Rapid evidence review of the socioeconomic determinants of mental wellbeing

Emma Riches, Andrew Pulford, Ross Whitehead, Stefania Greci, Karl Ferguson, Sonya Scott

Publication date: 19 October 2021
Acknowledgements

We would like to thank Gillian Armour, Ruth Flynn, Katy McCalister, Christina Buckton, Emma Hogg and Elizabeth Oldcorn (Public Health Scotland), Dr Naomi Wilson (Mental Health Foundation), Dr Anna Macintyre (Strathclyde University), Wendy Halliday (See Me Scotland) and Dr Rachel Anderson (Scottish Government) for their input into the report.

Other formats of this publication are available on request at:
0131 314 5300
phs.otherformats@phs.scot
Contents

Acknowledgements 1
Executive summary 4
What we did 4
What we found 4
   Evidence on the association between socioeconomic position and mental wellbeing 5
   Evidence for interventions to improve mental wellbeing and address socioeconomic inequalities in wellbeing 5
   What this means for policy, practice and research 6
1. Introduction 7
2. Objective 8
   2.1 Research questions 8
3. Methodology 9
4. Overview of findings 12
   4.1 Is there an association between socioeconomic position and mental wellbeing? 13
   Summary 13
      4.1.1 Individual measures of socioeconomic position 16
      4.1.2 Area-based measures of deprivation 29
      4.1.3 Sensitivity analysis 31
   4.2 What are effective interventions to improve mental wellbeing and reduce socioeconomic inequalities in mental wellbeing at population level? 32
   Summary 32
5. Discussion 34
   5.1 Strengths and limitations 35
6. Conclusions 38
7. Appendices 39
Executive summary

What we did

We undertook a rapid evidence review to determine whether there is an association between socioeconomic position and mental wellbeing, and to identify effective interventions to improve mental wellbeing and reduce inequalities in mental wellbeing.

We searched four bibliographic databases for studies that reported one or more measure of socioeconomic position (such as income, employment, education, occupation, material wealth or area-based deprivation) and used the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), a shorter version of WEMWBS (known as SWEMWBS) and Affectometer 2 as measures of mental wellbeing. The searches were limited to papers published from 2007 (approximately when the WEMWBS measure of wellbeing was developed) to March 2021. A search of grey literature was also undertaken for the same period. English-language studies were selected if they were undertaken in high-income countries.

What we found

We found 12 studies that investigated an association between mental wellbeing and socioeconomic position, and two studies that evaluated the effectiveness of socioeconomic interventions relating to income, which sought to improve mental wellbeing. Three studies were classed as high quality, nine as moderate quality and two as weak quality.\(^a\)

\(^a\) Based on an amended version of the Effective Public Health Practice Project (EPHPP) tool.
Evidence on the association between socioeconomic position and mental wellbeing

We found evidence of an association between measures of socioeconomic position (including employment status, income, material wealth, occupation type or area-based deprivation) and mental wellbeing, with increased levels of mental wellbeing associated with higher socioeconomic position. Longitudinal evidence came from two data analyses in one high-quality study that included data from four British birth cohorts. The study found that socioeconomic advantage in childhood is important for wellbeing in mid-to-later life. Cross-sectional evidence came from 26 analyses derived from two weak-quality and eight moderate-quality studies that largely included nationally representative samples. Overall estimates of association varied, and given the variability in measures for socioeconomic position as well as the statistical methods used to calculate the strength of association, it is difficult to draw comparisons and determine the size of the effect. Only one data analysis from one moderate-quality study provided evidence of a negative association, but the effect was not statistically significant.

Eight out of the 12 association studies used statistical models that adjusted for more than one type of socioeconomic position measure and/or for other factors that would also be expected to be associated with socioeconomic position. These studies were considered to be prone to a type of bias, known as over-adjustment. This may mean the association between socioeconomic position and wellbeing outcomes is in reality stronger than described in these studies. We conducted a sensitivity analysis, which removed all over-adjusted studies. A positive association between socioeconomic position and mental wellbeing was still apparent based on the remaining four studies, which were not at risk of over-adjustment.

Evidence for interventions to improve mental wellbeing and address socioeconomic inequalities in wellbeing

Evidence for socioeconomic interventions to improve mental wellbeing was limited to two studies, both of which aimed to improve adult or family income. The London Living Wage was assessed in a high-quality feasibility study and provided some
evidence that a population-level labour market intervention could be effective in improving employee wellbeing. The findings of a high-quality study with a prospective quasi-experimental controlled design suggested that co-located welfare benefits and debt advice in a primary healthcare setting may be useful in improving mental wellbeing.

We found no effectiveness studies that investigated the impact of interventions on socioeconomic inequalities in mental wellbeing (for example, assessed changes to the gap or gradient between most and least deprived).

**What this means for policy, practice and research**

Measures of socioeconomic position appear to be important factors for mental wellbeing, and the association is likely to be underestimated in a high proportion of existing studies. Interventions to achieve adequate incomes and/or improve access to high-quality employment, and action to reduce other forms of material deprivation are likely to improve levels of mental wellbeing in the population.

There is a very limited evidence base on the effectiveness of specific socioeconomic position-focused interventions to improve mental wellbeing. Current policies that aim to increase incomes and/or access to high-quality employment (e.g. active labour market policies, Fair Work Agenda\(^1\)) or tackle other forms of material deprivation (e.g. Scottish Child Benefit\(^2\)) should be evaluated for their impact on mental wellbeing and inequalities in mental wellbeing.

Further observational studies of the association between socioeconomic position and mental wellbeing are also needed. This would allow a more precise estimate of the association between socioeconomic position and mental wellbeing to be pooled from the evidence base. Future investigations could use more rigorous scientific designs, which would develop our understanding of the extent to which these associations are causal.
1. Introduction

The Scottish Government has recognised mental health as one of six public health priorities. Promoting and supporting conditions for good mental health as well as prevention and early intervention are central to the 2017–2027 mental health strategy. In October 2020, the Scottish Government published a mental health transition and recovery plan in response to the mental health impacts of the COVID-19 pandemic. One key area of focus is to promote and support conditions for good mental health at population level, and target support for at-risk or vulnerable groups such as children, young people and families, people with long-term physical health conditions and disabilities, people facing redundancy and older people.

Mental health and mental wellbeing are terms that are often used interchangeably but they are not the same. Mental health incorporates illness and wellness (wellbeing) domains. The concept of mental wellbeing (also sometimes called mental wellness, which is more than the absence of mental illness) is less clearly defined, and there are a range of definitions for mental wellbeing. Most tend to emphasise that mental wellbeing includes aspects of subjective wellbeing (which includes positive affect [feelings, mood and emotions] and life satisfaction). They also emphasise that mental wellbeing also includes psychological wellbeing (which covers a wide range of cognitive aspects of mental health, such as mastery and a sense of control, having a purpose in life, a sense of belonging and positive relationships with others).

Mental wellbeing is measured, as part of the Scottish Government’s National Performance Framework, using the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS). WEMWBS is a 14-item scale that assesses positive affect, satisfying interpersonal relationships and positive functioning within the last two weeks. Items, such as ‘I’ve been feeling optimistic about the future’ and ‘I’ve been feeling relaxed’ are rated on a five-point scale. Single scores are calculated as a sum of all items, ranging from 14 to 70, with higher scores reflecting greater mental wellbeing. A shorter version of WEMWBS, known as SWEMWBS, uses seven rather than 14 statements (scale range 7–35) and relates more to functioning than feelings. Both SWEMWBS and WEMWBS have good reliability and validity as measures of mental
wellness.\textsuperscript{9,10} They can be used to measure mental wellbeing at population and individual level in a range of settings, geographical locations, languages and cultural contexts. WEMWBS was based on the Affectometer 2, a measure which was developed in New Zealand in the 1980s to assess population positive mental health in adults.\textsuperscript{11}

Evidence is better established for the risk and protective factors that are associated with mental illness.\textsuperscript{12} Research suggests that inequalities in social, economic and physical environments can contribute to poor mental health outcomes across the life course.\textsuperscript{12,13} However, there is less clarity around the factors associated with mental wellbeing and whether these overlap with the determinants of mental illness.\textsuperscript{14} In particular, we are interested in whether socioeconomic position is associated with mental wellbeing. A public health approach to mental wellbeing requires a robust understanding of what affects mental wellbeing to promote positive states of health and to identify effective improvement action.

2. Objective

This rapid review summarises current evidence on the socioeconomic determinants of mental wellbeing, and effective interventions to improve mental wellbeing and reduce inequalities in mental wellbeing.

2.1 Research questions

- Is there an association between socioeconomic position and mental wellbeing in the population, using the WEMWBS, SWEMWBS or Affectometer 2 measure as the outcome of interest?

- What are effective socioeconomic interventions, policies or services to improve mental wellbeing and reduce socioeconomic inequalities in mental wellbeing at population level?
3. Methodology

Systematic methods were used to identify, critically appraise and synthesise both peer-reviewed and grey literature. A literature search of four electronic bibliographic databases (CINAHL, Proquest, Embase, PsycINFO) was undertaken to identify studies that were published since 2007 (WEMWBS was developed around 2007). An advanced Google search for the same time period was undertaken to identify grey literature.


The databases, search terms and strategies can be found in Appendix 1.

Title/abstract and full-text screening was undertaken by two reviewers. Titles, abstracts and full texts were screened, and the following inclusion criteria were applied:

- For studies assessing the association between socioeconomic position and mental wellbeing, these were limited to prospective cohort studies, case-control studies, cross-sectional studies and randomised controlled trials. Systematic reviews including these types of studies were also eligible for inclusion.

- For intervention studies, the study types were limited to randomised controlled trials, natural experiments and quasi-experimental studies. Systematic reviews including these types of studies were also eligible for inclusion.

- For exposure studies, we included studies with a representative population sample, and for interventions studies, we included studies with a community-based population sample.
• Studies that were conducted in Organisation for Economic Co-operation and Development (OECD) countries, to enable comparisons with populations of a similar socioeconomic position.

• Studies written in the English language.

• Populations of all ages and, where available, grouped across the life course, for example, early years and childhood, adolescence, young adults, working adults and older people. We did not include population subgroups, for example, by occupation, or health conditions such as dementia.

• Measures of socioeconomic position, which were categorised under two broad groupings of individual and area-based measures. Within individual measures, there could be education, material wealth, occupation, employment or income (individual or household). Area-based measures include indices of multiple deprivation (IMD) or equivalent. A valid comparator was required (usually the highest or lowest available grouping of socioeconomic position, depending on the analysis undertaken in individual papers).

• Mental wellbeing outcomes as measured by WEMWBS, SWEMWBS or Affectometer 2. Using WEMWBS, SWEMWBS and Affectometer 2 measurement tools enabled comparisons across countries and studies, and applied a consistent definition of mental wellbeing.

• Studies related to subjective mental wellbeing at population level. We did not include studies on mental illness.

Critical appraisal of the included studies was carried out using a modified version of the Effective Public Health Practice Project (EPHPP) tool. Overall study quality was categorised as high, moderate or weak, and based on individual scores against criteria, which included:

• selection bias (representativeness of the sample and participation rate)

• study design (study type and whether randomisation was undertaken)
• confounder quality (percentage of confounders controlled for and over-adjustment in analyses)

• data collection methods, such as tool validity and reliability (categorisation/continuous use of WEMWBS/SWEMWBS)

• withdrawal and drop-out quality, and methods to deal with this

• quality of statistical analysis

• exposure integrity, which covered percentage of participants allocated to exposure of interest, consistency of exposure measurement and the likelihood of contamination or co-exposure (intervention studies only).

Statistical models that adjusted for multiple socioeconomic position measures and/or adjusted for potential mediators were subject to over-adjustment. We drew causal diagrams (also known as directed acyclic graphs) using the software package \textbf{DAGitty version 3.0}. These diagrams helped to explain the configuration of measures of socioeconomic position in individual studies, and to identify intermediate variables on a causal path from exposure to outcome. This meant we selected the key exposure variable and extracted appropriate data. We assumed over-adjustment would underestimate the true total effect for socioeconomic position. Over-adjustment was assessed as part of the modified EPHPP critical appraisal tool, with this being used as a criterion for lowering the quality.\textsuperscript{15} A sensitivity analysis was performed by removing all over-adjusted analyses and assessing the impact of this on the overall conclusions.

A harvest plot was used to visually summarise the results based on the direction of effect of the analyses, that is, whether it was a positive or negative association. We undertook exact binomial tests which counted the data analyses based on their direction of effect in line with the Cochrane approach.\textsuperscript{16} This test was used to calculate the probability of seeing the observed results if, in reality, there is an equal chance of analyses showing increasing or decreasing mental wellbeing with higher socioeconomic position.
4. Overview of findings

After de-duplication, 1,276 papers were screened based on their title and abstract. Of these, 348 full-text papers were assessed for eligibility. In addition, 40 grey literature papers were screened. Our review includes 12 studies (10 peer-reviewed studies and two grey literature studies) which assessed the relationship between socioeconomic position and mental wellbeing, and two peer-reviewed studies that looked at effectiveness evidence for related interventions. A summary of the included studies is in Appendix 2. A PRISMA diagram outlines the selection process for this review (Figure 1).

Figure 1: PRISMA diagram for selection of studies
4.1 Is there an association between socioeconomic position and mental wellbeing?

**Summary**

An association between increased mental wellbeing and higher socioeconomic position (as measured by employment, income, material wealth, occupation and area-based deprivation) was observed in 28 analyses from one high-quality longitudinal study, eight moderate-quality and two weak-quality cross-sectional studies.

Only one analysis from one-moderate quality study found that higher socioeconomic position (as measured by income) was associated with poorer mental wellbeing. However, this finding was not statistically significant.

Three-quarters of the studies were subject to over-adjustment, but the sensitivity analysis, which removed all over-adjusted studies, indicated that the finding of a positive association between socioeconomic position and mental wellbeing is still valid.

Twelve studies were identified, eleven of which were conducted in the UK and one undertaken in Denmark.\(^{17}\) Three studies used the shortened WEMWBS scale\(^{18,19,20}\) while the remaining nine studies used the full scale. The study design was mainly cross sectional \((n = 11)\) but also included one cohort study.\(^{21}\) Overall, the quality of the studies was mixed, with one study considered to be high quality,\(^{21}\) nine of moderate quality and two graded as weak quality.\(^{17,20}\) One study was undertaken in children,\(^{19}\) two in adolescents\(^{20,22}\) and nine in those aged 16 years and older.

The results of 28 analyses of the association between socioeconomic position and mental wellbeing across 11 studies are graphically summarised in Figure 2. One study\(^{23}\) was not included in Figure 2 as the primary association it explored was between geographical areas and mental wellbeing rather than directly assessing the association between measures of socioeconomic position and mental wellbeing.
Figure 2: Harvest plot of associations between measures of socioeconomic position and wellbeing from observational studies (n = 11)

<table>
<thead>
<tr>
<th>Measure of Socioeconomic Position</th>
<th>Higher Socioeconomic Position and Poorer Mental Wellbeing</th>
<th>Higher Socioeconomic Position and Better Mental Wellbeing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material wealth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area-based deprivation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each row represents a measure of socioeconomic position. Each bar represents an estimate of the relationship between a measure of socioeconomic position and mental wellbeing (there may be multiple for each study), and the direction of effect is denoted by a positive relationship (higher socioeconomic position and better mental...
wellbeing) or negative relationship (higher socioeconomic position and poorer mental wellbeing) to mental wellbeing. Bar colour indicates analyses from the same study reference and bar height represents study quality (with higher bars indicating higher quality). The reference number of the study is also labelled at the top of each bar. In line with Cochrane Collaboration guidance, the harvest plot only presents direction of effect.  

Tables 1a-c summarise the exact binomial test results for the associations between measures of socioeconomic position and mental wellbeing, and the 95% confidence intervals (CI). As seen in Figure 2, 27 out of 28 analyses from 11 studies found that increased mental wellbeing was associated with higher socioeconomic position (i.e. there is evidence of a positive association). The results in Table 1a also illustrate that 96% of the data analyses showed higher socioeconomic position (assessed by a range of measures) will result in higher mental wellbeing. We are 95% confident that the actual proportion lies between 82% and 100%. This result was statistically significant (p < 0.05).

Table 1a: Results of exact binomial tests for the associations between measures of socioeconomic position and mental wellbeing

<table>
<thead>
<tr>
<th>Socioeconomic exposure (number of analyses)</th>
<th>Number of analyses with a positive association</th>
<th>% of analyses with a positive association</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>All socioeconomic position measures (n = 28)</td>
<td>27</td>
<td>96%</td>
<td>82% to 100%</td>
</tr>
</tbody>
</table>

Table 1b: Individual measures of socioeconomic position

<table>
<thead>
<tr>
<th>Socioeconomic exposure (number of analyses)</th>
<th>Number of analyses with a positive association</th>
<th>% of analyses with a positive association</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material wealth (n = 2)</td>
<td>2</td>
<td>100%</td>
<td>20% to 100%</td>
</tr>
<tr>
<td>Occupation (n = 7)</td>
<td>7</td>
<td>100%</td>
<td>60% to 100%</td>
</tr>
<tr>
<td>Socioeconomic exposure (number of analyses)</td>
<td>Number of analyses with a positive association</td>
<td>% of analyses with a positive association</td>
<td>95% CI</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Employment (n = 7)</td>
<td>7</td>
<td>100%</td>
<td>60% to 100%</td>
</tr>
<tr>
<td>Income (n = 8)</td>
<td>7</td>
<td>88%</td>
<td>50% to 100%</td>
</tr>
</tbody>
</table>

Table 1c: Area-based measures of socioeconomic position

<table>
<thead>
<tr>
<th>Socioeconomic exposure (number of analyses)</th>
<th>Number of analyses with a positive association</th>
<th>% of analyses with a positive association</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area-based deprivation (n = 4)</td>
<td>4</td>
<td>100%</td>
<td>40% to 100%</td>
</tr>
</tbody>
</table>

The effect of increased mental wellbeing was seen in all analyses from studies that measured socioeconomic position using area-based deprivation, employment, occupation and material wealth. However, only the results for occupation and employment were statistically significant (95% CI 60% to 100%, \( p = 0.02 \)) (Table 1b).

By contrast, Figure 2 also shows evidence to support a negative association between higher socioeconomic position and lower wellbeing was limited to one data analysis from one moderate-quality study with income as the measure of socioeconomic position.\(^{24}\)

4.1.1 Individual measures of socioeconomic position

4.1.1.1 Material wealth

Material wealth was measured using the Family Affluence Scale (FAS) in two studies, one in children\(^{19}\) and one in children as well as adolescents,\(^{20}\) the results of which are summarised in Table 2.
Table 2: Studies that measure the association between material wealth and mental wellbeing

<table>
<thead>
<tr>
<th>Author (date)/ quality</th>
<th>Exposure</th>
<th>Outcome measure</th>
<th>Results(^b)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shackleton (2018)(^19) Moderate</td>
<td>FAS (0–9 score)</td>
<td>Total SWEMWBS score (7–35 points)</td>
<td>An increase of one unit on the FAS increased mental wellbeing by 0.2 points on the SWEMWBS scale</td>
<td>The increase could be as little as 0.12 points or as much as 0.29 points</td>
</tr>
<tr>
<td>Morgan (2019)(^20, c) Weak</td>
<td>FAS (0–9 score)</td>
<td>SWEMWBS scores (7–35 points)</td>
<td>Low FAS was shown to have a small direct effect on mental wellbeing, with 65.2% of the total effect mediated by summer holiday experiences</td>
<td>Not reported</td>
</tr>
</tbody>
</table>

One moderate-quality study examined the effect of pupil and school-level socioeconomic position on mental wellbeing in children, and used baseline survey data from a large cluster randomised trial of 6,667 pupils aged 11–12 from 40 London schools.\(^{19}\) Pupil affluence was measured by the FAS (ranging from 0 to 9, with lower scores denoting lower family affluence). The level of socioeconomic disadvantage of the school was measured using the percentage of pupils eligible for free school meals (%FSM). The authors found an increase of one unit on the FAS increased mental wellbeing by 0.2 points on SWEMWBS (95% CI 0.12 to 0.29).

Although the main effect of higher FAS was seen on increased wellbeing, the interaction between pupil-reported FAS and school-level %FSM is noteworthy. In schools with lower %FSM, pupil wellbeing increased with increasing FAS (i.e. family affluence).

\(^b\) A range of outcome measures were used to calculate an effect estimate.

\(^c\) Studies with over-adjusted data.
affluence appears to be more impactful if individuals are less affluent in a less deprived school) but in more deprived schools (higher %FSM), there was less variation across FAS scores.

One weak-quality study used cross-sectional survey data from 101,910 pupils aged 11–16 at 193 schools in Wales to assess the role of summer holiday experiences on socioeconomic inequalities in mental wellbeing. In this study, the participants’ mental wellbeing during the school summer break was measured retrospectively on return to school and is not necessarily reflective of longer-term enduring mental wellbeing. The FAS was used as an indicator of socioeconomic position and the total affluence score was split around the median into low and high FAS. The total effect of FAS on mental wellbeing was not reported. However, the study found that pupils with a low FAS score were more likely to report poor mental wellbeing (estimate of direct effect = −0.04, p < 0.001). Path analysis suggested that 65.2% of the total effect of FAS on mental wellbeing on return to school operated through experiences over the summer holidays, such as hunger, loneliness, time with friends and participation in physical activity.

4.1.1.2 Occupation

Two studies conducted in working adults used father's and participant's own adult occupational social class or occupation of the main wage earner as measures of socioeconomic position. The results are summarised in Table 3.
Table 3: Studies that measure the association between occupation and mental wellbeing

<table>
<thead>
<tr>
<th>Author (date)/quality</th>
<th>Exposure</th>
<th>Outcome measure</th>
<th>Results&lt;sup&gt;d&lt;/sup&gt;</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood (2017)&lt;sup&gt;21&lt;/sup&gt; High</td>
<td>Father’s occupational social class</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Those whose fathers were at the top of the social class distribution had a mean score 2.77 points higher (measured in adulthood) than those with fathers at the bottom of the social class distribution</td>
<td>Not reported</td>
</tr>
<tr>
<td>Wood (2017)&lt;sup&gt;21&lt;/sup&gt; High</td>
<td>Adult occupational social class</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Those at the top of the social class distribution had a mean score 3.59 points higher than those at the bottom of the adult social class distribution</td>
<td>Not reported</td>
</tr>
<tr>
<td>Jones (2014)&lt;sup&gt;25, e&lt;/sup&gt; Moderate</td>
<td>Socioeconomic status (SES) (based on occupation) (least [A] vs. most deprived [E])</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to the most deprived socioeconomic category (E), wellbeing scores were 5.95 points higher in the least deprived SES category (A)</td>
<td>Not reported</td>
</tr>
</tbody>
</table>

<sup>d</sup> A range of outcome measures were used to calculate an effect estimate.

<sup>e</sup> Studies with over-adjusted data
<table>
<thead>
<tr>
<th>Author (date)/quality</th>
<th>Exposure</th>
<th>Outcome measure</th>
<th>Results(^d)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jones (2014)(^{25, e}) Moderate</td>
<td>SES (based on occupation) (B vs. E)</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to the most deprived SES category (E), wellbeing scores were 5.65 points higher in SES category B</td>
<td>Not reported</td>
</tr>
<tr>
<td>Jones (2014)(^{25, e}) Moderate</td>
<td>SES (based on occupation) (C1 vs. E)</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to the most deprived SES category (E), wellbeing scores were 5.06 points higher in SES category C1</td>
<td>Not reported</td>
</tr>
<tr>
<td>Jones (2014)(^{25, e}) Moderate</td>
<td>SES (based on occupation) (C2 vs. E)</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to the most deprived SES category (E), wellbeing scores were 4.91 points higher in SES category C2</td>
<td>Not reported</td>
</tr>
<tr>
<td>Jones (2014)(^{25, e}) Moderate</td>
<td>SES (based on occupation) (D vs. E)</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to the most deprived SES category (E), wellbeing scores were 3 points higher in SES category D</td>
<td>Not reported</td>
</tr>
</tbody>
</table>

Longitudinal evidence for an association between socioeconomic position, in childhood (aged 10–11) and adulthood (aged 42–43), and adult mental wellbeing came from a large high-quality study of four British birth cohorts (combined \(n = 20,717\)).\(^{21}\) Childhood socioeconomic position was measured through father’s occupational social class, and adult socioeconomic position was measured using education and occupational social class. This study used a slope index of inequality for father’s and adult social class categories, which can be interpreted as the absolute difference in wellbeing between the top and bottom of the social class distribution. In sex-adjusted models, those whose fathers were at the top of the social class distribution had a mean score 2.77 points higher (on WEMWBS) than those with fathers at the bottom of the social class distribution. The association between
adult social position and mental wellbeing was larger in magnitude, with those at the top of the social class distribution having a higher wellbeing (3.59 points) than those at the bottom of the adult social class distribution. Both of these estimates were statistically significant (p < 0.001).

Further support for an association between socioeconomic position and wellbeing in adults was provided by a large (n = 8,237) moderate-quality cross-sectional study. In this study, socioeconomic position was defined by occupation of the main wage earner (current or last job). Relative to those with the lowest socioeconomic position, mental wellbeing scores reduced with decreasing socioeconomic position. All comparisons reached statistical significance (p < 0.001).

4.1.1.3 Employment

Three studies assessed the relationship between employment status and mental wellbeing in working-age adults, and these are summarised in Table 4. We only included analyses which used 'employed' as a labour market status.
Table 4: Summary of studies that measure the association between employment and mental wellbeing

<table>
<thead>
<tr>
<th>Author (date)/ quality</th>
<th>Exposure/subgroup</th>
<th>Outcome measure</th>
<th>Results&lt;sup&gt;f&lt;/sup&gt;</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bellis (2012)&lt;sup&gt;18, g&lt;/sup&gt; Moderate</td>
<td>Unemployment vs. employment (comparator), stratified by IMD, deprived tertile</td>
<td>Categorised SWEMWBS: low (below one standard deviation [SD] from the mean) and high (above one SD from the mean) wellbeing</td>
<td>The odds of low mental wellbeing were 51% greater among unemployed individuals compared with employed individuals</td>
<td>We can be confident the increased risk of low mental wellbeing for unemployed people lies between 21% and 89% higher than that of those in employment</td>
</tr>
<tr>
<td>Bellis (2012)&lt;sup&gt;18, g&lt;/sup&gt; Moderate</td>
<td>Unemployment vs. employment (comparator), stratified by IMD, middle tertile</td>
<td>Categorised SWEMWBS: low (below one SD from the mean) and high (above one SD from the mean) wellbeing</td>
<td>The odds of low mental wellbeing were 27% greater among unemployed individuals compared with employed individuals</td>
<td>We can be confident the increased risk of low mental wellbeing for unemployed people lies between 1% lower and 63% higher than that of those in employment</td>
</tr>
</tbody>
</table>

<sup>f</sup> A range of outcome measures were used to calculate an effect estimate.

<sup>g</sup> Studies with over-adjusted data.
<table>
<thead>
<tr>
<th>Author (date)/ quality</th>
<th>Exposure/ subgroup</th>
<th>Outcome measure</th>
<th>Results</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bellis (2012)$^{18, g}$ Moderate</td>
<td>Unemployment vs. employment (comparator), stratified by IMD, affluent tertile</td>
<td>Categorised SWEMWBS: low (below one SD from the mean) and high (above one SD from the mean) mental wellbeing</td>
<td>The odds of low mental wellbeing were 24% greater among unemployed individuals compared with employed individuals</td>
<td>We can be confident the increased risk of low mental wellbeing for unemployed people lies between 14% lower and 80% higher than that of those in employment</td>
</tr>
<tr>
<td>Bryson (2012)$^{26}$ Moderate</td>
<td>Unemployment vs. employment, male</td>
<td>WEMWBS score (14–70 points)</td>
<td>Relative to males in employment, wellbeing scores were 4.94 points lower in males who were unemployed</td>
<td>We can be confident the true difference in scores lies between 3.08 and 6.80 points lower for unemployed males</td>
</tr>
<tr>
<td>Bryson (2012)$^{26}$ Moderate</td>
<td>Unemployment vs. employment, female</td>
<td>WEMWBS score (14–70 points)</td>
<td>Relative to females in employment, wellbeing scores were 2.17 points lower in females who were unemployed</td>
<td>We can be confident the true difference in scores lies between 0.70 and 3.63 points lower for unemployed females</td>
</tr>
<tr>
<td>Author (date)/quality</td>
<td>Exposure/subgroup</td>
<td>Outcome measure</td>
<td>Results</td>
<td>95% CI</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Johnson (2013)²⁷,g</td>
<td>Unemployment vs. employment, male</td>
<td>WEMWBS score (14–70 points)</td>
<td>Compared to males in employment, wellbeing scores were 2.5 points lower in males who were unemployedʰ</td>
<td>Not reported</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnson (2013)²⁷,g</td>
<td>Unemployment vs. employment, female</td>
<td>WEMWBS score (14–70 points)</td>
<td>Compared to females who were employed, wellbeing scores were 1.76 points lower in females who were unemployed</td>
<td>We can be confident the true difference in scores lies between 3.55 points lower and 0.03 points higher for unemployed females</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A cross-sectional study of 15,228 adults examined risk and protective factors associated with high and low mental wellbeing and their variation with area-based deprivation.¹⁸ After correcting for confounding, an association between unemployment and low mental wellbeing was observed across all three deprivation categories. The strongest association was noted in the most deprived group, with the odds of low mental wellbeing being 51% greater among unemployed individuals compared with employed individuals (95% CI 1.21 to 1.89). Only this association reached statistical significance (p < 0.001) but the number of unemployed individuals was highest in this deprivation category.

Data from the 2010 Health Survey for England also support the positive relationship between wellbeing and labour market status.²⁶ Among women, the wellbeing of those who were unemployed was significantly lower than those in paid employment, by

ʰ Exact data were not reported for males and were estimated from graphs.
-2.17 (95% CI -3.63 to -0.70) points on the WEMWBS scale. Among men, the difference was larger, with the unemployed having WEMWBS scores of -4.94 (95% CI -6.80 to -3.08) points compared with their employed counterparts. Both associations are significant at the 5% level.

Data from a study looking to understand factors associated with inequality in mental wellbeing among adults living in Coventry (n = 2,168) showed employment was a positive predictor of adult wellbeing.\textsuperscript{27} WEMWBS scores of unemployed males and females were -2.5 (no 95% CI reported) and -1.76 (95% CI -3.55 to 0.03) points lower, respectively, compared with people in work. The results were reported to be statistically significant for men but not for women.

4.1.1.4 Income

Three studies looked at the relationship between income and mental wellbeing in working-age adults.\textsuperscript{17,24,28} The results are summarised in Table 5.

### Table 5: Summary of studies looking at the association between income and mental wellbeing

<table>
<thead>
<tr>
<th>Author (date)/ quality</th>
<th>Exposure/ subgroup</th>
<th>Outcome measure</th>
<th>Results\textsuperscript{1}</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stewart-Brown (2015)\textsuperscript{28, i} Moderate</td>
<td>Equivalised income (second highest vs. highest band)</td>
<td>Categorised WEMWBS score: low mental wellbeing (14–42 points) compared with middle-range (43–59 points)</td>
<td>The odds of lower mental wellbeing were 7% greater among those in the second highest income bracket than those in the highest income bracket</td>
<td>The odds of low mental wellbeing could be as little as 10% lower and as much as 29% higher</td>
</tr>
</tbody>
</table>

\textsuperscript{1} A range of outcome measures were used to calculate an effect estimate.

\textsuperscript{i} Studies with over-adjusted data.
<table>
<thead>
<tr>
<th>Author (date)/quality</th>
<th>Exposure/subgroup</th>
<th>Outcome measure</th>
<th>Results</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stewart-Brown (2015) 28, j</td>
<td>Equivalised income (middle vs. highest band)</td>
<td>Categorised WEMWBS score: low mental wellbeing (14–42 score) compared with middle-range (43–59 score)</td>
<td>The odds of low mental wellbeing were 59% greater among middle-income individuals compared with those in the highest income bracket</td>
<td>The increased odds of low mental wellbeing could be as little as 34% or as much as 90%</td>
</tr>
<tr>
<td>Stewart-Brown (2015) 28, j</td>
<td>Equivalised income (second lowest vs. highest band)</td>
<td>Categorised WEMWBS score: low mental wellbeing (14–42 score) compared with middle-range (43–59 score)</td>
<td>The odds of low mental wellbeing were 107% higher among individuals in the second lowest income bracket compared with those in the highest income bracket</td>
<td>The increased odds of low mental wellbeing could be as little as 75% or as much as 145%</td>
</tr>
<tr>
<td>Stewart-Brown (2015) 28, j</td>
<td>Equivalised income (lowest vs. highest band)</td>
<td>Categorised WEMWBS score: low mental wellbeing (14–42 score) compared with middle-range (43–59 score)</td>
<td>The odds of low mental wellbeing were 269% higher among individuals in the lowest income bracket compared with those in the highest income bracket</td>
<td>The increased odds of low mental wellbeing could range from 213% to 336%</td>
</tr>
<tr>
<td>McAneney (2015) 24, j</td>
<td>Income (9 categories of increasing amount)</td>
<td>WEMWBS score (14–70 points)</td>
<td>Increased income was associated with a reduction in wellbeing score of 0.04 points</td>
<td>We are 95% confident wellbeing scores could be a reduction of up to 0.32 points or an increase of as much as 0.23 points</td>
</tr>
<tr>
<td>Author (date)/ quality</td>
<td>Exposure/subgroup</td>
<td>Outcome measure</td>
<td>Results¹</td>
<td>95% CI</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------</td>
<td>-----------------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>Santini (2020)¹⁷,j</td>
<td>Income, second highest quartile vs. highest quartile</td>
<td>Categorised WEMWBS score: low mental wellbeing (score ≤ 43) compared with moderate mental wellbeing (score &gt; 43 and ≤ 60)</td>
<td>The odds of low mental wellbeing were 21% higher among individuals in the second highest income quartile compared with those in the highest income quartile</td>
<td>The odds of low mental wellbeing could be as little as 19% lower and as much as 79% higher</td>
</tr>
<tr>
<td>Santini (2020)¹⁷,j</td>
<td>Income, second lowest quartile vs. highest quartile</td>
<td>Categorised WEMWBS score: low mental wellbeing (score ≤ 43) compared with moderate mental wellbeing (score &gt; 43 and ≤ 60)</td>
<td>The odds of low mental wellbeing were 137% higher among individuals in the second lowest income quartile compared with those in the highest income quartile</td>
<td>The odds of low mental wellbeing could range from 65% to 239% higher</td>
</tr>
<tr>
<td>Santini (2020)¹⁷,j</td>
<td>Income, lowest quartile vs. highest quartile</td>
<td>Categorised WEMWBS score: low mental wellbeing (score ≤ 43) compared with moderate mental wellbeing (score &gt; 43 and ≤ 60)</td>
<td>The odds of low mental wellbeing were 227% higher among individuals in the lowest income quartile compared with those in the highest income quartile</td>
<td>The odds of low mental wellbeing could range from 131% to 364% higher</td>
</tr>
</tbody>
</table>

Two cross-sectional studies reported a positive association between income and wellbeing.¹⁷,²⁸ Both studies categorised the WEMWBS score into low, middle/moderate and high mental wellbeing groups, had a similar definition for the categories based on the WEMWBS score, and used the middle group as the reference category. We focused on the data analyses for the low mental wellbeing category compared to the reference category, but commented on how these estimates compared with those in the high mental wellbeing category for income. In
terms of quality, Stewart-Brown et al. was considered to be moderate quality\textsuperscript{28} and the Santini et al. was weak.\textsuperscript{17}

Stewart-Brown et al. conducted a study on a representative sample of the English population aged 16 years and over (n = 13,983) and found that lower-income groups had lower mental wellbeing compared with higher-income groups.\textsuperscript{28} Low mental wellbeing was associated with equivalised income, with odds increased for those in the lowest, second lowest, middle and second highest income equivalised brackets compared with the highest income bracket at 269% (95% CI 3.12 to 4.36), 107% (95% CI 1.74 to 2.45), 59% (95% CI 1.34 to 1.90) and 7% (95% CI 0.9 to 1.29) respectively. By contrast, there was less variation in the odds of high mental wellbeing across quintiles of equivalised income. Compared with the highest income quintile, the odds were 3% lower in the lowest income quintile (95% CI 0.81 to 1.15) but broadly similar across the remaining quintiles (11% lower in second highest quintile to 17% lower in the second lowest quintile).

These results are consistent with the findings of Santini et al.\textsuperscript{17} Analysis of the 2016 Danish mental health and wellbeing survey of 3,508 adults aged 16 years and older reported increased odds of low mental wellbeing across decreasing income quartiles. Relative to the highest income quartile, income in the second-lowest and lowest quartile showed significantly increased odds of low mental wellbeing, at 2.37 (95% CI 1.65 to 3.39) and 3.27 (95% CI 2.31 to 4.64), respectively (p < 0.05). The findings for the association between income and high mental wellbeing showed broadly similar reduced odds ratios of high wellbeing across income quartiles. The findings for both low and high mental wellbeing were similar to those of the Stewart-Brown et al. study,\textsuperscript{28} and suggest that lower income is associated with lower wellbeing, but relative to the highest income group, all other income groups have reduced odds of higher wellbeing.

The findings of these studies on income and wellbeing contrast with those of a moderate-quality cross-sectional study by McAneney et al., which examined individual factors and community characteristics in relation to mental wellbeing, and compared these relationships across different levels of deprivation.\textsuperscript{24} This study used a representative sample of 1,209 adults living in Belfast and found that overall higher
income was associated with a small 0.04 point reduction on the WEMWBS scale (95% CI -0.32 to 0.23) but the finding was not significant.

4.1.2 Area-based measures of deprivation

Two moderate-quality studies assessed socioeconomic position based on area-based deprivation in adolescents\textsuperscript{22} and working adults.\textsuperscript{23} The results of these studies are summarised in Table 6.

Table 6: Summary of studies that measure the relationship between area-based deprivation and mental wellbeing

<table>
<thead>
<tr>
<th>Author (date)/ quality</th>
<th>Exposure/subgroup</th>
<th>Outcome measure</th>
<th>Results\textsuperscript{k}</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gireesh (2018)\textsuperscript{22, l} Moderate</td>
<td>English IMD (low, average, high) (average vs. highest deprivation, males)</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to areas with highest deprivation, wellbeing scores were 0.57 points higher among those from areas of average deprivation</td>
<td>Wellbeing scores could be as little as 0.31 points or as much as 0.81 points higher</td>
</tr>
<tr>
<td>Gireesh (2018)\textsuperscript{22, l} Moderate</td>
<td>English IMD (low, average, high) (average vs. highest deprivation, females)</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to areas with highest deprivation, wellbeing scores were 0.35 points higher among those from areas of average deprivation</td>
<td>An increase in wellbeing scores could be as little as 0.10 or as much as 0.59 points</td>
</tr>
</tbody>
</table>

\textsuperscript{k} A range of outcome measures were used to calculate an effect estimate.

\textsuperscript{l} Studies with over-adjusted data
<table>
<thead>
<tr>
<th>Author (date)/ quality</th>
<th>Exposure/subgroup</th>
<th>Outcome measure</th>
<th>Results</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gireesh (2018)</td>
<td>English IMD (low, average, high) (lowest vs. highest deprivation, males)</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to areas with the highest deprivation, wellbeing scores were 1.05 points higher among those from areas of the lowest deprivation</td>
<td>An increase in wellbeing scores could be as little as 0.87 or as much as 1.21 points</td>
</tr>
<tr>
<td>Gireesh (2018)</td>
<td>English IMD (low, average, high) (lowest vs. highest deprivation, females)</td>
<td>WEMWBS scores (14–70 points)</td>
<td>Relative to areas with the highest deprivation, wellbeing scores were 1.16 points higher among those from areas of average deprivation</td>
<td>An increase in wellbeing scores could be as little as 0.92 or as much as 1.40 points</td>
</tr>
<tr>
<td>Landy (2012)</td>
<td>Scottish Index of Multiple Deprivation (SIMD)</td>
<td>Categorised WEMWBS score (low mental wellbeing was one SD below the mean)</td>
<td>Compared with the rest of Scotland, the residents of Greater Glasgow and Clyde (GGC) Health Board had higher odds of low wellbeing by 25%. Adjusting for SIMD removed this association</td>
<td>We can be confident the increased risk of low mental wellbeing for residents of GGC lies between 8% and 44% higher than the rest of Scotland</td>
</tr>
</tbody>
</table>

Data from a moderate-quality study using a large representative survey of 120, 115 15-year-olds indicated that mental wellbeing increased with reduced area-based deprivation score (e.g. English IMD) in both sexes. IMD scores were divided into three deprivation categories and defined by quintiles of the national distribution: 1 and 2 (high deprivation), 3 (average deprivation), 4 and 5 (low deprivation). Relative to areas with the highest deprivation, wellbeing scores were significantly higher.
among those from areas of average deprivation (regression coefficient: males 0.57, 95% CI 0.31 to 0.81; females 0.35, 95% CI 0.10 to 0.59) and for those from areas of least deprivation (regression coefficient: males 1.05, 95% CI 0.87 to 1.21; females 1.16, 95% CI 0.92 to 1.40).

Landy et al. (not included in Figure 2) assessed the association between socioeconomic position and mental wellbeing indirectly through secondary adjusted analyses.23 The health outcomes of residents of NHS GGC Health Board were compared with Health Boards of the rest of Scotland.23 Age and sex-adjusted data from the 2008–2009 Scottish Health Survey indicated that the residents of GGC had significantly higher odds of low wellbeing by 25% (95% CI 1.08 to 1.44). However, following adjustment for area deprivation (SIMD), this estimate was no longer significant (data not reported) which suggests that deprivation is a main contributor to this difference.

4.1.3 Sensitivity analysis

Seven out of 10 studies that used individual measures of socioeconomic position were subject to over-adjustment for confounders, including all three studies for income,17,24,28 two out of three studies for employment18,27 and one out of two studies for both material wealth20 and occupation.25 In terms of area-based measures of socioeconomic position, one of the two area-based deprivation studies was at risk of over-adjustment bias.22 Over-adjustment is likely to underestimate the association between measures of socioeconomic position and mental wellbeing, and these results should be interpreted with caution.

Statistical models in four studies (which measured area-based deprivation,23 employment,26 occupation21 and material wealth19) did not over-adjust for confounders so the estimates are less likely to suffer from this type of bias. The sensitivity analysis, which removed all over-adjusted studies, provides greater certainty that a positive association between socioeconomic position and mental wellbeing is valid.
4.2 What are effective interventions to improve mental wellbeing and reduce socioeconomic inequalities in mental wellbeing at population level?

**Summary**

Evidence for socioeconomic interventions to improve mental wellbeing among adults was limited to two studies. These studies suggest a population-level labour market intervention (London Living Wage) and provision of welfare advice services (which provide support for issues with benefits, housing, employment, debt and money) can lead to improvements in mental wellbeing.

No evidence was identified for interventions to address the socioeconomic inequalities in mental wellbeing (for example, changes to the gap or gradient between most and least deprived).

Two studies were identified that assessed socioeconomic interventions to improve mental wellbeing among adults. The interventions both related to income; the first of these was the London Living Wage\(^{29}\) and the second related to welfare advice services.\(^{30}\) No studies identified in our review investigated the impact of interventions on inequalities in mental wellbeing (for example, changes to the gap or gradient between most and least deprived).

A non-randomised feasibility study assessed the impact of the London Living Wage on the wellbeing of employees of organisations that signed up to the initiative to reduce the impact of in-work poverty in a city with a high cost of living compared with those who did not.\(^{29}\) Among Living Wage employees (n = 173), WEMWBS scores were significantly greater than non-Living Wage employees (n = 127) by 3.9 points on average (95% CI 1.8 to 6.0). The estimate took account of sociodemographic differences between the two groups as well as mediators, such as having another job and working hours. Owing to the cross-sectional nature of the study, causality cannot be determined and there may be unmeasured confounding. However, the findings from this high-quality feasibility study provide some evidence that a population-level labour market intervention could be effective in improving wellbeing, particularly
among an ethnically diverse population in a low-paid service sector. It would merit replication with a prospective study design and a wider organisational context.

One further study looked at the impact of welfare advice services providing support on benefits, housing, employment, debt and money on mental wellbeing. The high-quality multisite study used a prospective quasi-experimental controlled design and a large sample (n = 1,001) to assess co-locating a welfare and advice service in general practices on mental wellbeing using the short version of WEMWBS. After three months, there was no difference in mental wellbeing scores between recipients of the co-located advice services (n = 273) and propensity weighted, matched controls (n = 623) whose GP practice did not have co-located welfare advice services (mean wellbeing scores intervention group: 18.1 at baseline vs. 18.0 at follow-up; comparison group: 18.7 at baseline vs. 19.7 at follow-up). However, in a subgroup analysis, participants who received a positive outcome from the co-located advice service had significantly higher SWEMWBS scores on average at 3 months' follow-up compared with controls by 1.29 points (p = 0.015). A key source of bias for this study is the lack of adjustment for confounders. However, this study provides some evidence to suggest that a positive outcome through the provision of welfare advice services can lead to short-term improvements in mental wellbeing. The study authors hypothesise this is mediated through reduced financial stress.
5. Discussion

To the best of our knowledge, this is the first time the relationship between socioeconomic determinants and mental wellbeing has been reviewed using a systematic approach.

Evidence of a positive association between socioeconomic position (using individual and area-based measures) and mental wellbeing came from two analyses from one high-quality study that included longitudinal data from four British birth cohorts, and 26 analyses derived from eight moderate and two weak-quality cross-sectional studies that included largely representative samples. Only one analysis from one-moderate quality study found that higher socioeconomic position (as measured by income) was associated with poorer mental wellbeing, with a small and non-statistical effect. Owing to variations in the explanatory variables for socioeconomic position, the use of full and short versions of WEMWBS, and the statistical methods used to calculate estimates of effect, it was not possible to draw comparisons or determine an overall estimate of the strength of association.

WEMWBS does not have set cut-points to indicate high or low levels of wellbeing. This makes it difficult to assess the practical significance of the effect sizes, particularly changes in WEMWBS scores. However, the typical distribution of WEMWBS scores in a population means that a difference of only a couple of points on the scale can be meaningful in terms of the average level of mental wellbeing in a population or between population subgroups.31

Our review identified limited longitudinal data. One high-quality study found that socioeconomic advantage in childhood is a predictor of improved wellbeing in mid to later life.21 However, cross-sectional studies were the main sources of data used to examine an association between socioeconomic position and mental wellbeing, and because these primarily involve a single measurement of exposure and outcome, it is not possible to demonstrate causality.

There is a need for more rigorous investigation in social determinant studies, with further longitudinal research to confirm the temporal relationship between socioeconomic position and mental wellbeing.
Mental illness is distributed along a socioeconomic gradient, with a higher risk of mental health conditions such as depression and anxiety among the most socioeconomically disadvantaged compared with the least disadvantaged. The findings from our review suggest that mental wellbeing might also be distributed along a socioeconomic gradient, with higher socioeconomic position associated with increased mental wellbeing. The findings from Santini et al.17 and Stewart-Brown et al.28 also suggest that for income, this effect is greater on low wellbeing than on high wellbeing. Broadly, our results indicate that socioeconomic correlates for mental wellbeing might be similar to those for mental illness, however, this warrants further quantitative research to compare respective effect size.

In terms of effectiveness evidence for socioeconomic interventions, only two studies were identified and the interventions affected adult or family income. A high-quality feasibility study provided some evidence that a population-level labour market intervention which increases income (London Living Wage) could be effective in improving employee wellbeing, particularly among an ethnically diverse and low-paid population. The findings from one high-quality study assessing the impact of welfare advice services suggests that welfare advice interventions co-located in primary care may be useful in improving mental wellbeing. Again, the mechanism for this impact appears to be an improvement in financial position and merits further research in other settings or models of care.

We found no studies that investigated the impact of interventions on socioeconomic inequalities in mental wellbeing. This aligns with the wider evidence base which shows a significant lack of analysis or unclear results on the equity impact of interventions on health outcomes generally.34 This is a key issue for future research of evaluation studies which measure mental wellbeing.

5.1 Strengths and limitations

A strength of our review was selecting studies based on validated measures of mental wellbeing to enable comparison of studies and a consistent definition of mental wellbeing. However, use of these tools relies on self-reported data and they are subject to a number of well-recognised biases. There was also variation in the
way the measurement tools were used. Three studies used a categorical approach with WEMWBS and applied cut-points using two different methods.\textsuperscript{17,18,28} A weakness of categorisation is that it is typically based on mean and spread of scores which may vary among studies. The remaining studies used WEMWBS or SWEMWBS as continuous data. These differences were captured in the quality appraisal checklist.

We found that studies in this literature base did not often deal with confounding appropriately. Statistical models in three-quarters of the studies were over-adjusted (controlling for multiple measures of socioeconomic position or for other mediating factors that would be expected to be associated with socioeconomic position). Statistical models which treat mediators in likely causal chains as confounders will produce biased results.\textsuperscript{35} This is a notable risk when dealing with measures that attempt to capture aspects of similar or overarching concepts.\textsuperscript{36} Measures of socioeconomic position, for example, comprise a complex configuration of education (individual and parental), social class, area deprivation, employment and income. This configuration will place some measures of socioeconomic position as downstream of others (e.g. individual education as downstream of parental). Adjusting for downstream measures when estimating the effect of upstream measures may yield overly conservative estimates as mediation conveys part of the ‘total effect’ of an exposure on an outcome.\textsuperscript{37} Drawing the causal diagrams for each study ensured that we selected the key exposure variable for socioeconomic position and extracted appropriate data.

To mitigate against over-adjustment, we extracted estimates from models with lowest risk of over-adjustment (which was often just age and sex where possible) and included over-adjustment as an item in an amended version of the EPHPP quality checklist. In addition, we performed a sensitivity analysis which removed over-adjusted studies, and findings from the remaining four studies still supported the positive association between socioeconomic position and mental wellbeing. These analyses used father and adult occupational social class, family affluence, area deprivation and being employed as exposures of socioeconomic position.
There were several limitations in our approach. We only included English-language studies and did not undertake dual data extraction. However, at least two reviewers discussed the estimates from each study after constructing the causal diagrams and selected the most appropriate estimates to include in this review.
6. Conclusions

Evidence for a positive association between mental wellbeing and socioeconomic position (using occupation, material wealth, area-based deprivation, employment status and income as exposure variables) was underpinned by 28 analyses from one high-quality longitudinal study, eight moderate-quality and two weak-quality cross-sectional studies. Only one data analysis from one moderate-quality study did not support a positive relationship.

Our review identified only one longitudinal study which assessed the association between socioeconomic position and mental wellbeing, and highlighted there is a need for further research with longitudinal designs.

We also found that studies in the available literature base often did not deal with confounding appropriately. Many were subject to over-adjustment for non-confounding covariates, which may lead to systematic error in estimates that underestimate the strength of association between socioeconomic position and mental wellbeing. After a sensitivity analysis removed over-adjusted studies, findings from three moderate-quality studies and one high-quality study still supported the positive association.

We found limited evidence for interventions that effectively address socioeconomic position and mental wellbeing. Effective interventions from two high-quality studies included a labour market intervention (London Living Wage) and a health and social care intervention (co-locating welfare benefit and debt advice services in a primary care setting), both of which suggest that increasing income and/or reducing financial stress improves mental wellbeing. Further research is needed on what else works to improve wellbeing and/or reduce inequalities in mental wellbeing.
7. Appendices

7.1 Appendix 1. Search strategy

Peer-reviewed literature

Language: English

CINAHL (Ebsco), to March Week 3 2021

TX ( "Warwick-Edinburgh Mental Well-Being Scale" or "short Warwick-Edinburgh Mental Well-Being Scale" OR "Warwick-Edinburgh Mental Wellbeing Scale" OR "short Warwick-Edinburgh Mental Wellbeing Scale" ) OR TX ( WEMWBS OR SWEMWBS OR affectometer OR s-wemwbs )

PROQUEST public health database

(("Warwick-Edinburgh Mental Well-Being Scale" or "short Warwick-Edinburgh Mental Well-Being Scale" OR "Warwick-Edinburgh Mental Wellbeing Scale" OR "short Warwick-Edinburgh Mental Wellbeing Scale") OR (WEMWBS OR SWEMWBS OR affectometer OR s-wemwbs))

APA PsycInfo, 2002 to March Week 3 2021

1. (wemwbs or swemwbs or s-wemwbs or affectometer).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

2. ("Warwick-Edinburgh Mental Well-Being Scale" or "Warwick-Edinburgh Mental Wellbeing Scale").mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

3. 1 or 2

EMBASE 2007-2021
("Warwick-Edinburgh Mental Well-Being Scale" or "Warwick-Edinburgh Mental Wellbeing Scale") OR (wemwbs or swemwbs or s-wemwbs or affectometer)

**Grey literature**

Advanced GOOGLE, 2007-2020

Language: English

Include ALL of these terms: WEMWBS Warwick-Edinburgh

EXACT word or phrase: "subjective wellbeing" OR "subjective well-being"

ANY of these words: policy OR policies OR demographics OR poverty OR inequalities OR inequality OR economic OR socioeconomic
### 7.2 Appendix 2. Summary of included studies

#### Summary of association studies

<table>
<thead>
<tr>
<th>Author (date)</th>
<th>Country</th>
<th>Literature source</th>
<th>Socioeconomic position measure</th>
<th>Study design</th>
<th>Life course</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shackleton (2018)(^{19})</td>
<td>UK (England)</td>
<td>Peer reviewed</td>
<td>Material wealth</td>
<td>Cross-sectional survey</td>
<td>Children (11–12 years)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Morgan (2019)(^{20})</td>
<td>UK (Wales)</td>
<td>Peer reviewed</td>
<td>Material wealth</td>
<td>Cross-sectional survey</td>
<td>Children/adolescents (11–16 years)</td>
<td>Weak</td>
</tr>
<tr>
<td>Wood (2017)(^{21})</td>
<td>UK</td>
<td>Peer reviewed</td>
<td>Occupation</td>
<td>Cohort study</td>
<td>Adults (42 years; 50 years; 60–64 years; 70 years)</td>
<td>High</td>
</tr>
<tr>
<td>Jones (2014)(^{25})</td>
<td>UK (Scotland)</td>
<td>Peer reviewed</td>
<td>Occupation</td>
<td>Cross-sectional survey</td>
<td>Working adults (16+ years)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Bellis (2012)(^{18})</td>
<td>UK (North West England)</td>
<td>Peer reviewed</td>
<td>Employment</td>
<td>Cross-sectional survey</td>
<td>Working adults (18+ years)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Bryson (2012)(^{26})</td>
<td>UK</td>
<td>Grey</td>
<td>Employment</td>
<td>Cross-sectional survey</td>
<td>Working adults (16+ years)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Johnson (2013)(^{27})</td>
<td>UK (Coventry)</td>
<td>Grey</td>
<td>Employment</td>
<td>Cross-sectional survey</td>
<td>Working adults (16+ years)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Country</td>
<td>Literature source</td>
<td>Socioeconomic position measure</td>
<td>Study design</td>
<td>Life course</td>
<td>Quality</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------------</td>
<td>-------------------------</td>
<td>--------------------------------</td>
<td>------------------------------------</td>
<td>----------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Stewart-Brown (2015)²⁸</td>
<td>UK</td>
<td>Peer reviewed</td>
<td>Income</td>
<td>Cross-sectional survey</td>
<td>Working adults (16+ years)</td>
<td>Moderate</td>
</tr>
<tr>
<td>McAneney (2015)²⁴</td>
<td>UK (Northern Ireland)</td>
<td>Peer reviewed</td>
<td>Income</td>
<td>Cross-sectional survey</td>
<td>Working adults (16+ years)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Santini (2020)¹⁷</td>
<td>Denmark</td>
<td>Peer reviewed</td>
<td>Income</td>
<td>Cross-sectional survey</td>
<td>Working adults (16+ years)</td>
<td>Weak</td>
</tr>
<tr>
<td>Gireesh (2018)²²</td>
<td>UK</td>
<td>Peer reviewed</td>
<td>Area-based deprivation</td>
<td>Cross-sectional survey</td>
<td>Adolescents (15 years)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Landy (2012)²³</td>
<td>UK (Scotland)</td>
<td>Peer reviewed</td>
<td>Area-based deprivation</td>
<td>Cross-sectional survey</td>
<td>Working adults (16+ years)</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

**Summary of intervention studies**

<table>
<thead>
<tr>
<th>Author (date)</th>
<th>Country</th>
<th>Literature source</th>
<th>Socioeconomic position measure</th>
<th>Study design</th>
<th>Life course</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flint (2014)²⁹</td>
<td>UK (London)</td>
<td>Peer reviewed</td>
<td>Income</td>
<td>Feasibility study</td>
<td>Working adults (18+ years)</td>
<td>Strong</td>
</tr>
<tr>
<td>Woodhead (2017)³⁰</td>
<td>UK (London)</td>
<td>Peer reviewed</td>
<td>Income</td>
<td>Quasi-experimental controlled study</td>
<td>Working adults (18+ years)</td>
<td>Strong</td>
</tr>
</tbody>
</table>
8. References


19 Shackleton N, Allen E, Bevilacqua L, Viner R, Bonell C. Associations between socio-economic status (including school- and pupil-level interactions) and student


33 Kromydas T, Thomson RM, Pulford A, Green MJ, Katikireddi SV. Which is most important for mental health: money, poverty, or paid work? A fixed-effects analysis of the UK Household Longitudinal Study. SSM – Population Health 2021;15.

