending on durables (car, telephone, microwave), transport, food away from home and to a lesser extent adult clothing, but have no effect on spending on children's clothing, learning and enrichment. This study highlights the difficulty of identifying securely whether expenditure categories are positive, neutral or negative for children's outcomes. The authors suggest that food away from home and adult clothing (as well as transport) are all spending patterns that could be related to employment; given the mandatory employment criteria of US benefits, these patterns in spending may be expected and, although we have categorised them as negative, are not a clear signal that when receiving higher benefits parents prioritise spending on themselves rather than their children.

Additionally, Kaushal and colleagues suggest that there may be a labelling effect of benefits, which may explain why another study on expenditure finds more straightforwardly positive results: Gregg, Waldfogel and Washbrook (2006) find that changes in child benefit in the UK led to increased spending on children's clothing, toys and books, fruit and vegetables as well as similar durables (car, telephone). They also found parents reduced their spending on alcohol and cigarettes. Kaushal, Gao and Waldfogel (2007) argue that because these UK benefits are labelled as 'child benefit' and 'child tax credits' this might have encouraged parents to spend them on child-specific goods. Raschke (2012) also analyses variation in child benefit or 'kindergeld' in Germany, and finds an increase in food expenditure with a significantly larger effect of child benefit compared to other sources of income, providing further evidence that there may be a labelling effect. Raschke also finds increases in child benefit are associated with living in a larger apartment with a greater number of rooms, reduced probability of renting and an increase in parents' spending on trips out including

cultural excursions likely to include children (e.g. going to the zoo). Unlike Gregg et al. (2006), Raschke finds no effect on smoking, the number of cigarettes smoked or on drinking.

Taking these four expenditure studies together it is difficult to draw firm conclusions about the effect of changes in benefits on parents' spending patterns. Whilst there are some findings included in the 'negative effect' column of Table A4, it is not unambiguously clear that these spending patterns should be characterised as negative, when potentially related to employment activities, or when effects do not apply to low income families. The studies of child benefit specifically (in England and Germany) do provide some evidence of what can be interpreted as positive effects on spending patterns, such as increased spending on fruit and vegetables and increased food expenditure, more spending on children's clothes, books and toys as well as trips outside of the home.

Studies that focus on other types of intermediate outcomes have more straightforwardly positive findings than the expenditure studies. Looking at our full evidence base, we now have six studies measuring parenting behaviours and the home environment. The evidence comes from two randomised controlled trials (Cancian et al., 2013 and Gennetian and Miller, 2002), two quasi-experiments (Akee et al's 2010 casino study and an EITC study by Hamad and Rehkopf, 2015), and two observational studies (Votruba-Drzal, 2003 and Dearing and Taylor, 2007). All find significant positive effects, although not all for every measure. Gennetian and Miller's (2002) examination of the Minnesota Family Investment Program (an RCT), found a reduction in domestic abuse (and in maternal depression, included below) but no effect on the overall HOME[13] score or on HOME subscales, and no effect on extra-curricular activities. The remaining five studies find only positive effects, including evidence that increased income is associated with an improved home environment (including the overall HOME score, cognitive stimulation in the home, physical home environment e.g. learning materials and activities, and psychosocial home environment, such as parental warmth and responsiveness), increased parental supervision and increased activities with the mother, as well as a decrease in parental arrests. One of our new studies, an RCT of the Wisconsin Works Program, which allowed child support payments to 'pass through' in full to families, rather than being partly withheld where families were in receipt of benefits, finds that children in families keeping more child support were significantly less likely to be at risk of maltreatment (Cancian et al, 2013). This is a particularly important finding for a number of reasons – the consequences of child maltreatment, the fact that this is the only study we have found which looks at child abuse and neglect, and the robustness of the evidence given the randomised control group.

Seven studies measure maternal mental health and all but one (the lottery study by Cesarini et al (2016)) find increases in income are associated with a reduction in symptoms of maternal depression (or in the case of Wickham et al, (2017) moving into poverty is associated with a worsening of mothers' mental health). This includes the Minnesota RCT (Gennetian and Miller, 2002), quasi-experimental studies of EITC and child benefit in Canada (Evans and

[13] The Home Observation for Measurement of the Environment (HOME) is based on interviewer observations as well as questions about the home environment.

Garthwaite, 2010; Boyd-Swan et al, 2016; Milligan and Stabile, 2011) as well as Dearing et al.'s (2004) observational study for the US, and Fitzsimons et al's (2017) observational UK study. These studies look at measures of depression including the Centre for Epidemiological Studies Depression Scale (CES-D) and the Kessler scale. Boyd-Swan et al (2016) also find an increase in mothers' reported happiness, self-worth and self-efficacy. The causal evidence for the importance of income for mothers' mental health is therefore strong. The one study which finds no effect uses a more ambiguous measure than the other studies: Cesarini et al (2016) find no effect of income on parents' consumption of mental health drugs, but does not measure symptoms of depression directly.

Nine of the studies look at mothers' physical health and health behaviours, such as smoking and drinking (including during pregnancy), and/or at take-up of pre-natal care. Four of these studies use changes in EITC in the US and find that this is associated with a reduction in smoking and smoking during pregnancy (Cowan and Tefft, 2012; Averett and Wang, 2013 and Strully et al., 2010), as well as an improvement in mothers' general physical health and a reduction in medically measured risky conditions (Evans and Garthwaite, 2010). Mocan et al (2015) use skill-biased technology shocks and find for low-skilled mothers an increase in prenatal care consumption and reduced delay in prenatal care initiation, but no effect on smoking and drinking during pregnancy; similarly Chung , Ha and Kim (2016) find positive effects of the Alaska Permanent Fund dividends on prenatal care use, with earlier initiation of the first prenatal care visit, although no effect on the overall number of prenatal care visits. Two studies use variation in child benefit to isolate the effect of income: Milligan and Stabile (2011) find no effect on mother's general health and Raschke (2012) finds no effect on the probability of smoking, number of cigarettes smoked and drinking. As noted, the lottery study by Cesarini et al. (2016) finds no effect on smoking during pregnancy. These results are therefore rather more mixed than for other intermediate outcomes. There does seem to be very consistent evidence that changes in income linked to the EITC in the US are associated with an improvement in maternal health behaviours, but limited evidence that these findings are replicated in other contexts.

As well as the expenditure studies discussed above, which include measures of spending on food, four studies measure the effect of income on food insufficiency (i.e. not having enough to eat). The evidence includes a randomised controlled trial of a conditional cash transfer programme in New York (Riccio et al., 2010), the study of child benefit in Canada (Milligan and Stabile, 2011) and two observational studies, one for the US and one for Canada (Heflin et al, 2007; Loopstra and Tarasuk, 2013). The evidence is consistent: all four studies find that increases in income lead to decreases in food insufficiency.

Taking the evidence of all intermediate outcomes together the newly extended evidence base testifies to the importance of income for a range of intermediate outcomes likely to be important for children's development. There is support for both of the central theories about why money may affect children's outcomes, the Family Stress Model and the Investment Model. Evidence on maternal depression and food insufficiency is strongest, while studies on expenditure are less clear cut and leave a lot to interpretation. Income is also found to be important for parenting and the home environment, and for maternal health behaviours,

although not for every measure used. On smoking in particular, there is very clear evidence of the positive impact of the EITC in the US, but no evidence replicating this finding in other contexts.

Because many of the studies make use of changes in benefits or, in the case of a couple of studies, randomised controlled trials of welfare programmes, many of the samples (14 of the 24) include low income families only. Of the remainder, seven studies test explicitly for non-linear effects. Six of these find effects are either larger or only significant for less advantaged families, providing more evidence that additional income has greatest impact at the lower end of the income distribution.[14]

5. How *much* does money matter? Updating the evidence on effect sizes

We have found that the overwhelming majority of studies looking at the effects of income (or assets) on children's outcomes find significant positive effects. But how large are these effects? How much difference would a given boost to a household's financial resources make to children's prospects?

The original review presented standardised effect sizes for all studies for which this was possible, and we update those tables here (see Tables 7-10). Effect sizes give us the marginal effects of income change as a percentage of the outcome variable's standard deviation. In other words, if income was boosted by a given amount, how much of the average variation that exists between any given child and the mean score for a particular outcome would we expect to see eliminated? Here we present the effect sizes linked to a boost in household income of $1,000 USD in 2000 prices. A number of studies present their results in these terms, and as the majority of studies are from the US it seemed appropriate to leave results in dollar terms. Effect sizes for studies using different dollar amounts were adjusted up or down accordingly, after dollar sums had been converted to 2000 prices using the US Consumer Price Index. For countries outside the US, currencies were first converted into US dollars using OECD Purchasing Power Parities (PPP), and then to 2000 prices using the US CPI.[15]

As noted in the original review, the calculations remain somewhat crude. One reason for this is the different approaches taken to income equivalisation in different studies. Most of the experimental studies consider the effects of a given boost to income to the household as a whole (not adjusted for needs), whereas many (though not all) of the observational studies standardise income using a measure of household needs (namely household size). Thus a standardised $1,000 is actually capturing something rather different across studies; the larger the household, the more $1,000 in equivalised income will be worth relative to $1,000 unadjusted. Given the difficulty of doing justice to these differences, we simply advise that

[14] The remaining study which distinguishes effects at different levels of income is the study by Blow et al (2012) which finds negative expenditure effects are not significant for low income families.

[15] See www.usinflationcalculator.com and www.oecd.org/std/prices-ppp/.

results are treated as giving us a broad idea of the range of effect sizes rather than a clean comparison across individual studies or outcomes.

In practice, standardised effect sizes cannot be calculated for all studies, and in fact only six of our 27 studies can be added to the effect size tables. The reasons for omission are various. A number of studies do not provide the descriptive information necessary to standardise results (e.g. they do not give standard deviations or equivalent information for their outcome variables). Several have measures of money which cannot be converted to our common format – they use house price variation, or they present income in log form, or they focus on movement in or out of poverty, rather than a given income change. Finally, some outcomes (such as smoking, child maltreatment or being born below a cut-off for low birthweight) are categorical variables which cannot be standardised in a way that can be compared to other outcomes.

The evidence we have added from the new studies is highlighted in Tables 7-10. For cognitive achievement (Table 7), we have just one new effect size: Elstad and Bakken (2015)'s effect of income in Norway on Grade Point Average is calculated at just 1% of a standard deviation for $1,000, even among lower income households. This is a small number, in keeping with other effect sizes from observational studies, and considerably below those emerging from experimental evidence. As we argue in the original review, observational studies are considerably more likely than experimental studies to suffer from measurement error in the income variable, which is likely to bias results downward. More experimental studies which enable the calculation of standardised effect sizes would clearly be valuable.

Table 8 shows effect sizes for social and behavioural outcomes. Here we have two new studies to add. Zachrisson and Dearing's (2015) observational study of Norwegian data finds an effect size of 2% for internalising behaviour, very much in line with the effects on behaviour calculated from US observational studies. Hamad and Rehkopf's quasi-experimental approach using the Earned Income Tax Credit finds an effect of 3% on an overall behaviour problems scale (internalising and externalising behaviour). This is at the upper end of results from observational studies, but lower than the effects from the few experimental studies already in the table. Again, a larger body of comparable evidence would be helpful.

Table 9 turns to child health outcomes. We now have three studies with effect sizes for mean birthweight, compared to just one in the original review. Both the new studies (both of which make use of quasi-experimental evidence for the US) find small effects of 1-2% of a standard deviation, just below the 3% from Conley and Bennett's observational US study. Chung, Ha and Kim (2016), using the Alaska Permanent Fund, also find a small 2% effect on the Apgar score of newborn health.

Finally, Table 10 shows intermediate outcomes – specifically, maternal depression and the home environment – with evidence from two new quasi-experimental studies added. Boyd-Swan et al's EITC study finds effects of 13-15% of a standard deviation on measures of maternal depression and wider mental health, very much in line with those from the other two

pieces of experimental evidence already represented (Gennetian and Miller's range of welfare-to-work RCTs, and Milligan and Stabile's study of child benefit in Canada). Hamad and Rehkopf, also looking at the EITC, find a 4% effect on the HOME home environment measure, somewhat larger than most of the other home environment effects in the table, all of which come from observational US studies.

Overall, the limited additions to our evidence base tend to support the scale of effect sizes identified in the original review. Focusing on evidence from quasi-experimental studies only (given our belief that these provide more robust estimates of effect sizes), new evidence on maternal depression shows effects at least the size of previous findings, while new studies on the home environment and on health and behavioural outcomes find effects perhaps a little smaller than we might have expected from the previous evidence base. There are no new quasi-experimental studies on cognitive outcomes for which we can calculate standardised effect sizes.

As we argue in the original review, effect sizes in the range identified here are small but far from negligible. They compare reasonably well to effect sizes from other interventions: effects for a £1,000 increase in annual expenditure per child have been linked to between 2% and 7% of a standard deviation in test scores, for example (Steele et al., 2007; Holmlund et al., 2010; Nicoletti and Rabe, 2012). Furthermore, increases in household income are very likely to reach more household members and to affect a wider range of outcomes than increases in spending on particular public services, valuable as the latter may also be. The sizeable significant results for maternal depression are one indication of this. The effect sizes presented here do not suggest that increases in household income would be a magic bullet solution for inequalities in children's development and wider outcomes. But they do provide evidence that changes in household income, especially at the bottom of the income distribution, are likely to have important and measurable effects both on children's environment and on their development. There is nothing here to lead one to revise the conclusion that reducing income poverty needs to be one plank in any strategy to improve children's life chances and equalise opportunities for children from different backgrounds.

Table 7: Effect sizes for cognitive and educational outcomes (standard deviation change linked to USD$1,000 in 2000 prices)

	RCTs			Quasi-experiments					Observational			
	Gennetian and Miller (2002)	Clark-Kauffman et al (2003)	Duncan et al (2011)	Fernald et al (2008)	Akee et al (2010)	Milligan and Stabile (2011)	Dahl and Lochner (2012)	Black et al (2014)	Blau (1999)	Votruba-Drzal (2003)	Votruba-Drzal (2006)	Elstad and Bakken (2015)
Relevant population and data/source of income variation	*Low income US (Minnesota Family Investment Program)*	*Low income US (14 welfare programs)*	*Low income US and Canada (10 welfare programs)*	*Low income Mexico (Oportun-idades CCT)*	*Low income Native American US (casino)*	*Low education Canada (child benefit)*	*Low income US (EITC)*	*Low/middle income Norway (childcare subsidy)*	*All income groups US (NLSY)*	*All income groups US (NLSY)*	*All income groups US (NLSY)*	*All income groups Norway (public register data)*
Performance in school/GPA	0.12 (0.23 boys)	0.05	0.06					0.17		0.02		0.01 (low-inc)
Maths						0.07 (0.23 boys)	0.06		0.01		0.02	
Reading							0.05		0.01		0.02	
Peabody PPVT				0.21		0.37 (boys)			0.01			
Long-term memory				0.14								
Short-term memory				0.15								
Visual integration				0.10								
Completed schooling (years)					0.10						0.01	

Notes: Dahl and Lochner reading is an average of effect size for reading recognition (0.04) and reading comprehension (0.06). Black et al (2014) effect is mid-point of range given (0.09-0.26). Elstad and Bakken (2016) result significant for children in low-income families only. All coefficients presented are significant at least the 5% level.

Table 8: Effect sizes for social and behavioural outcomes (standard deviation change linked to USD$1,000 in 2000 prices)

	RCTs	**Quasi-experiments**		**Observational**			
	Gennetian and Miller (2002)	Milligan and Stabile (2011)	Hamad and Rehkopf (2015)	Blau (1999)	Dearing et al (2006)	Votruba-Drzal (2006)	Zachrisson and Dearing (2015)
Relevant population and data/source of income variation	*Low income US (Minnesota Family Investment Program)*	*All income groups Canada (child benefit)*	*Low income US (EITC)*	*All income groups US (NLSY)*	*Chronic poor and partnered only US (NICHD SECCYD)*	*All income groups US (NLSY)*	*All income groups Norway (Mother and Child Cohort Study)*
Behaviour Problem Index	0.12 (girls 0.22)		0.03	0.01		0.01	
BPI Internalising	0.12				0.02		0.02
BPI externalising	0.11				0.03		
Positive behaviour	0.15						
Engagement in school	0.17						
Hyperactivity – inattention		0.07					
Emotional disorder – anxiety		0.10					
Indirect aggression		0.22 (low ed girls)					
Conduct disorder – physical aggression		0.10 (0.16 low ed girls)					

Note: All coefficients presented are significant at least the 5% level.

Table 9: Effect sizes for child health (standard deviation change linked to USD$1,000 in 2000 prices)

	Quasi-experiments				Observational
	Fernald et al (2008)	Milligan and Stabile (2011)	Mocan et al (2015)	Chung, Ha and Kim (2016)	Conley and Bennett (2001)
Relevant population and data/source of income variation	*Low income Mexico (Oportunidades CCT)*	*All income groups Canada (child benefit)*	*All income groups US (skill-biased technology shocks)*	*All income groups Alaska (dividends from Alaska Permanent Fund)*	*All income groups US (PSID)*
Height for age	0.24	0.04 (boys 0.13)			
Birthweight			0.01 (low-skilled mothers only)	0.02	0.03 (children of low birthweight parent only)
Apgar score				0.02	

Note: All coefficients presented are significant at least the 5% level.

Table 10: Effect sizes for maternal depression and home environment (standard deviation change linked to USD$1,000 in 2000 prices)

	RCTs	**Quasi-experiments**			**Observational**			
	Gennetian and Miller (2002)	Milligan and Stabile (2011)	Boyd-Swan et al (2016)	Hamad and Rehkopf (2016)	Blau (1999)	Votruba-Drzal (2003)	Dearing et al (2004)	Dearing et al (2007)
Relevant population	*Low income US*	*All income groups Canada (child benefit)*	*Low income US (EITC)*	*Low income US (EITC)*	*All income groups US (NLSY)*	*All income groups US (NLSY)*	*All income groups US (NICHD SECCYD)*	*Low income US (NICHD SECCYD)*
Maternal depression	-0.15	-0.10 (-0.20 low ed only)	-0.14				0.01 (0.06 for chronically poor)	
Maternal happiness			0.14					
Maternal self-worth			0.13					
Maternal efficacy			0.15					
Home environment				0.04	0.02	0.01 (0.02 lowest income)		
Physical environment								0.05 (low income)
Psychosocial environment								0.06 (low income)
Learning materials								0.20 (low income, low HE)
Responsiveness								0.14 (low income, low HE)
Cognitive stimulation								0.06 (low income, low HE)

Note: All coefficients presented are significant at least the 5% level.

6. Conclusion

This report updates our systematic review of the evidence on the causal effects of household financial resources on children's outcomes (Cooper and Stewart, 2013). We conducted systematic searches of the evidence from 2012-2017 to add to our database of evidence from 1988-2012. Because of time constraints, our new searches were less comprehensive than in our original approach – we took the top 2,000 search results from each search conducted, rather than examining all abstracts returned – and yet we found nearly as many studies from the most recent five year period as from the 24 years up to 2012. This is clearly a rapidly expanding field of research.

Our evidence base is now a little broader than it was before, with new studies identified on Sweden, Germany and Australia to add to those on the US, UK, Canada, Norway and Mexico. Nevertheless, the evidence remains heavily dominated by studies of the US; these comprise nearly two-thirds of the 61 studies in the expanded review. More evidence from other countries would still be welcome.

An encouraging development is the increase in the number of studies making use of quasi-experimental evidence. These studies exploit a change in income which is independent of other household characteristics likely to affect child outcomes, so we can be confident that significant effects are the result of income change rather than other factors. Included are studies making use of benefit changes (these are most common), and changes in wages due to minimum wage increases or technology shocks which affect some workers' earnings more than others. Where these studies can identify a control group who are otherwise similar but unaffected by the income change, they offer confidence that we are identifying the causal effects of the income change itself; the approach is more robust to the influence of unobserved effects than the observational studies we also include, and the quasi-experimental studies are also more likely to capture income change accurately, which means less downward bias on effect sizes. In the original review, 20 of 34 studies were either randomised controlled trials or quasi-experiments, and among the new studies, 19 out of 27 fall into these categories.

Overall, the expanded evidence base lends further support to the conclusions of the original review. The overwhelming majority of studies find significant positive effects of income across the range of children's outcomes, including cognitive development and school achievement, social and behavioural development and children's health. The evidence on health in particular has been strengthened in comparison to the previous review, with a series of new studies identifying positive income effects on birth weight in particular; evidence is more mixed for later child health outcomes including obesity and respiratory diseases.

There is also new evidence on intermediate outcomes, providing further support for both the two dominant theories about *why* money affects children's outcomes, the Investment Model and the Family Stress Model. Two new observational studies, one for the US and one for Canada, find that an increase in income is associated with a reduction in food insufficiency – evidence that a shortage of resources prevents families from buying the most basic things their children need to thrive. In support of the Family Stress Model, there are new studies on

maternal depression which lend weight to the clear picture that emerged from the original review of the damaging effects of poverty on mothers' mental health, itself an important predictor of child well-being and development. There is also additional evidence of the positive effect the EITC in the US had on reducing maternal smoking, including smoking during pregnancy.

Two new strands of evidence are worth highlighting, as they expand rather than deepen our evidence about money effects. Cancian et al (2013) is the first study to our knowledge using causal methods to examine the effects of income on child abuse and neglect. The study found that allowing families to retain more of their child support payments, rather than deducting the payments from benefits, led to significant reductions in investigations for child maltreatment. This is a particularly important finding given the devastating negative consequences of maltreatment for children, and the robustness of the methodology (an RCT). A very different type of evidence is provided by the three new studies making use of variation in house prices to examine post-school college choices. These are the only studies we include that look at assets rather than household income. The effects (positive effects of house price growth on pathways for the children of home owners, and negative effects on the children of renters) remind us that variation in types of financial resources which are not captured by the majority of our studies, with their focus on income and often on benefit receipt, can shape young people's option sets in ways which are likely to define their working lives.

The studies that have not found significant effects on the whole look a little different to others. One study which finds no positive effects (and even some negative effects, with a boost in income linked to more hospitalisations among children) examines effects of lottery wins in Sweden (Cesarini et al, 2016). But lottery wins may well have different effects on spending patterns and behaviour than other more day-to-day changes to benefits or wages.

The updated review also supports our previous conclusions that income effects are likely to be non-linear, with greater effects at the bottom of the income distribution. A large number of studies focus on lower income groups in particular. Studies which look for effects across the whole distribution appear less likely to find them, and those that are able to test for non-linear effects often find them, identifying a greater effect of a given amount of income on households with less to begin with, or finding that effects are significant only for lower income households. This has important methodological implications for ongoing research in this area.

Finally, where we were able to extract effect sizes from our new studies, these tend to support the broad range of effect sizes found in our original report, though (with the exception of maternal depression) they come in towards the lower end of our existing range. While small, these effects are far from negligible, and compare reasonably well to effect sizes from other interventions such as spending on education. We conclude that increases in household income cannot be seen as a magic bullet solution for inequalities in children's development and wider outcomes. But there is strong reason to believe that reducing income poverty would itself have important and measurable effects both on children's environment and on

their development. This is not to suggest there is no value in policy interventions that aim to change structures to break the link between family income and lack of opportunities, but to highlight that these types of specific interventions are likely to have effects that are more domain-specific, compared with increased income which has been shown to affect a range of outcomes across different domains (mental and physical health, cognitive and behavioural as well as parental mental health and the home environment). Given rising levels of child poverty in the UK, and much steeper increases projected for the next few years, this conclusion could not be more important or topical, especially in light of stated government commitment to promoting social mobility. Certainly any strategy that seeks to improve life chances and equalise opportunities for children without turning the tide against growing levels of child poverty is going to face an uphill struggle and place an even greater burden on services that seek to alleviate various negative effects of inadequate family resources.

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Appendix 1: Search terms

As in the original review the search terms included four sections, the first three of which were used for all search, and the fourth part was unique to the type of outcome being searched for.

Included in all searches:

1. Search terms related to money:

AB(wealth* OR assets OR salary OR salaries OR earning* OR wage* OR pension* OR income* OR "socio-economic status" OR "socioeconomic status" OR SES OR poverty OR poor OR depriv* OR disadvantag* OR hardship OR money OR cash* OR **expenditure** OR spending OR "standard* of living" OR "living standard*" OR "cost of living")

2. Search terms related to the causal relationships

AND AB(caus* OR effect* OR determin* OR impact* OR influenc* OR associat* OR correlat*)

3. Search terms related to the age group of interest i.e. children

AND AB(child* OR teenage* OR adolescen* OR infan*)

4. Search terms for each outcome

Cognitive development

AB(Cognitive OR Development* OR ″school readiness″ OR Reading OR Math* OR Writing OR vocabulary OR Test score* OR IQ OR Attainment OR Performance OR ″School outcome″ OR Qualification* OR ″Exam* result*″ OR ″Exam* score*″ OR Proficiency OR Achiev* OR Abilit* OR ″Key stage″ OR college OR ″sixth form″ OR NEET OR postcompulsory OR postcompulsory OR post-16 OR "child development" OR learning OR enrichment OR education OR outcomes)

Social, emotional and behavioural outcomes

AB(behav* OR ″social outcome*″ OR ″social assessment*″ OR ″social skills″ OR ″social withdrawal″ OR ″social development″ OR ″social* competen*″ OR socioemotional OR emotional OR social-emotional OR ″positive social behav*″ OR ″negative social behav*″ OR "self-regulation" OR "self regulation" OR "executive function" OR attention OR aggress* OR destructive OR ″mental health″ OR depression OR anxi* OR stress OR ″sleep* problems″ OR antisocial OR "conduct disorder" OR externali* OR internali* OR ″behavioral problem index″ OR "adaptive social behaviour inventory" OR "child behavior checklist" OR "motor AND social development scale" OR "social rating scale" OR "social skills rating scale" OR fight* OR violen* OR crim* OR delinqu* OR offending OR arrest* OR convict* OR ″substance use″ OR ″substance dependence″ OR "substance abuse" OR drug* OR alcohol OR drinking OR smoking OR ″under-age sex*″ OR ″underage sex*″ OR ″early sex* activ*″ OR ″early sex* behav*″ OR ″risk-taking″ OR ″risky behav*″ OR ″self harm*″ OR ″self-harm*″ OR ″teen* pregnan*″ OR "teen* sex*")

Physical health outcomes

AB(health* OR morbidity OR mortality OR death OR ill* OR sick* OR obes* OR overweight OR underweight OR accident* OR diabet* OR asthma OR anaemia OR cancer OR disease* OR lead-poisoning OR “birth weight” OR “birth-weight” OR “birthweight” OR “born premature*” OR “premature birth” OR “preterm birth” OR nutrition* OR malnutrition OR nutrients OR “tooth decay” OR “hospital admission*” OR exercise OR "physical activit*" OR inactiv* OR injur* OR cortisol OR breakfast)

Intermediate outcomes

AB(abuse OR neglect OR maltreatment OR “physical punishment” OR “harsh parenting” OR “positive parenting” OR “parental responsiveness” OR “parental sensitivity” OR authoritative OR authoritarian OR “parenting style” OR supervision OR attachment OR “investment theory” OR “investment model” OR “parent* stress” OR breastfeeding OR “parent* smok*” OR “smoking N/3 pregnan*” OR “stress N/3 pregnan*” OR “prenatal smoking” OR “cortisol N/3 pregnan*” OR “maternal cortisol” OR “maternal depression” OR “mother* N/3 depress*” OR “postnatal depression” OR “post-natal depression” OR “books N/3 home” OR “bedtime story” OR “bedtime reading” OR “reading N/2 home” OR toys OR games OR “educational resources N/2 home” OR “internet N/2 access” OR “internet N/2 home” OR “computer N/2 home” OR “computer N/2 access” OR “leisure activit*” OR “afterschool activit*” OR “out-of-school activit*” OR TV OR television OR “five a day” OR “fruit and veg*” OR “food security” OR “food insecurity” Or “home environment” OR “chaotic lifestyle*” OR chaos”)

Appendices 2 and 3 are available online via the following links:

Appendix Table 2: List of all studies, grouped by ‘case’ or dataset, with overall classification of results. http://sticerd.lse.ac.uk/dps/case/cp/App2.pdf
Appendix 3: Summary tables of all studies group by outcome measured
Table A1: Studies examining the effect of income on children’s cognitive and educational outcomes http://sticerd.lse.ac.uk/dps/case/cp/App3tab1.pdf
Table A2: Studies examining the effect of income on children’s social, emotional and behavioural outcomes http://sticerd.lse.ac.uk/dps/case/cp/App3tab2.pdf
Table A3: Studies examining the effect of income on children’s physical health http://sticerd.lse.ac.uk/dps/case/cp/App3tab3.pdf
Table A4: Studies examining the effect of income on intermediate outcomes (potential mechanisms) http://sticerd.lse.ac.uk/dps/case/cp/App3tab4.pdf