Educating oneself out of social exclusion

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RESEARCH REPORT

Publisher's note

About the research

Educating oneself out of social exclusion

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Providing more education and training is considered one means by which to reduce the extent of social exclusion and consequently has been a key focus in recent public policies.

Using the first ten waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey as well as data from the Survey of Education and Training, the research builds a multi-dimensional measure of social exclusion comprising: material resources (household income and expenditure); employment; education and skills (literacy and numeracy, educational attainment, work experience); health and disability; social interactions; community (neighbourhood quality, civic participation, volunteerism); and personal safety. The authors are then able to show how social exclusion varies across different levels of educational attainment and over time.

The authors also simulate the effect on the measure of multi-dimensional social exclusion of the Council of Australian Governments (COAG) target: halving, between 2009 and 2020, the proportion of 20 to 64-year-olds without at least a certificate III qualification. This mind experiment takes advantage of the correlations between the various dimensions by assuming that the outcomes of the 'new certificate III graduates' are the same as the 'previous certificate III' graduates. In a sense therefore it is a 'best case' simulation and assumes that the quality of the education expansion induced by the COAG target is high.

Key messages

- The level of social exclusion has declined over the decade beginning in 2001, except during the period around 2008—10, presumably as a result of the Global Financial Crisis.

- Education is a powerful marker of social exclusion. Those who are early school leavers or have a certificate II as their highest qualification suffer from social exclusion to a far greater degree than those with other levels of educational attainment. This is true for all dimensions of the index.

- The impact of improved basic educational levels on social inclusion is potentially very significant; for example, if we calibrate our cut-off of the measure of social exclusion so that around 10% of the population is in the socially excluded category and then conduct the COAG target simulation, the percentage of the population who are socially excluded drops to under 7%.

Notwithstanding its statistical complexity, the research clearly shows the power of attacking poor levels of education to reduce social exclusion.

Tom Karmel
Managing Director, NCVER

Contents

Tables and figures

Tables

Figures

Executive summary

Social exclusion is inherently multi-dimensional, with many, at times interconnecting, factors with the potential to impede an individual from fully participating in society. In this report we examine the relationship between education and training and social exclusion in Australia using data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey and the Survey of Education and Training (SET) conducted by the Australian Bureau of Statistics (ABS). The measure of multi-dimensional social exclusion used builds on earlier work for Australia and identifies seven dimensions of exclusion: material resources; employment; education and skills; health and disability; social interactions; community; and personal safety. In each of these dimensions a person is proportionally excluded, with the proportion ranging from 0 (not excluded) to 1 (fully excluded). These proportions are than summed to express multi-dimensional exclusion by a single 'sum-score', which therefore ranges between 0 and 7. A person is deemed to be multi-dimensionally socially excluded if their sum-score exceeds a threshold level. Although less intuitive, the principle is identical to, say, classifying a person as 'poor' when their income falls below a certain threshold level.

Having defined how social exclusion is measured, the report then asks:

- What is the extent of social exclusion in Australia?

We find that a key overarching message from this report is that setting the sum-score's threshold level for being deemed multi-dimensionally socially excluded at 1 or 2 indeed only affects the level of social exclusion in Australia. The story, such as what is happening with exclusion over time, or the relative levels of exclusion among different subgroups in the population is, in the main, independent of such threshold levels.

In terms of the trend in exclusion, we find that the incidence of multi-dimensional social exclusion has been declining from 2001 to 2008, but this downward trend was reversed and exclusion rates increased from 2008 to 2009, and again from 2009 to 2010. For those individuals who are early school leavers holding, at most, certificate II, the incidence of exclusion did not decline over time but was flat to slightly rising from 2001 to 2008. However, this group, too, has experienced a sharp increase since 2008. Although not formally tested, the period since 2008 coincides with the Global Financial Crisis (GFC), which is most likely to be at least partly responsible for the increase in our multi-dimensional social exclusion measure.

- Are particular education and training qualifications more or less likely to be associated with social exclusion?

There are clear links between education and measured social exclusion. However, while the exclusion rates are lowest for those with the highest levels of education ('higher education'[1] and [advanced] diplomas) and the exclusion rates for people with Year 12 and those with certificates level III and IV even overlap, there is only a real dichotomy between early school leavers with at most certificate II, and the rest. This suggests that the biggest impact on social inclusion through education is expected to come from efforts to increase Year 12 completion rates and/or completion of certificate level III qualifications rather than from efforts to increase the proportion of people with even higher levels of qualifications.

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[1] Higher education includes postgraduate degrees (master's or doctorate), graduate diplomas, graduate certificates, and bachelor or honours degrees.

- To what extent do low levels of education and training, in other words, the education and skills dimension, contribute to social exclusion?

An advantage of our measure of social exclusion is that it can be decomposed and fully apportioned to each of the seven dimensions that make up our measure. That is, the contribution by each of the seven dimensions can be expressed as a share, with the shares over all seven dimensions adding to 100%. Overall, approximately 12% of social exclusion can be attributed to the dimension education and skills. For all education subgroups the material resources dimension (that is, income, expenditure, net worth, financial stress) is the largest driver of exclusion, contributing between 30 and 40%, followed by community. The share of 'community' is stable across education levels, contributing approximately 18% to the overall adjusted headcount. There is also a strong positive relationship between age and the contribution of health, with health contributing about 16% for those aged 45 years and over.

- If the target set by the Council of Australian Governments (COAG) in relation to halving the proportion of the population aged 20—64 without qualifications at certificate III level and above by 2020 is met, how will this impact on the level of multi-dimensional social exclusion?

We simulate the effect of the COAG target to halve the proportion of Australians aged 20—64 without qualifications at certificate III level and above between 2009 and 2020 on our measures of multi-dimensional exclusion. We consider two impacts: the direct effect and the cumulative effect.

The direct effect is the effect of (randomly) changing education levels in half the number of cases where individuals report Year 11 and/or certificate I/II. The impacts measured as absolute changes in the level of multi-dimensional social exclusion are modest.

The cumulative effect considers the impact of superimposing the COAG target on the analysis, taking into account the multiplier effect of increasing people's education with the resultant better health, higher incomes, higher labour force participation rates etc. This effectively assumes that, by improving the individual's education level, all the characteristics associated with this higher education level are also inherited. Not surprisingly, the impact on the multi-dimensional exclusion measure is stronger in the case of a cumulative impact, with an approximate 30% reduction in the headcount measure of social exclusion. It might be considered that this is mainly due to assuming higher incomes in tandem with assuming higher education levels, but this is not the case, as the income poverty headcount ratio barely changes under the simulation of the cumulative effect. It is the other dimensions, and in particular their combined impact, that reduce multi-dimensional social exclusion under the COAG scenario, assuming a cumulative effect of lifting education levels.

Introduction

> The distributional goals of government must relate to a much broader concept of prosperity or wellbeing; one that goes well beyond standard inequality measures, or poverty lines constructs, based on crude statistical measures of dispersion around mean or median income. These traditional income based measures of poverty and disadvantage are just too simplistic for the task. The dispersion of money income is of consequence, to be sure, but it is not enough.
>
> (Secretary to the Treasury, Ken Henry, 2007)

Social exclusion is inherently multi-dimensional, as is well documented in the various writings by Nobel Prize recipient Amartya Sen. Sen (1999) defined 'poverty' in terms of deprivation of capability or opportunities. Various other research undertaken since the late 1990s outlines attractive concepts of multi-dimensional poverty, but empirical implementation of these measures has been proved to be relatively unsatisfactory and difficult.

In response, a new literature emerged that maintained the basic notion of multi-dimensionality, but traded theoretical purity and aesthetics for practicality. The index for multi-dimensional social exclusion used in this report is a product of that literature and takes into account seven key dimensions that contribute to exclusion: material resources (income, expenditure, net worth, financial stress); employment; education and skills; health and disability; social interactions; community; and personal safety. It is perhaps useful to highlight from the start that, although exclusion does take into account many different aspects — from health to income (giving rise to the term 'multi-dimensional') — our measure itself aggregates exclusion over the different domains to express exclusion by a single number.[2] This process is described in the section 'measuring social exclusion'.

The key focus of this study is how education and training, in particular, the lack of post-school qualifications, impacts on the level of social exclusion. To place this in context, the paper takes a wider view and addresses the following specific research questions:

- What is the extent of social exclusion in Australia?

- Are particular education and training qualifications more or less likely to be associated with social exclusion?

- To what extent do low levels of education and training, in other words, the education and skills dimension, contribute to social exclusion?

- If the target by the Council of Australian Governments (COAG) in relation to halving the proportion of the population aged 20—64 without qualifications at certificate III level and above by 2020 is met, how will this impact on the level of multi-dimensional social exclusion?

To answer the first of the four questions we consider both the extent of exclusion at a given point in time (for each of the ten years in our data) and its persistence over time. These measures are reported for different subgroups, such as groups defined by geographic location, age, or gender. Further disaggregation of the results for groups with different education levels addresses the second research question. Using a recently developed framework by Alkire and Foster (2009) multi-dimensional social exclusion is decomposed and fully apportioned to contributions by each of the

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[2] This process is described in non-technical terms in the section, Measuring social exclusion, and formally described in appendix C.

dimensions and addresses the third research question. The fourth and final question is addressed by re-computing all of our measures of multi-dimensional social exclusion after altering the data by randomly assigning half of the people who record low levels of formal education as having completed Year 12 instead.

Previous studies

This section discusses some of the earlier efforts to measure social exclusion.[3] Before discussing the Australian studies we describe some of the key European studies. This also reflects how the literature on social exclusion developed, with implementation of the concept and comprehensive statistical analysis being pioneered in the European Union (EU) before gaining traction elsewhere, including in Australia.

Research into multi-dimensional social exclusion was given a strong push after the European Union developed its Social Inclusion Strategy. The Lisbon Summit, held in Portugal at the beginning of the new millennium, contributed to the reinforcement of the EU's Social Inclusion Strategy and further emphasised the European Social Model. The aim was to make a decisive impact on eradicating poverty by 2010. For this purpose the European Union developed a set of indicators. Atkinson et al. (2002) acknowledged their importance and made a further list of recommendations that distinguished between level I (lead) indicators and level II (other) indicators. The Social Inclusion Strategy has since been renamed the Social Protection and Social Inclusion Process, and progress continues to be monitored for the different member states. The 13 lead indicators currently used in the European Union[4] mainly relate to financial measures such as income inequality, income poverty, as well as labour market outcomes and the proportion of people aged 18—24 with low levels of secondary education who are neither studying nor working.[5]

Several studies were undertaken for the different member states. For instance, Burchardt, Le Grand and Piachaud (2002) studied multi-dimensional exclusion in Britain between 1991 and 1998 using data from the British Household Panel Survey (BHPS). They distinguished consumption, production, political engagement and social interaction as the four dimensions, and each dimension had its own decision rule for being deemed excluded. This painted a picture of how many people were not excluded in any of the four dimensions and how many were excluded in one, two, three or all four dimensions. Another more recent study for the United Kingdom is Levitas et al. (2007), which provides a review of the range of quantitative data on social exclusion available in England and Wales. They constructed a matrix, named B-SEM — the Bristol Social Exclusion Matrix — with ten dimensions for social exclusion, broadly grouped into three main areas: resources, participation, and quality of life.

The Australian Government's response was initiated in 2008 when it established the Social Inclusion Board to advise the government on ways to address disadvantage in the community, with the Social Inclusion Unit set up within the Department of the Prime Minister and Cabinet.[6] This led to a number of publications outlining the concepts (for example, Hayes, Gray & Edwards 2008) and a national statement outlining the goals and challenges ('A stronger and fairer Australia', Commonwealth of Australia 2009). The Australian Social Inclusion Board (2010) also reported on social exclusion in Australia as a baseline against which to measure future progress.

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[3] The main findings of the studies surveyed in this section are summarised in table A.1 in appendix A.

[4] The EU Directorate-General Employment, Social Affairs & Inclusion makes their data and policy documents available electronically on <http://ec.europa.eu/social/main.jsp?langId=en&catId=750>. Detailed information on the indicators is available from <http://ec.europa.eu/social/main.jsp?catId=756&langId=en>.

[5] A similar concern exists in Australia with policies such as 'earn-or-learn' targeting similar groups of individuals.

[6] Several state-based initiatives preceded the government's response, most notably the Social Inclusion Initiative of South Australia's then Premier Mike Rann, which later informed the Australian Government's initiative.

Examples of Australian studies on multi-dimensional social exclusion are Heady (2006), Saunders, Naidoo and Griffiths (2007), and Scutella, Wilkins and Kostenko (2009). Saunders, Naidoo and Griffiths (2007) use data from the 2006 Community Understanding of Poverty and Social Exclusion (CUPSE) survey. They measure social disadvantage by three indicators: income poverty (based on 50% of median equivalised income), deprivation (defined as a lack of life's necessities) and social exclusion (defined as a lack of social participation and a lack of access to services and resources). Saunders, Naidoo and Griffiths (2007) show that there is substantial overlap between the three indicators, with the overlap between income poverty and deprivation at about 40%, and the overlap between income poverty and social exclusion at about 37%.

The work by Heady (2006) uses the first three waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey.[7] In it, he presents a framework for a multi-dimensional analysis of disadvantage based on the 'capabilities' and 'functionings' approach advocated by Sen (1999), distinguishing between four dimensions: financial, employment, health, and social. Heady (2006) denotes 'capabilities' as stocks and 'functionings' as flows. To give an example, financial assets are considered financial capital (that is, stock), whereas current income reflects financial 'functioning' (that is, a flow). A person with 'low (financial) capability' is a person with no assets, whereas a person with assets but low income has 'low (financial) functionings'. Similarly, a distinction is made between having no work experience ('capability') and currently being unemployed ('functioning'). Heady (2006) also links disadvantage to wellbeing and shows that groups with low capabilities are often linked to low social/economic functioning and low levels of wellbeing.[8]

Scutella, Wilkins and Kostenko (2009) and Scutella, Wilkins and Horn (2009) expand on the work by Heady (2006) to operationalise a multi-dimensional measure of social exclusion. They also use more waves of the HILDA Survey and expand the set of dimensions examined to seven. This measure also became the basis for the calculation of the Social Exclusion Monitor.[9] The methodology used by Scutella, Wilkins and Kostenko (2009) is the same as that applied in this research and is described in detail in the next section.

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[7] This is the same data source as used in this report, except we use the first ten available waves of the HILDA Survey.

[8] Despite the very different terminology, almost all studies mentioned use very similar indicators for exclusion. For example, Heady (2006) distinguishes between having no work experience as a 'capability' or stock and currently being unemployed as 'functioning' or flow. Our approach treats work experience and unemployment simply as indicators of exclusion (or as 'components' in our own terminology, as described in the next section).

[9] The Social Exclusion Monitor was jointly developed by the Brotherhood of St Laurence (BSL) and the Melbourne Institute and continues to be updated annually by the BSL.

Measuring social exclusion

Constructing (adjusted) headcount measures

Our framework and subsequent measures are those developed in Scutella, Wilkins and Kostenko (2009) and build on work by Headey (2006) and Saunders, Naidoo and Griffiths (2007) for Australia. They are strongly influenced by recent international work on social exclusion, including Burchardt, Le Grand and Piachaud (2002), Atkinson et al. (2002) and Levitas et al. (2007). Appendix C provides a formal presentation of how social exclusion is measured, but our discussion here is limited to providing insight into the principle and describing the method, without relying on formal notation. To compute our measure of multi-dimensional social exclusion we use the first ten waves of data from the Household, Income, and Labour Dynamics in Australia Survey, spanning the period 2001—10.

The core approach to measuring social exclusion taken in this report is a 'counting' approach (Atkinson 2003), which has strong parallels with the 'dual cut-off' approach applied by Alkire and Foster (2009) to multi-dimensional poverty measurement. Atkinson (2003), among others, has discussed how multi-dimensional approaches to deprivation can be broadly classified as either 'union' or 'intersection' approaches. The intersection approach considers a person to be excluded if they are excluded in all dimensions considered; that is, they have to have low income and low wealth, be in bad health and unemployed etc. By contrast, the union approach considers a person to be excluded if they are excluded in one or more dimensions; that is, being unemployed or in bad health itself is enough to be deemed excluded. It is easy to see that both extremes will lead to unsatisfying conclusions when the number of dimensions grows. The intersection approach will conclude that there is no exclusion (since it is hard to tick every box), whereas the union approach will conclude that nearly everyone is excluded (since it is equally difficult not to tick any box). The methodology we apply has elements of both approaches.

We use seven key dimensions in our framework that measure social exclusion, with each dimension itself comprising a number of components. They are: material resources; employment; education and skills; health and disability; social interactions; community; and personal safety. Table 1 lists the components of each dimension and provides basic information on what constitutes being excluded for each of these components. To give an example, the dimension material resources contains the following four components: income less than 60% of median income; household net worth less than 60% of median household net worth; consumption expenditure less than 60% of median consumption expenditure; and three or more indicators of financial stress. Another example is the dimension personal safety, which constitutes three components: victim of physical violence in the last 12 months; victim of property crime in the last 12 months; and a low level of satisfaction with 'how safe you feel'.

The fact that these dimensions or components are correlated is not a concern. It is indeed the extent of these correlations that are important in determining who faces multi-dimensional disadvantage. For instance, people in poor health will have lower employment rates than people in good health; that is, labour market outcomes and health status are clearly related. Similarly, components within a dimension are also clearly correlated. A person who was burgled will most likely also report a low level of satisfaction with how safe they feel. However, all dimensions and components are valid indicators of exclusion in their own right and any correlation will be picked up by our measure and show up as deeper, or more entrenched, disadvantage.

Our measure of social exclusion begins by considering each dimension in turn and assesses whether a person ticks the box for any component in the dimension. For example, in the dimension personal safety, we check whether the person was the victim of a property crime in the previous 12 months, a victim of physical violence, or whether they report a low satisfaction with 'how safe they feel'. If they tick all three boxes, their 'score' for the dimension personal safety is 1. If they only tick the box of reporting a low level of satisfaction with how safe they feel, their 'score' for the dimension personal safety is $^1/_3$. Similarly, a person who ticks all the boxes in the dimension material resources has a score of 1, whereas a person who ticks only one of the four components in the material resources dimension has a score of $^1/_4$. We do this for each of the seven dimensions. The 'score' in each dimension represents the degree of exclusion in that dimension and is captured by the proportion of components within that dimension that get ticked. So every individual has a 'score' for each dimension that lies between 0 (not excluded at all in that dimension) and 1 (fully excluded in that dimension).

The scores for each dimension are then added to give the 'sum-score'. This sum-score has a value ranging from 0 to 7, where 0 represents a person not excluded at all in any of the dimensions and 7 a person fully excluded in all dimensions. A person is deemed to be multi-dimensionally socially excluded if their score exceeds a nominated threshold level.

It is this sum-score that forms the basis of all summary measures of social exclusion. In Scutella Wilkins and Kostenko (2009) a headcount ratio of social exclusion is defined by counting the number of individuals with a sum-score above a threshold level (that is, are excluded) divided by the total number of individuals in the population. In the results section we report these headcount ratios of social exclusion based on threshold levels 1 and 2.

One limitation of the headcount ratio is that when a person who is already deemed excluded (that is, has a sum-score above the threshold) becomes excluded in one or more new dimensions (that is, ticks the box for several new components), the headcount ratio remains unchanged. A more desirable measure of social exclusion would recognise the increasing level of this person's exclusion. We therefore also compute and report the adjusted headcount ratio that does just that. This adjusted headcount ratio is described formally in appendix C, but the intuition and principle behind this measure is that the adjusted headcount can be interpreted as the product of two useful concepts: frequency and average breadth. When an individual who is already deemed excluded becomes deprived in a further dimension, the adjusted headcount rate will increase because the average breadth of exclusion will increase even if the frequency (that is, the headcount ratio) remains unchanged.

Table 1   Dimensions of social exclusion in Australia and their components

'Dimensions'		Indicator for exclusion ('Components')		Availability
Material resources (four components)	Household income	(1)	Income less than 60% of median income	All waves
	Household net worth	(2)	Household net worth less than 60% of median household net worth	Waves 2, 6 & 10
	Household consumption expenditure	(3)	Consumption expenditure less than 60% of median consumption expenditure	Waves 5–10
	Financial hardship	(4)	Three or more indicators of financial stress	Waves 1-–9
Employment (five components)	Paid work and unpaid work	(5)	Long-term unemployed	All waves
		(6)	Unemployed	All waves
		(7)	Marginally attached	All waves
		(8)	Underemployed	All waves
		(9)	In a jobless household	All waves
Education and skills (five components)	Basic skills (literacy and numeracy)	(10)	Low literacy	Wave 7
		(11)	Low numeracy	Wave 7
		(12)	Poor English proficiency	All waves
	Educational attainment	(13)	Low level of formal education	All waves
	Lifelong learning	(14)	Little or no work experience	All waves
Health and disability (five components)	General health	(15)	Poor general health	All waves
	Physical health	(16)	Poor physical health	All waves
	Mental health	(17)	Poor mental health	All waves
	Disability/long-term health condition	(18)	Has a long-term health condition or disability	All waves
		(19)	Household has a disabled child	All waves
Social (two components)	Social support	(20)	Little social support	All waves
	Participation in common social activities	(21)	Get together with friends/relatives less than once a month	Waves 1–6
Community (five components)	Neighbourhood quality	(22)	Low neighbourhood quality	Waves 1–4, 6, 8 & 10
		(23)	Reported satisfaction with 'the neighbourhood in which you live' low	All waves
		(24)	Reported satisfaction with 'feeling part of local community' low	All waves
	Civic participation and voluntary activity/ membership	(25)	Not currently a member of a sporting, hobby or community-based club or association	All waves
		(26)	No voluntary activity in a typical week	All waves
Personal safety (three components)	Victim of violent crime	(27)	Victim of physical violence in the last 12 months	Waves 2–10
	Victim of property crime	(28)	Victim of property crime in the last 12 months	Waves 2–10
	Subjective safety	(29)	Low level of satisfaction with 'how safe you feel'	All waves

To allow implementation of this approach, all components are expressed in such a way that any number of them — from zero through to all 29 of them — could in principle indicate exclusion by taking on the value 1.[10] Only components in the employment dimension need further clarification. With each of the 29 components taking on either the value 1 (excluded) or 0 (not excluded) a straightforward application would result in a situation where a person who is long-term unemployed would be considered equally excluded as a person who is unemployed or marginally attached. They

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[10] One could also consider particular combinations of components to be important, for instance, having a disability only being a problem in the absence of strong social support and not if a wide network of caring friends and relatives is available.

would each have a 1 for being long-term unemployed, unemployed, or marginally attached, respectively, and a zero for all other components in the employment dimension. To reflect the different levels of exclusion in the employment dimension we make components 5 to 8 recursive. For instance, a person who has a 1 for being marginally attached also has a 1 for being underemployed, and a person who has a 1 for being long-term unemployed also has 1s for being unemployed, marginally attached and underemployed. This means that, in the case of a long-term unemployed individual, his/her 'score' in the employment dimension would be 1 if s/he lived in a jobless household, or 0.8 if at least one other person in the household held a job.[11] A single person who is underemployed will have a 'score' of 0.2 in the employment dimension.

Details on indicators of exclusion by dimension and component

In this section we discuss the main elements of exclusion for each of the possible components, but report only on the main aspects. A full discussion of dimensions and components is presented in Scutella, Wilkins and Kostenko (2009). The components and dimensions reflect the outcome of a consultation with members from the not-for-profit sector, academia and government to establish a consensus,[12] but ultimately do reflect a choice from a much broader set of possible options.

Material resources dimension

The income variable used is the annual disposable income of the household, adjusted for household composition using the modified Organisation for Economic Co-operation and Development (OECD) equivalence scale.[13] The indicator for 'low income' applies if equivalised income is less than 60% of the median equivalised income in the population, which is an income poverty standard adopted by the European Union.[14]

Household wealth has been obtained in Waves 2, 6 and 10 of the HILDA Survey. A measure of total wealth — or net worth — can be constructed as equal to the sum of all assets less the sum of all debts. The indicator for low wealth is defined in an analogous manner to the indicator for low income: equivalised household wealth is less than 60% of median equivalised household wealth, using the modified OECD scale.

We define an indicator for low consumption expenditure to be present if equivalised consumption expenditure is less than 60% of median equivalised consumption expenditure, where equivalisation is via the OECD equivalence scale. Expenditure is limited to non-durable consumption expenditure, ranging from groceries to private health insurance.

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[11] Making the components in the employment dimension recursive is really just a trick for convenience. None of the other dimensions has this problem. Making the components for the employment dimension recursive allows us to treat all 29 components consistently as dummy indicators.

[12] In constructing the measure of multi-dimensional exclusion and choosing the components and their decision rules, Scutella, Wilkins and Kostenko (2009) and Scutella, Wilkins and Horn (2009) consulted with members from the not-for-profit sector, academia and government to establish a consensus. Specifically, they held a workshop hosted by the Brotherhood of St Laurence and the Melbourne Institute in December 2008. A list of participants is included in Scutella, Wilkins and Horn (2009, p.38).

[13] After having used the old OECD scale in the 1980s and the earlier 1990s, the Statistical Office of the European Union (EUROSTAT) adopted in the late 1990s the so-called OECD-modified equivalence scale. This scale, first proposed by Haagenars, de Vos and Zaidi (1994), assigns a value of 1 to the household head, of 0.5 to each additional adult member and of 0.3 to each child.

[14] At the 2001 Laeken European Council, 18 indicators to measure progress towards the agreed EU social inclusion objectives were adopted. The main measure of monetary poverty included in the EU list of indicators is a relative one (net income less than 60% national median), known as the 'at-risk-of-poverty' rate (European Commission 2010, p.6).

We define individuals experiencing financial hardship if they report experiencing three or more of the following seven indicators of financial stress:

- could not pay electricity, gas or telephone bills on time

- could not pay the mortgage or rent on time

- pawned or sold something

- went without meals

- were unable to heat the home

- asked for financial help from friends or family and/or

- asked for help from welfare or community organisation.

Employment dimension

An individual is said to be unemployed if s/he was not employed in the last week, looked for work within the last four weeks, and was available to start work in the last week. A person is long-term unemployed if s/he has been unemployed for a year or more.

A person is marginally attached to the labour force if s/he is not employed and is either looking for work and, while not available to start within one week, is available within four weeks; or available to start work within four weeks but is not looking for work because of the belief that s/he is unlikely to find work.

A person is underemployed if s/he is currently employed part-time (usual weekly hours of employment in all jobs are less than 35) and hours per week usually worked in all jobs are less than the hours the individual would like to work, having regard to the effect this would have on income.

Education and skills dimension

In Wave 7, respondents were asked, 'Thinking about the needs of your daily life, both at work and at home, how would you rate your reading/maths skills? Would you say your reading/maths skills are excellent, good, moderate or poor?' We define a person to have a low level of literacy/numeracy if that person reported having poor skills.

An indicator of low English proficiency is defined to be present if the individual speaks a language other than English at home and reports that he or she does not speak English well or does not speak English at all.

The indicator for low formal educational qualifications is a situation in which an individual is not currently studying full-time and has a highest educational qualification of less than high school completion. Certificate I and certificate II vocational qualifications are treated as qualifications of a lower level than high school completion. Due to the relatively low number of individuals with a certificate I or II we group them with early school leavers.[15]

As with formal education, the accumulation of work experience is associated with increases in skills, not only because of on-the-job training, but also because of the more general acquisition of knowledge and skills in the course of carrying out a job. We define a person to have low work

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[15] There are also a very small number of observations that record that a certificate has been obtained, but the level is not defined. We drop these observations from the sample to keep our categories easily interpretable.

experience if he or she has spent fewer than three years in paid employment. This naturally affects young people more than it does older individuals.[16]

Health and disability dimension

All health measures are from the SF-36 health survey (Ware et al. 1993), a 36-question survey administered in each wave in the self-completion questionnaire of the HILDA Survey.

An indicator of low general health is defined based on the SF-36 general health sub-scale, which is derived from respondent answers to five questions. Responses are converted into a combined score that ranges between 0 and 100. Higher scores correspond to better general health. We adopt a threshold of 50 for being excluded, which is relatively commonly used in studies and has the intuitive appeal of being half the maximum possible score.

Physical health is defined according to the SF-36 physical health sub-scale, which comes from respondent answers to ten of the SF-36 health survey questions. Responses are again converted into a combined score that ranges between 0 and 100. Higher scores correspond to better physical functioning and we adopt a threshold of 50 for being excluded.

Similarly, low mental health comes from the SF-36 mental health sub-scale, which is derived from five of the SF-36 health survey questions. As with the general health and physical functioning sub-scales, we adopt a threshold of 50 for defining poor mental health.

Our indicator of disability is based on whether an individual reports a long-term health condition, impairment or disability that restricts everyday activities, and has lasted, or is likely to last, for six months or more.

Social dimension

The indicator of low social support is based on responses for ten items that describe the amount of support received from other people. The self-completion questionnaire in the HILDA Survey obtains respondents' extent of agreement, on a seven-point scale (ranging from 1 for strongly disagree through to 7 for strongly agree), with ten statements about how much support they receive from other people. The statements are: (1) People don't come to visit me as often as I would like; (2) I often need help from other people but can't get it; (3) I seem to have a lot of friends; (4) I don't have anyone I can confide in; (5) I have no one to lean on in times of trouble; (6) There is someone who can always cheer me up when I'm down; (7) I often feel very lonely; (8) I enjoy the time I spend with the people who are important to me; (9) When something's on my mind, just talking with the people I know can make me feel better; and (10) When I need someone to help me out, I can usually find someone. The scales for items (1), (2), (4), (5) and (7) are inverted so that a higher score corresponds to greater social support for every item. Thus, the maximum score is 70 and the minimum score is 10.

A score of less than 30 is interpreted as a situation of low social support, since on average the respondent is agreeing with statements reflecting the absence of social support and disagreeing with statements reflecting the presence of social support.

In Waves 1 to 6, the self-completion questionnaire contains the question 'In general, about how often do you get together socially with friends or relatives not living with you?' Seven response categories are offered: every day; several times a week; about once a week; two or three times a month; about

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[16] It also mainly affects individuals early on in our data observation period due to the use of longitudinal weights in our computations to keep our statistics representative of the population at Wave 1.

once a month; once or twice every three months; and less often than once every three months. We classify persons who select either of the last two responses, that is, get together with friends or relatives less than once per month, as excluded on this component.

Community dimension

There is a ten-item question in the self-completion questionnaire of Waves 1 to 4, and Waves 6, 8 and 10 of the HILDA Survey about how common various phenomena are in the local neighbourhood, with response options 'never happens', 'very rare', 'not common', 'fairly common', 'very common', and 'don't know'. The ten aspects are (1) Neighbours helping each other out; (2) Neighbours doing things together; (3) Loud traffic noise; (4) Noise from airplanes, trains or industry; (5) Homes and gardens in bad condition; (6) Rubbish and litter lying around; (7) Teenagers hanging around on the streets; (8) People being hostile and aggressive; (9) Vandalism and deliberate damage to property; and (10) Burglary and theft. Items (1) and (2) are positive neighbourhood attributes, while the remainder would generally be regarded as negative aspects. A scale running from 1 to 5 is adopted, whereby a higher value corresponds to better neighbourhood quality. The aggregate score potentially ranges from 10 to 50. A threshold of 20 for defining low neighbourhood quality is adopted, implying that on average the individual regards negative aspects as fairly or very common and positive aspects as very rare or never happening.

Reported satisfaction with 'the neighbourhood in which you live' and 'feeling part of your local community' is rated by HILDA Survey respondents on a scale from 0 (completely dissatisfied) to 10 (completely satisfied). A value of less than 5 is taken to denote a low level of satisfaction with the neighbourhood.

Civic participation broadly defined is not measured by the HILDA Survey, but low civic participation is indicated by an individual not being a member of a sporting, hobby or community-based club or association. We define an indicator that captures exclusion if an individual spends no time on volunteer or charity work in a typical week and is not in paid employment or studying (full-time or part-time).

Personal safety dimension

From Wave 2 onwards, the self-completion questionnaire asks whether respondents have been a victim of physical violence (for example, assault) or property crime within the preceding 12 months. A positive response indicates exclusion for that component.

An indicator for low perceived personal safety is derived from the reported level of satisfaction with 'how safe you feel', which is rated on a scale from 0 (completely dissatisfied) to 10 (completely satisfied). A score of less than 5 is taken to indicate low perceived personal safety.

Data and results

Data

We use the confidentialised HILDA release 10.0 data. The HILDA Survey began in 2001 and each year interviews roughly 12 000 individuals in 7000 households. Our core sample for the analysis consists of those individuals aged 15 years and over for whom we can compute the sum-score based on the indicators for exclusion (components) that are available for each wave (that is, the common components).[17]

Table 2   Core sample by wave

Wave (2001 = wave 1)	Observations	
	Unweighted	Weighted
1	11 421	12 147 207
2	9 830	11 852 608
3	8 964	11 833 869
4	8 295	11 815 624
5	7 680	11 434 922
6	7 276	11 207 988
7	6 817	10 886 133
8	6 413	10 491 714
9	6 193	10 533 031
10	6 322	11 019 751
Total across all 10 waves pooled	**79 211**	

Note: The weights used are the longitudinal weights available at each wave. The weighted sample will always reflect the population at Wave 1.

Incidence of components of social exclusion

Table 3 summarises the incidence of exclusion in each of the 29 underlying components that make up the seven dimensions. The incidence is averaged[18] over all ten waves. Exclusion is based on the rules for each component as listed in table 1. For example, the component low income is 1 for a person having an equivalised income below 60% of the median equivalised income for Australia as a whole. Table 3 reports that 21.39% of respondents experience low income. This component is also widely known as the (headcount) income poverty rate.

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[17] The useable sample for each of the 29 components varies slightly due to item non-response. If a score cannot be computed for a particular dimension, then the sum-score cannot be computed either. This is why the sample size based on the availability of a valid sum-score is a lower bound and why in some instances more observations are used, e.g. in computing the means in table 3.

[18] The average is taken over the number of years for which this component is available. For instance, in the case of 'Low net worth' the average 'over the ten waves' is in actual fact the average of just three waves: waves 2, 6 and 10 when wealth data were collected.

Table 3   Incidence of each individual component of social exclusion, all waves 1 to 10 pooled, population aged 15 years and over (%)

Material resources dimension		Health dimension	
Low income	21.39%	Poor general health	18.97%
Low net worth	35.51%	Poor physical health	11.00%
Low consumption	14.30%	Poor mental health	9.66%
In financial hardship	6.02%	Long-term health condition	28.91%
Employment dimension		Disabled child in the household	3.25%
Long-term unemployed	0.47%	**Social dimension**	
Unemployed	2.64%	Little social support	1.36%
Underemployed or unemployed	8.11%	Infrequent social activity	11.11%
Marginally attached, underemployed or unemployed	13.13%	**Community dimension**	
		Low neighbourhood quality	1.59%
In a jobless household	11.47%	Low satisfaction with neighbourhood	4.31%
Education and skills dimension		Low satisfaction with feeling part of community	13.38%
Low literacy	3.20%		
Low numeracy	4.44%	Low civic participation – membership	19.22%
Poor English proficiency	2.30%	Low civic participation – voluntary activity	23.40%
Low formal education	33.41%	**Personal safety dimension**	
Little work experience	5.34%	Victim of violence	1.27%
		Victim of property crime	4.52%
		Low subjective safety	3.89%

Note: The data are pooled over all waves, but weighted using the longitudinal weights available for each wave to always reflect the population at Wave 1.

Table 3 provides a quick snapshot of the components that drive social exclusion. For the components in the education and skills dimension, the incidence rates over time are displayed graphically in figure 1.[19] The incidence of having poor English proficiency does not vary over time. However, there has been a big drop in the rate of people with 'low formal education' in the decade since 2001. It appears as if the rate of people with 'little work experience' also declines, but this is due to the use of longitudinal weights. If cross-sectional weights are used (not shown here), the line for little work experience also remains near constant, but the line for the component 'low formal education' still shows a strong downward trend. In other words, the downward trend is not attributable to sample attrition; that is, the trend is not due to individuals with low formal education leaving the sample. It should be kept in mind that the period covered (at least up until 2008—09) was a period of strong economic growth and low unemployment.

Incidence rates for components other than those in the education and skills dimension are tabulated for each year in appendix B, table B1. The overall trend for the different components is positive, meaning that incidence rates drop over time or, at worst, remain stable. A notable exception is having a long-term health condition or a disability, which is trending up from an incidence rate of 23.7% in 2001 to 32.0% in 2010. Some components have a very low incidence rate, such as reporting low satisfaction with 'how safe you feel'. In these cases the relative improvement may still be quite marked. In the case of low subjective safety, the incidence of exclusion in that particular component dropped from 6.7% in 2001 to 3.0% in 2010; that is, more than halved.

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[19] The components 'low literacy' and 'low numeracy' are only available for Wave 7 and are hence not displayed. Their incidence was 3.2% and 4.4%, respectively (table 3).

Figure 1 Incidence of exclusion for education and skills components

Population aged 15 and over (%)

(Chart showing three trend lines from 2001 to 2010)

Low formal education: 39.1%, 36.5%, 34.6%, 33.5%, 32.6%, 32.6%, 32.0%, 31.4%, 30.8%, 30.0%

Legend:
— Low formal education
– – Poor English proficiency
····· Little work experience
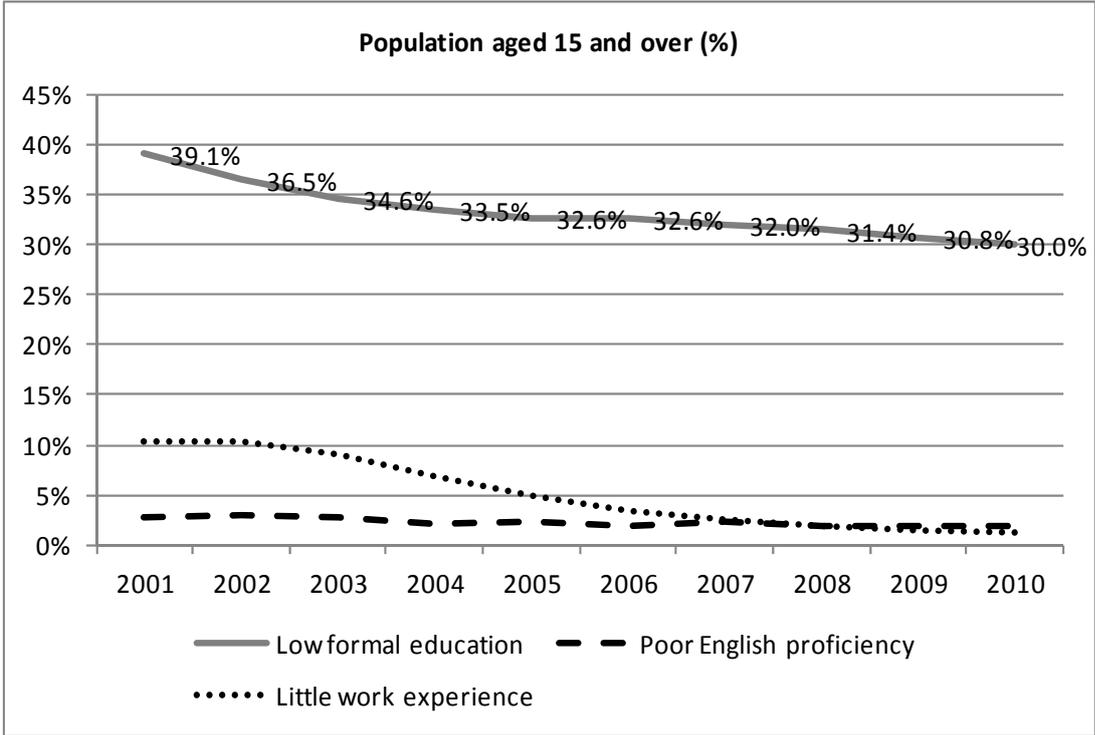
Headcount of social exclusion

In the section that outlined how multi-dimensional social exclusion is measured through the use of a single index, the sum-score was defined as the sum of the 'score' for each of the seven dimensions. The score itself was defined as the proportion of the dimension's components that the respondent ticks as being excluded from. The distribution of this sum-score is plotted in figure 2. Not surprisingly, the distribution is heavily skewed towards the left and a sum-score in excess of 3 is very rare, even though, theoretically, the sum-score can be as large as 7.

Based on the sum-scores, a headcount measure of exclusion can be calculated by simply specifying an (arbitrary) cut-off k for the sum-score and counts a person as excluded if his/her sum-score is above this cut-off level.[20] In figure 3 we plot the headcount exclusion ratio for Australia based on two cut-offs for the sum-score: a cut-off $k = 1$ and a cut-off $k = 2$. The choice of cut-off does not impact on the trend, which is downwards, representing less exclusion over time, but it does affect the levels and also the relative size of the reduction in exclusion rates. The rates presented in figure 3 are weighted using longitudinal person weights to reflect the population in 2001.

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[20] Equation (3) in appendix C formally defines the headcount measure of exclusion for a chosen cut-off level k.

Figure 2   Distribution of sum-scores pooled over all HILDA, Waves 1–10
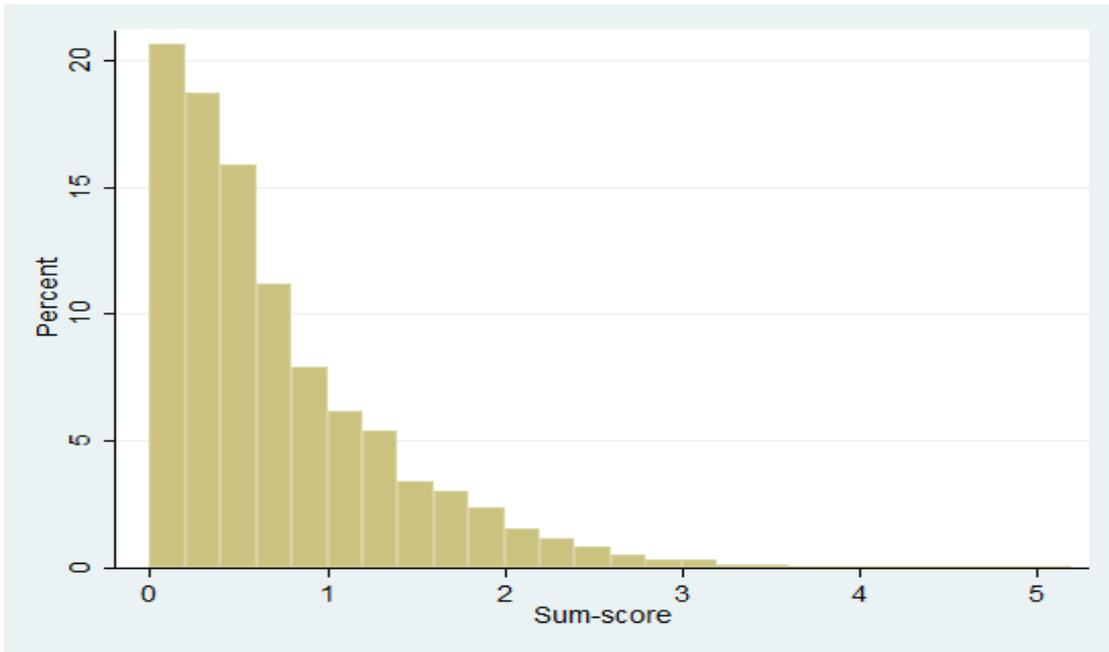
Figure 3   Headcount measure of social exclusion for two thresholds of the sum-score determining exclusion over time (based on common components, Waves 1–10)
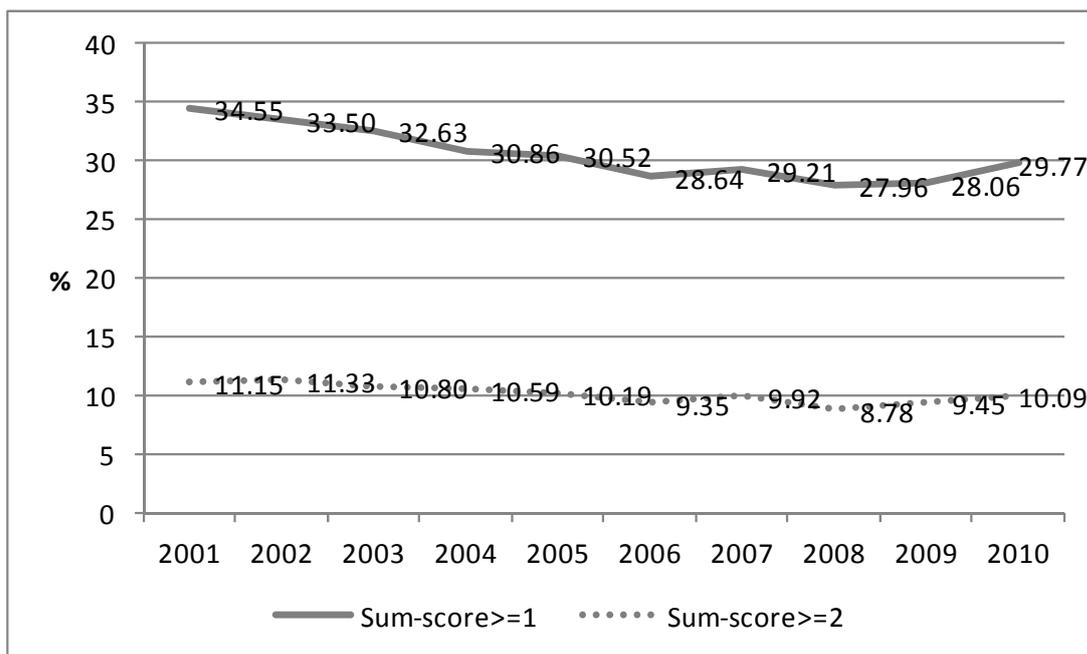
To investigate the association between formal education and the headcount exclusion rate, figure 4 displays the Australia-wide headcount measure based on a cut-off level of 2 for the sum-score (a reasonably conservative level that sees roughly 10% of individuals deemed excluded), along with the headcount exclusion rates for individuals with different levels of formal schooling. Having completed higher education levels dominates having (advanced) diplomas, which in turn dominates completing only Year 12 or having a certificate III or IV. However, the headcount exclusion rates for those who completed Year 12 and those with a certificate III or IV overlap and cross on multiple occasions. It could even be argued that the only real difference is between early school leavers and those with a certificate I/II, compared with the rest. This suggests that the biggest impact on social inclusion

through education is expected to come from efforts to increase school completion rates and/or completion of certificate level III qualifications rather than from efforts to increase the proportion of people with even higher levels of qualifications. The number of respondents in the HILDA data with certificate I/II as their highest level of qualification completed is relatively small, so they have been grouped with early school leavers.[21]

Highest formal education levels are based on the HILDA variable 'edhigh'. 'Higher education' includes postgraduate degrees (master's or doctorate), graduate diplomas, graduate certificates, and bachelor or honours degrees. The other categories are self-explanatory.

Figure 4   Breakdown of headcount measure of social exclusion over time by level of highest formal education completed (sum-score>2; based on common components, Waves 1–10)
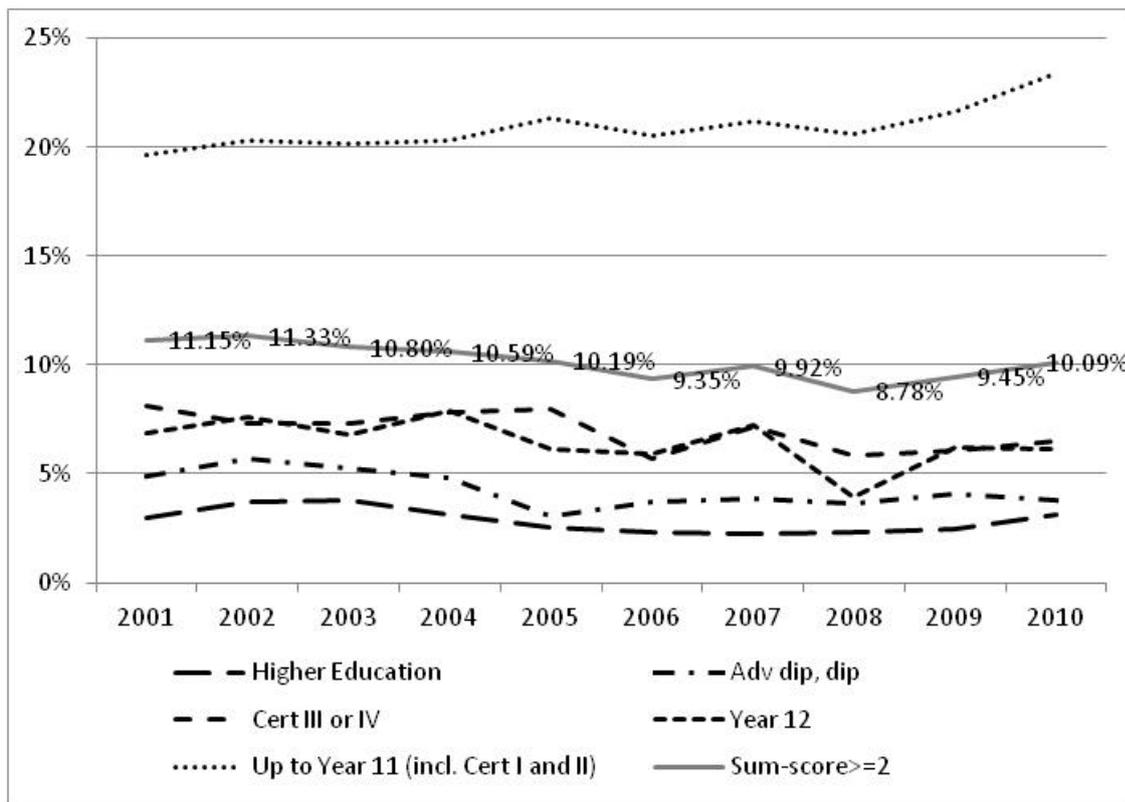
Persistence of social exclusion

One of the advantages of panel data is that it can tell you whether it is the same people who are excluded year on year, or whether there is considerable churn in exclusion status. In table 4 the distribution of the number of years in exclusion is provided for the subpopulation of HILDA respondents who participated in all ten waves. The last column in table 4 shows the distribution for Australia as a whole. A minority (37.51%) does not experience any exclusion over the ten-year period, when 1 is taken as the cut-off level for the sum-score to determine exclusion. The distribution is also reported for each of the five categories of formal qualifications. Not too much should be read into the probability of experiencing exclusion once in the ten-year period being relatively high for those with

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[21] A very small number of individuals report having completed a certificate, but for which the level cannot be assessed. These observations are dropped from the sample.

higher education qualifications. This is, in fact, directly related to the much lower probability of experiencing exclusion for two or more years for this group.

Table B3 in appendix B provides the equivalent to table 4 when using $k = 2$ as the cut-off level for the sum-score for determining exclusion.

Table 4   Persistence of social exclusion (%) for the balanced Wave 10 sample (k = 1)

Years	Higher education	Adv diploma, diploma	Certificate III or IV	Year 12	Up to Year 11 (incl. Cert I and II)	Total
0	53.70	47.52	40.55	39.48	18.55	37.51
1	18.82	15.57	16.88	17.36	12.06	15.78
2	9.25	12.41	9.62	12.78	10.66	10.55
3	5.62	6.34	7.21	8.31	9.80	7.69
4	4.30	4.15	5.35	5.87	8.68	6.07
5	2.63	3.32	5.81	3.97	7.51	5.07
6	1.83	3.40	4.38	2.37	7.65	4.41
7	1.40	1.86	3.28	3.38	7.35	3.95
8	1.54	2.78	2.69	3.07	7.71	4.02
9	0.64	1.31	2.43	1.82	6.11	2.94
10	0.27	1.33	1.81	1.57	3.91	2.01

Note: Higher education includes postgraduate degrees (master's or doctorate), graduate diplomas, graduate certificates, and bachelor or honours degrees.

Adjusted headcount of social exclusion

The (unadjusted) headcount ratio of social exclusion (H^k) was defined as the proportion of the population deemed excluded (that is, has a sum-score above a given threshold level k). One limitation of this measure is that when a person who is already deemed excluded becomes excluded in one or more new dimensions, the headcount measure H^k remains unchanged. The adjusted headcount ratio (M^k_0) is therefore a more appealing measure since it would recognise the deepening of this person's exclusion.[22]

Table 5 presents the headcount and adjusted headcount of multi-dimensional exclusion for two levels of the cut-off k. The numbers reported are those for the pooled sample across all ten waves using the longitudinal weights available at each wave. The adjusted multi-dimensional exclusion headcount is much lower than the non-adjusted one. This is to be expected, given that the adjusted headcount is the product of the (non-adjusted) headcount and the average breadth of exclusion. The average breadth represents the average proportion of components of which those who are deemed excluded are deprived, and thus it is bound to be less than 1. For instance, in the case of a cut-off $k = 1$, the average breadth is 0.258. In other words, those deemed excluded on average are deprived in 26% of all possible components. When lifting the cut-off k to 2 we will classify far fewer people as excluded (10.2% for the population as a whole compared with 30.7% for the population as a whole under $k = 1$), but when deemed poor they are on average deprived in about 37% of all possible components (as opposed to the 26% under $k = 1$).

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[22] Although we do not want to introduce formal notation in the main text we do keep the notation of H^k and M^k for the headcount and adjusted headcount, respectively, to allow consistency with appendix C. The superscript k takes on the value of 1 or 2 and represents the chosen cut-off for the sum-score.

Table 5   Profile of exclusion by education level

Education level	Population (Share)	Income poverty headcount ratio	Based on cut-off $k = 1$			Based on cut-off $k = 2$		
			Multi-dimensional poverty headcount ratio (H^1)	Average breadth of exclusion (A^1)	Adjusted multi-dimensional poverty headcount ratio $(M^1_0 = H^1 \cdot A^1)$	Multi-dimensional poverty headcount ratio (H^2)	Average breadth of exclusion (A^2)	Adjusted multi-dimensional poverty headcount ratio $(M^2_0 = H^2 \cdot A^2)$
Higher education	23%	0.092	0.136	0.226	0.031	0.029	0.353	0.010
Adv. dip., dip.	10%	0.159	0.205	0.230	0.047	0.042	0.369	0.016
Cert. III or IV	20%	0.183	0.260	0.243	0.063	0.070	0.362	0.025
Year 12	14%	0.189	0.252	0.242	0.061	0.066	0.359	0.024
Up to Year 11 (incl. cert. I/II)	33%	0.340	0.510	0.275	0.140	0.208	0.370	0.077
Total	100%	0.214	0.307	0.258	0.079	0.102	0.367	0.037

Note: Income poverty is defined as less than 60% of median household equivalised income.

Figures 5 and 6 display graphically how the adjusted multi-dimensional headcount ratios develop over time, split by the highest level of education achieved. They are similar in spirit to figure 4, which showed the time trends for the non-adjusted headcount. Figure 5 is based on a cut-off score of 1, figure 6 on a cut-off score of 2. Both are shown here to underscore that the cut-off in a sense is not of much importance. It does of course affect the levels, but the trends and the comparisons between different levels of formal education are not affected at all. In fact, even figure 4 (non-adjusted headcount) looks the same as figures 5 and 6.

Figure 5   Breakdown of adjusted headcount ratio of social exclusion over time by level of highest formal education completed (k = 1; based on common components, Waves 1–10)
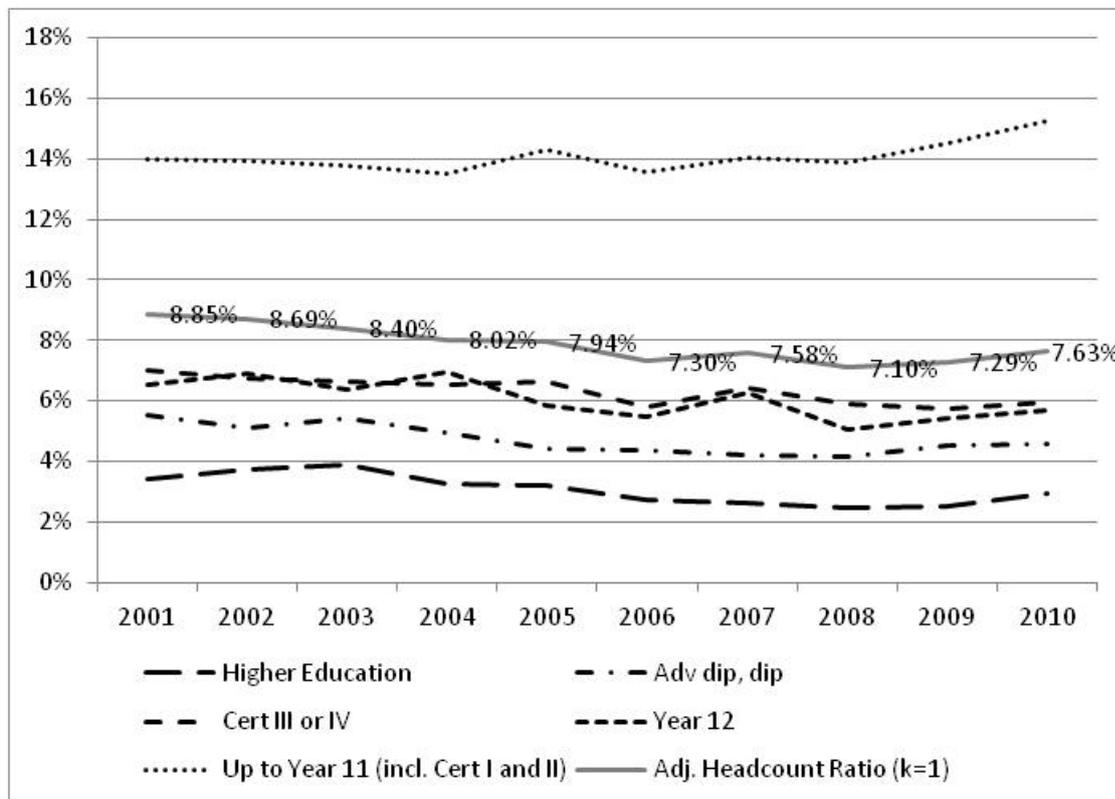
Figure 6 Breakdown of adjusted headcount ratio of social exclusion over time by level of highest formal education completed (k = 2; based on common components, Waves 1–10)
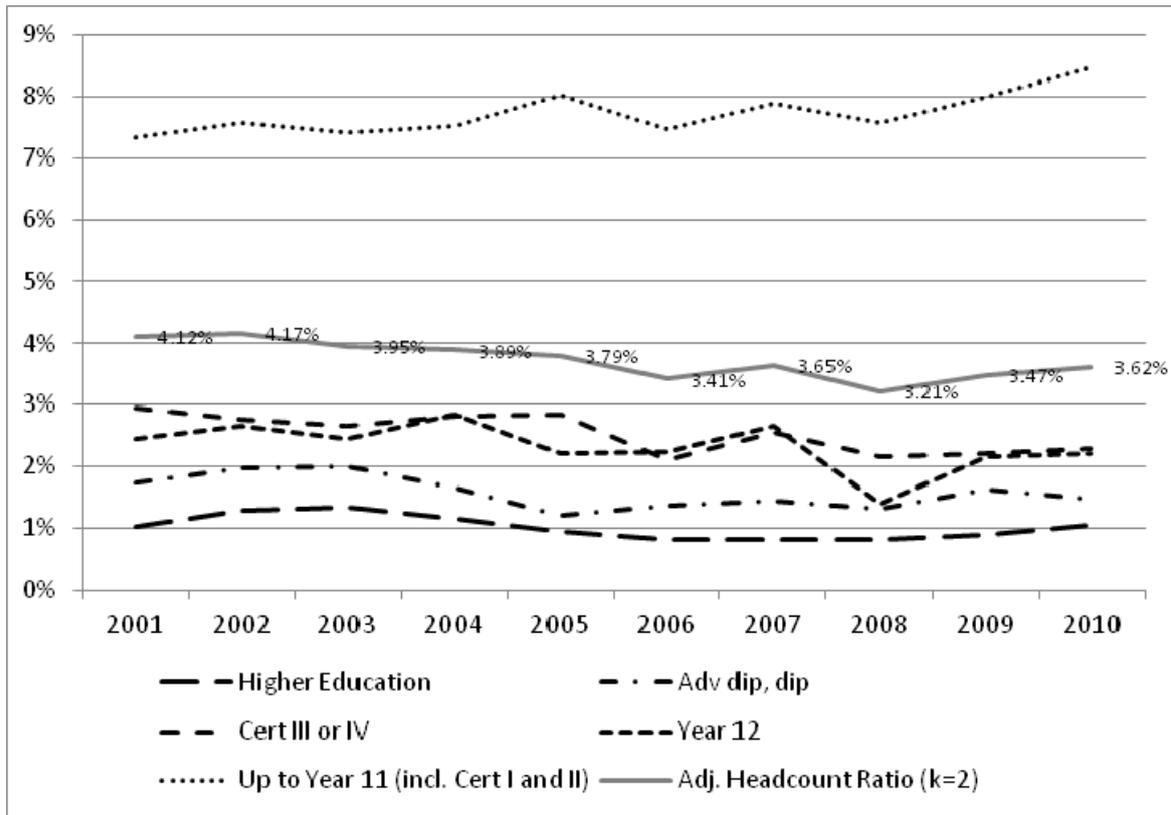
Apportioning the adjusted headcount to contributions by dimensions

Although the headcount and adjusted headcount show a similar pattern over time, and this pattern does not seem to be altered in a meaningful way (other than in levels) when choosing different cut-off levels, the adjusted headcount poverty measure has one major advantage: it can be decomposed and fully apportioned to reveal how each dimension contributes to the overall adjusted headcount ratio.[23] Furthermore, this breakdown can be made for any (sub)group in the population.

In addition to looking at the level of exclusion for different (sub)groups in the population, it is also important to examine the source of their exclusion. For instance, in table 5 it is shown that on average the multi-dimensional exclusion rates for those with a higher education qualification are about half of those for individuals who have completed Year 12, irrespective of the choice between the headcount and adjusted headcount ratio and irrespective of the cut-off value *k* being 1 or 2. The question is whether that 50% reduction is equally distributed over all of the dimensions, or if there are noticeable differences in the sources for exclusion. Table 6 does just that, by decomposing the adjusted headcount ratio and conveniently expressing the contributions that each of the seven dimensions makes as a percentage contribution. The sum of these percentage contributions is always 100. The first column gives the population share for each of the education subgroups.

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[23] How this is achieved is described in appendix C, but the key point is that the adjusted headcount ratio can be fully apportioned to reflect the percentage contribution each dimension makes.

Table 6   Breakdown of the adjusted headcount ratio by education level into contributions by each dimension (common components; cut-off k = 1; all waves pooled)

Education level	Population (Share)	Adjusted multi-dimensional poverty headcount (M^1_0)	The % contribution of each dimension to M^1_0						
			Material resources	Employment	Education and skills	Health	Social	Community	Personal safety
Higher education	23%	0.031							
Percentage contribution		*100%*	*38.39%*	*10.07%*	*2.32%*	*13.67%*	*7.30%*	*16.32%*	*11.91%*
Adv. dip., dip.	10%	0.047							
Percentage contribution		*100%*	*41.80%*	*8.96%*	*1.17%*	*14.83%*	*7.00%*	*17.59%*	*8.65%*
Cert. III or IV	20%	0.063							
Percentage contribution		*100%*	*37.88%*	*9.41%*	*1.32%*	*16.78%*	*7.75%*	*18.91%*	*7.96%*
Year 12	14%	0.061							
Percentage contribution		*100%*	*36.92%*	*11.44%*	*5.01%*	*13.25%*	*6.21%*	*18.84%*	*8.32%*
Up to Year 11 (incl. cert. I/II)	33%	0.140							
Percentage contribution		*100%*	*31.22%*	*6.89%*	*18.57%*	*14.49%*	*6.08%*	*18.27%*	*4.48%*
Total	100%	0.079							
Percentage contribution		*100%*	*34.21%*	*8.22%*	*11.76%*	*14.66%*	*6.53%*	*18.23%*	*6.38%*

In our example of a comparison between individuals with a higher education qualification and those who completed Year 12 we see that the difference in the relative contribution by dimensions mainly operates through the dimensions of education and skills, and personal safety. The education and skills dimension has three components that are present in each of the ten waves: poor English proficiency, low levels of formal qualifications, and little or no work experience. To be excluded in the component low levels of formal qualifications, an individual can possess at most certificate I or II and have not completed school. Hence, for both the school completers and higher education educated subgroups, exclusion in the education and skills dimension is due to poor English proficiency and/or little work experience. What table 6 shows is that those two components are bigger drivers, relatively speaking, for school completers than they are for individuals with a higher education qualification. Instead, conditional on being excluded, personal safety is more important for driving exclusion for those with higher education qualifications, relative to other subgroups in the population.

A key observation that can be made from the breakdown in table 6 is that for all education subgroups the dimension, material resources, is the largest driver of exclusion, contributing between 30 and 40%, followed by community. The share of community is stable across education levels, contributing approximately 18% to the overall adjusted headcount. The only real stand-out is the contribution of the education and skills dimension to the subgroup of early school leavers (including those with certificates I or II). However, this is by virtue of design. Low formal education is a component in the education and skills dimension, which itself is part of the adjusted headcount poverty ratio. It is not surprising then that the education and skills dimension contributes a larger part to the adjusted headcount for individuals with low formal education, relative to that for individuals with higher levels of formal education.[24]

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[24] The insight is that having low formal education already puts you ahead in the sum-score by 1/3 points because there are three components in the 'education and skills' dimension available in all waves: poor English proficiency, low formal education and little or no work experience. From a baseline of 1/3 it is easier to break the threshold level of 1 for the sum-score, albeit no guarantee. Among those who did break the threshold to be deemed excluded, low formal education (that is, the skills and education dimension) would have played a relatively important role.

Table 7 is similar in spirit to table 6 and does the same breakdown for other subgroups. Only the percentage contribution that each dimension makes to the adjusted headcount ratio is reported. The dimension of community still, very consistently, contributes about one-fifth to the adjusted headcount ratio, but is lowest for the youngest age group. We now also get more variation in the percentage contributions for dimensions across different subgroups. For instance, the contribution of material resources is as high as 44.1% for lone persons. There is also a strong positive relationship between age and the contribution of health, with health contributing about 16% for those aged 45 years and over.

The breakdown in table 7 also shows that the adjusted headcount for the two territories is very low. For the Australian Capital Territory this is not an unexpected result, but for the Northern Territory it reflects that the HILDA sample is not representative of the general population residing in the Northern Territory. The breakdown in this case neatly shows that those considered multi-dimensionally excluded in the Northern Territory are so because they have much higher contributions from the dimensions of personal safety and social interactions than any of the other subgroups.

Table 7   **Breakdown of the adjusted headcount ratio for other subgroups into contributions by each dimension (common components; cut-off k = 1; all waves pooled)**

	Population (Share)	Adjusted multi-dimensional poverty headcount (M^1_0)	Material resources	Employment	Education and skills	Health	Social	Community	Personal safety
			__	__	% contribution of each dimension to M^1_0				
Total	**100%**	**0.079**	**34.21**	**8.22**	**11.76**	**14.66**	**6.53**	**18.23**	**6.38**
Gender									
Male	47%	0.070	34.66	8.54	10.27	15.23	7.21	17.84	6.25
Female	53%	0.088	33.86	7.97	12.92	14.23	6.00	18.54	6.49
Age									
15–24 yrs	17%	0.072	34.12	15.69	19.32	7.75	3.86	13.72	5.53
25–34 yrs	16%	0.045	29.56	14.13	9.03	11.70	6.19	17.95	11.45
35–44 yrs	20%	0.051	28.07	11.62	9.63	13.85	8.78	16.98	11.07
45–54 yrs	19%	0.059	28.70	10.47	9.96	16.00	9.92	16.56	8.40
55–64 yrs	13%	0.098	31.63	9.76	11.47	16.70	6.64	18.40	5.40
65 yrs+	14%	0.168	42.20	1.03	12.32	16.01	4.83	20.77	2.84
Family type									
Couple – no kids	37%	0.081	33.58	6.17	12.30	16.16	6.86	20.10	4.82
Couple – dependent kids	37%	0.043	26.43	11.31	13.74	13.49	8.59	17.15	9.30
Lone parent – dependent kids	6%	0.125	32.19	14.61	10.57	12.03	5.28	16.70	8.62
Lone person	14%	0.132	44.13	7.01	9.88	13.48	4.50	15.89	5.10
Other	6%	0.097	23.95	9.61	11.80	16.21	8.05	20.40	9.98
Long-term health condition									
Yes	24%	0.163	29.44	6.60	10.68	22.63	6.36	18.97	5.33
No	76%	0.048	40.09	10.24	13.09	4.83	6.74	17.32	7.69

Continued next page

	Population (Share)	Adjusted multi-dimensional poverty headcount (M^1_0)	% contribution of each dimension to M^1_0						
			Material resources	Employment	Education and skills	Health	Social	Community	Personal safety
State									
NSW	29%	0.082	33.33	8.26	11.78	15.24	6.66	17.90	6.83
Vic.	25%	0.071	35.38	8.39	11.90	14.32	5.92	18.03	6.06
Qld	21%	0.082	34.15	8.53	11.74	14.42	7.45	18.38	5.33
SA	9%	0.091	35.64	7.79	11.74	14.80	6.50	18.00	5.52
WA	10%	0.074	35.14	7.42	11.04	13.41	5.13	19.87	8.00
Tas.	3%	0.102	34.75	8.06	12.55	16.06	5.61	17.96	5.01
NT	1%	0.044	21.51	8.08	13.93	7.74	13.27	16.33	19.15
ACT	2%	0.047	21.88	8.74	11.04	16.54	9.60	19.93	12.27
Level of remoteness									
Major city	62%	0.072	31.93	8.33	11.46	14.84	6.38	19.24	7.83
Inner regional Australia	25%	0.092	36.78	8.11	12.07	14.47	6.83	17.32	4.43
Outer regional Australia	11%	0.100	38.72	7.95	12.67	14.52	6.58	15.84	3.72
Remote and very remote Australia	2%	0.072	43.03	8.42	10.34	12.27	6.86	13.87	5.19

Simulating meeting COAG targets

In 2008 the Council of Australian Governments agreed on two targets (p.6): (a) halve the proportion of Australians aged 20—64 without qualifications at certificate III level and above between 2009 and 2020; and (b) double the number of higher qualification completions (diploma and advanced diploma) between 2009 and 2020.

In this report we only simulate the first target and assume that half of the people in our sample who have less than high school completion and/or a certificate I/II instead will have completed a higher level of education.[25] The simulation of this target is relatively straightforward because having low formal qualifications is one of the 29 components making up our measure of multi-dimensional exclusion. The trigger for being excluded in that component is being an early school leaver with at most a certificate II, which coincides with the certificate III level set by COAG. The simulation of the target effectively resets the low formal education component value back to zero for half the people who recorded a one in that component.[26]

There is an immediate effect on social exclusion simply because low formal education is one of the components in our multi-dimensional measure, but there will also be second-round effects from other

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[25] Strictly speaking, target (a) talks about certificate level III or higher. In our analysis we have treated certificates I and II as less than Year 12 (and grouped them with Year 11 or below) and by extension equate school completion to at least certificate level III. Hence, meeting target (a) can also be done through increased school completion rates instead of through certificate IIIs. Simulating target (b) is less straightforward because it is not clear who the individuals would be who would undertake a diploma or advanced diploma, unlike the case for target (a) where they have to come from the group with the lowest level of formal education.

[26] When a person has Year 11 or a certificate I/II as their highest level of education (and thus a value of 1 in the low formal education component), we take a draw from the standard normal distribution with mean zero. If the draw is negative, we alter this person's value for the low formal education component (that is, set it to zero); if it is positive we leave the value unchanged at 1. The end result will be that we halve the proportion in our sample who are early school leavers and/or have a certificate I or II.

components. For instance, incomes will be likely to increase when individuals obtain higher levels of formal education. Since income is also a component in the multi-dimensional measure this will again reduce exclusion. In other words, lifting formal education qualifications will have a multiplier effect. In reality there will, in all probability, be a continuous feedback loop, but it is beyond the scope of this report to fully model that process. Instead, we limit the simulation to estimating the direct (first-round) effect of halving the proportion of the population with low formal education and the cumulative (second-round) effect, also taking into account the effect better education may have on other outcomes. This cumulative effect is computed by assigning, for those low-educated individuals who are simulated to have improved their education levels, the average rates of exclusion in each of the components among the subgroup of the population who have completed Year 12. This effectively assumes that the effect of education on exclusion is causal and that by improving education level an individual also inherits all the characteristics associated with this higher education level.[27] Therefore, another way to interpret the direct and cumulative effects is to consider them to be a lower- and upper-bound estimate, or even as short- and long-run estimates.

Table 8 shows the impact of simulating the COAG target on the various measures of exclusion. The first row portrays the levels of exclusion prior to the simulation and forms our base scenario by which to compare the impact of the COAG target.[28] The second row shows the direct impact of the simulation, that is, only the impact of (randomly) changing education levels in half the number of cases where individuals report Year 11 and/or certificate I/II. The impacts measured as absolute changes are modest. For instance, the multi-dimensional exclusion headcount ratio drops from 0.307 to 0.299 under a scenario where the cut-off score $k = 1$ (second column in table 8), and from 0.102 to 0.094 under a scenario where the cut-off score $k = 2$ (fifth column in table 8). However, given that the only impact is through education, these impacts can be considered lower-bound estimates.

The last row of table 8 reports the impact of superimposing the COAG target when taking into account that there will be a multiplier effect of increasing people's education through better health, higher incomes etc.[29]

Not surprisingly, the impact on the multi-dimensional exclusion measure is stronger in the case of a cumulative impact. For the headcount ratio, the drop from 0.307 to 0.204 (second column table 8) under $k = 1$, or the drop from 0.102 to 0.067 (fifth column in table 8) under $k = 2$, is a very substantial reduction indeed, in the order of 30%. It should also be noted that it is not higher incomes that are responsible for these drops, as the income poverty headcount ratio (first column table 8) is only slightly reduced from 0.214 to 0.207. It is the other dimensions, and in particular their combined impact, that reduces multi-dimensional exclusion under the COAG scenario assuming the cumulative effect of lifting education levels.

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[27] It also assumes that reducing the proportion of people holding a qualification less than certificate III level has no general equilibrium effects. One could argue that strong growth in the number of people holding qualifications at the level of certificate III or better will have an impact on, for instance, the wage premiums currently associated with these qualifications. These may go down as a result of the increased competition due to the increased supply of people with certificate III, but it can also be argued that wages go up as the upskilling of the workforce will have productivity gains that will be shared widely through higher wages. Such general equilibrium effects are hard to ascertain and a case can be made that, in the absence of good guidance on these general equilibrium effects, a *ceteris paribus* approach is sensible.

[28] The first row in table 8 is identical to the last row of table 5.

[29] Table B2 in appendix B reports the incidence rates for each of the components by (selected) education levels. It is a version of table 3, but by education level. The average incidence rates for the Year 12 subgroup are then assigned to those individuals who have Year 11 and/or certificate I/II and who have been chosen at random (with probability 0.5) to have their low formal education component reset from 1 to 0.

Table 8   Impact of the COAG target on summary measures of multi-dimensional exclusion (common components; all waves pooled)

	Based on cut-off $k = 1$				**Based on cut-off $k = 2$**		
	Income poverty headcount ratio	Multi-dimensional poverty headcount ratio (H^1)	Average breadth of exclusion (A^1)	Adjusted multi-dimensional poverty headcount ratio ($M^1_0 = H^1 * A^1$)	Multi-dimensional poverty headcount ratio (H^2)	Average breadth of exclusion (A^2)	Adjusted multi-dimensional poverty headcount ratio ($M^2_0 = H^2 * A^2$)
Prior to simulation	0.214	0.307	0.258	0.079	0.102	0.367	0.037
After simulation							
Direct effect only	0.214	0.299	0.254	0.076	0.094	0.366	0.034
Cumulative effect	0.207	0.204	0.258	0.053	0.067	0.368	0.025

Note: Income poverty is defined as less than 60% of median household equivalised income.

Table 9   Impact of the COAG target on the breakdown of the adjusted headcount ratio into contributions by each dimension (common components; cut-off k = 1; all waves pooled)

		% contribution of each dimension to M^1_0						
	Adjusted multi-dimensional poverty headcount (M^1_0)	Material resources	Employment	Education and skills	Health	Social	Community	Personal safety
Prior to simulation	0.079	34.21	8.22	11.76	14.66	6.53	18.23	6.38
After simulation								
Direct effect only	0.076	35.61	8.40	9.35	14.91	6.59	18.48	6.64
Cumulative effect	0.053	33.70	8.51	12.04	14.46	6.35	18.19	6.74

Concluding remarks

By setting out the various dimensions of social exclusion and by presenting an initial exploration of some of the relationships between them, this report helps to set the scene for promoting social inclusion for disadvantaged groups through education and training — an important policy area. Second, the report contributes to the international literature on social exclusion measurement by: applying recent advances in the poverty measurement literature to measures of social exclusion; exploiting longitudinal data to examine the persistence of social exclusion over time; and exploring the particular role of education and training in driving social inclusion.

The desire to go beyond the standard poverty lines approach and have a much broader definition of poverty than just low income also has a downside. This downside is not related to a multi-dimensional measure being much more difficult to calculate, but rather to the rapidly increasing number of choices an individual needs to make on what factors of exclusion to account for. We were fortunate, since for Australia we were able to rely on the outcome of a process of consultation with stakeholders from the not-for-profit sector, academia and government that established a consensus. Equally important, we are fortunate enough to have good-quality longitudinal data from the Household, Income and Labour Dynamics in Australia Survey that enable exclusion to be measured. This still leaves other choices to make, but the decision where to draw the line in considering a person multi-dimensionally socially excluded turned out as changing only the level of exclusion recorded — as one would expect — but did not lead to any new insights.

This report uncovered two main insights with respect to formal education. The first is that, when multi-dimensional social exclusion is compared for groups with different levels of formal education, what might be expected is observed: higher levels of education correspond to lower levels of multi-dimensional social exclusion. However, the more important message from a policy perspective is that there is a clear dichotomy between early school leavers and those with, at most, certificate II, and the rest. This implies that efforts to promote inclusion through education should be focused on reducing the number of early school leavers, unless when these early leavers leave school they continue their education by pursuing a pathway through VET to obtain a certificate I, II and then certificate III or higher qualification. That is where the biggest pay-off using the education channel might be expected. Increasing the proportion of people going on to do a bachelor's degree after completing school[30] will also increase inclusion, but the impact on inclusion is predicted to be much more modest.

This leads to the second insight, which is related to the COAG goals to (a) halve the proportion of Australians aged 20—64 without qualifications at certificate III level and above between 2009 and 2020; and (b) double the number of higher qualification completions (diploma and advanced diploma) between 2009 and 2020. As discussed above, the analysis in this report suggests that, in terms of promoting social inclusion, (b) will have a much smaller impact than (a), albeit that both will have a positive impact.

We were able to run a simulation on (a) and assess the impact it would have on our adjusted headcount measure of social exclusion if the goal was met in full. If only the increase in education for half the population of early school leavers with at most certificate II is simulated and the adjusted headcount measures of social exclusion is re-computed, then the impact is negligible (but positive).

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[30] Related to the higher education target that by 2025, 40% of all 25 to 34-year-olds will have a qualification at bachelor level or higher.

Educating oneself out of social exclusion

This effect on exclusion can be considered a lower-bound, or short-run, effect of increased education levels. However, if it is accepted that, when an early school leaver does complete Year 12, he or she will also, over time, exhibit the same levels of health, employment, income, and more that Year 12 completers currently enjoy, then the impact on the adjusted headcount measure of social inclusion is a reduction of close to 30%, which is very substantial indeed.

A final point to make in relation to simulating the COAG goals is that the 30% reduction in the adjusted headcount ratio may be expected to be the result of assuming higher incomes, in concert with the higher education levels. However, under the simulation, the headcount income poverty ratio hardly changes, meaning that it is not just income but the combined effect of assuming better health, employment outcomes, personal safety and all other dimensions combined that leads to the big reduction in social exclusion.

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Appendix A: Overview of the literature

Table A1 Overview of the literature

Authors	Title	Data	Findings/notes
Literature Grouping I			
Alkire & Foster (2010)	*Counting and multi-dimensional poverty measurement*		Proposes a new methodology for measuring multi-dimensional poverty, in which two forms of cut-off are used: first, a within-dimension cut-off (for each dimension) to identify those who are deprived in that dimension, and then a second across-dimension cut-off to determine if a person is poor by 'counting' the number of dimensions in which that person is deprived.
			Extends the FGT measures (see notes on Foster, Greer & Thorbecke 1984) to multi-dimensional poverty measurement. Among other useful properties, the methodology produces measures that:
			▪ are decomposable (that is, the poverty measure can be disaggregated by subgroup)
			▪ have a poverty focus (that is, improvement in one dimension for a *non-poor* person does not change the value of the measure)
			▪ have a deprivation focus (that is, a person's poverty status is not affected by changes in that person's *non-deprived* dimension).
Atkinson et al. (2002)	*Social indicators: the EU and social inclusion*		In this book, acknowledging the importance of having a set of social indicators to assess EU member states' progress towards social inclusion, the authors make a list of recommendations for indicators among which include:
			▪ Level 1 (lead) indicators, for example:
			– risk of financial poverty
			– income inequality
			– proportion aged 18–24 with lower secondary education and not in education/training
			– long-term unemployment rates
			– proportion living in jobless households.
			▪ Level 2 (other) indicators, for example:
			– proportion of households persistently at risk of financial poverty
			– proportion living in overcrowded housing
			– proportion of low-paid employees.
Burchardt, Le Grand & Piachaud (2002)	*Degrees of exclusion: developing a dynamic, multi-dimensional measure*	British Household Panel Surveys 1991–98	Explores a multi-dimensional measure of social exclusion in Britain, using the British Household Panel Survey for the years 1991–98.
			The four dimensions identified are consumption, production, political engagement, and social interaction. Within each dimension, a threshold is set for each indicator (that is, a within-dimension cut-off). The authors then calculate the percentage of the working-age population excluded where the number of dimensions on which excluded is 0, 1, 2, and so on (that is, different across-dimension cut-offs).
			Also considers exclusion over time.
Foster, Greer & Thorbecke (1984)	*A class of decomposable poverty measures*		Forster, Greer and Thorbecke propose a class of poverty measures (known as the FGT measure in the literature) that:
			▪ are 'additively decomposable with population-share weights'
			▪ satisfy the monotonicity and transfer axioms
			▪ are based on relative, as opposed to absolute, deprivation.
			Such measures allow the effect of changes in subgroup poverty on total poverty to be assessed.

Authors	Title	Data	Findings/notes
Headey (2006)	*A framework for assessing poverty, disadvantage and low capabilities in Australia*	HILDA surveys 2001–03	In line with Sen's (1999) capability approach, the author presents a framework for the multi-dimensional analysis of disadvantage, where individuals' capabilities in four dimensions (that is, financial, employment, health, and social) have causal effects on their functionings and wellbeing.
			Using HILDA Survey data from 2001 to 2003, the groups with low capabilities and who suffer medium-term disadvantage are identified; the persistence of poverty is also analysed. It is found that low capabilities are strongly related to low social/economic functionings and to low levels of wellbeing.
Levitas et al. (2007)	*The multi-dimensional analysis of social exclusion*		The report reviews the range of quantitative data on social exclusion available in England and Wales. Among other recommendations, the authors construct and propose the use of B-SEM (that is, Bristol Social Exclusion Matrix), a matrix of ten dimensions in social exclusion, which fall under three main areas: resources, participation and quality of life.
Saunders, Naidoo & Griffiths (2007)	*Towards new indicators of disadvantage: deprivation and social exclusion in Australia*	Community Understanding of Poverty and Social Exclusion (CUPSE) survey 2006	Examines social disadvantage in Australia as measured by three indicators: ▪ income poverty (poverty line set as one half of median equivalised gross household income) ▪ deprivation (defined as a lack of necessities of life) ▪ social exclusion (defined as a lack of social participation, access to services, and/or access to economic resources). Using data from the CUPSE survey, the authors study the overlap between the three indicators and find that the overlap between poverty and deprivation (~40%) is slightly higher than that between poverty and exclusion (~37%).
Scutella, Wilkins & Kostenko (2009)	*Estimates of poverty and social exclusion in Australia: a multi-dimensional approach*	HILDA surveys 2001–07	Measures the extent and persistence of poverty and social exclusion in Australia using data from the HILDA Surveys 2001–07. In constructing the multi-dimensional measure, seven dimensions of social exclusion are included: material resources; employment; education and skills; health and disability; social; community; and personal safety. Within each dimension, a number of binary indicators are used. The core approach assigns equal weight to each dimension; alternative weighting regimes are considered.

Literature Grouping II

Authors	Title	Data	Findings/notes
Sparkes & Glennerster (2002)	*Preventing social exclusion: education's contribution*		Provides a detailed review of the literature on the role of education in preventing social exclusion. Among other key observations, the authors report the following findings: ▪ Unemployment rates generally decrease with educational attainment (OECD 2000); poor basic skills are associated with lower earnings and with other adult outcomes (Bynner & Parsons 1997). ▪ Factors other than educational attainment also have significant effects on later adult outcomes including labour market outcomes, for example, soft skills (Moss & Tiley 1995), school attendance (Hibbert & Fogelman 1990). ▪ Educational attainment is associated with other 'background' variables, for example: pupils' personal attributes, socioeconomic status, parents' educational attainment; family structure ethnicity etc.
Alexiadou (2002)	*Social inclusion and social exclusion in England: tensions in education policy*		The author presents three discourses of social exclusion, drawing on interviews with politicians and civil servants in a comparative research project that explores the links between social exclusion and education governance in Europe (Popkewitz et al. 1999) and concludes that 'there is no consensus on the definitions of the problem, or the role that education is expected to play in combating it' (p.83).

Authors	Title	Data	Findings/notes
			Two of the discourses of social exclusion emphasise the importance of skills acquisition and learning and which will guarantee employment. As such, paid work is seen as the 'main root to social inclusion'. The third so-called 'structural' approach, on the other hand, focuses on the social processes that arise from economic change.
Bynner (1999)	*Risks and outcomes of social exclusion: insights from longitudinal data*	1958 British birth cohort study (NCDA); 1970 British birth cohort study (BCS70); and other longitudinal data	Demonstrates the significance of early years experience in explaining variation in adult outcomes. Importantly, social exclusion risk also seems to continue from one generation to the next through material disadvantages in the parents' own childhood and the parents' own limited educational resources. Also discusses the origins of education and employment difficulties. The author argues that the acquisition of basic literacy and numeracy skills is central to educational achievement and that poor literacy and/or numeracy skills at any life stage increase the risk of poor employment outcomes in adulthood.
Hobcraft (2000)	*The roles of schooling and educational qualifications in the emergence of adult social exclusion*		Two dominant patterns are: ▪ Educational qualifications show a strong relationship to every single adult measure of disadvantage at ages 23 and 33 and for both men and women. ▪ Childhood poverty remains a clear predictor of negative adult outcomes, having controlled for all the other factors considered.
Nilsson (2010)	*Vocational education and training – an engine for economic growth and a vehicle for social inclusion?*		While VET could be an efficient means in the transition from school to work for youth and in turn counteract youth unemployment, empirically verifying the causality can be difficult, due to, for example, the complexity of defining VET and the high cost involved in assessing its benefits.
Sigle-Rushton (2004)	*Intergenerational and life-course transmission of social exclusion in the 1970 British Cohort Study*	1970 British Cohort Study	Among other findings, economic disadvantage (measured as earnings at age 30) is strongly related to childhood academic test scores for both genders. Those with at least one bottom quartile set of test scores are also more likely to work in a manual occupation compared with those in other quartiles.
Sparkes (1999)	*Schools, education and social exclusion*		The author draws attention to the concept of human capital, to which the notion that education reduces social exclusion is central. Education increases productivity, which is reflected in earnings and labour market participation. However, under the 'screening' paradigm, in which education is used to signal high-level ability, 'improvements in educational attainment … will have no effect on the overall distribution of income and unemployment rates' (p.34). Also argues for research on the extent of credentials inflation and a better understanding of the role that employers play in the transmission from low educational attainment to poor adult outcomes.

Appendix B: Additional information

Table B1   Incidence of exclusion for individual components over time, population aged 15 years and over (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Material resources dimension										
Low income	21.1	21.7	22.0	21.9	21.9	20.4	21.8	20.9	20.5	21.7
Low net worth		37.0				34.7				34.7
Low consumption					13.6	14.2	13.3	14.6	14.6	15.5
In financial hardship	8.7	6.8	6.8	5.9	5.6	5.0	5.2	4.6	5.0	
Employment dimension										
In a jobless household	13.2	13.4	12.6	12.1	11.3	10.8	10.4	10.0	10.2	10.2
Long-term unemployed	1.0	0.7	0.6	0.3	0.4	0.2	0.3	0.2	0.3	0.4
Unemployed	4.4	3.8	2.9	2.8	2.2	2.1	1.8	1.8	2.2	2.2
Underemployed or unemployed	10.6	10.4	9.8	8.6	7.8	7.4	6.7	5.9	6.7	6.5
Marginally attached, underemployed or unemployed	18.3	17.1	16.0	13.8	12.5	11.4	10.5	9.3	10.5	10.7
Education and skills dimension										
Low formal education	39.1	36.5	34.6	33.5	32.6	32.6	32.0	31.4	30.8	30.0
Low literacy							3.2			
Low numeracy							4.4			
Poor English proficiency	2.8	3.0	2.7	2.2	2.4	1.9	2.3	1.8	1.9	1.9
Little work experience	10.3	10.4	9.0	6.8	4.9	3.5	2.6	1.9	1.6	1.2
Health dimension										
Poor general health	17.2	18.2	18.7	19.4	19.2	19.2	19.3	19.1	18.8	20.8
Poor physical health	11.4	11.3	11.0	10.9	11.1	10.7	10.9	10.5	10.6	11.5
Poor mental health	10.5	9.9	10.0	10.0	9.3	9.5	9.3	9.3	9.2	9.4
Long-term health condition	23.7	22.3	28.7	28.1	30.9	29.7	30.8	30.6	33.3	32.0
Disabled child in the household	3.9	3.4	3.6	3.7	3.4	3.2	3.1	2.5	2.6	3.0
Social dimension										
Little social support	1.3	1.3	1.4	1.6	1.6	1.1	1.6	1.2	1.4	1.3
Infrequent social activity	10.2	10.5	10.7	11.1	11.9	11.5	10.7	12.6	9.7	12.4
Community dimension										
Low neighbourhood quality	1.6	1.8	1.7	1.7		1.2		1.5		1.6
Low satisfaction with feeling part of community	16.4	15.6	14.4	13.2	12.8	12.0	12.5	12.0	12.9	11.5
Low satisfaction with neighbourhood	5.3	5.1	4.5	4.1	4.2	4.0	4.0	4.3	3.9	3.5
Low civic participation – membership	19.5	21.3	20.8	20.7	18.5	18.2	18.7	16.9	18.4	18.9
Low civic participation – voluntary activity	22.6	25.8	24.4	25.1	22.6	21.9	22.9	21.8	22.9	23.8
Personal safety dimension										
Victim of violence		2.0	1.6	1.3	1.2	1.1	0.9	1.2	1.1	1.0
Victim of property crime		6.6	6.3	5.0	4.2	4.5	3.1	3.6	3.6	3.4
Low subjective safety	6.7	5.3	4.2	3.7	3.5	3.3	3.4	2.5	3.0	3.0

Notes: Data are weighted using longitudinal weights available at each wave. Table 3 is the corresponding table that reports on the averages across the pooled ten waves.

Table B2 Incidence of poverty and social exclusion for individual components by select education levels, population aged 15 years and over (%) (all waves pooled)

	Sample			
	All	Cert. III/IV	Year 12	Up to Year 11 (incl. cert I/II)
Material resources dimension				
Low household income	0.2139	0.1831	0.1894	0.3400
Low household net worth	0.3551	0.3531	0.4138	0.3792
Low household consumption	0.1430	0.1178	0.1421	0.2317
In financial hardship	0.0602	0.0694	0.0757	0.0668
Employment dimension				
In a jobless household	0.1147	0.1037	0.0993	0.1680
Long-term unemployed	0.0047	0.0059	0.0048	0.0065
Unemployed	0.0264	0.0261	0.0341	0.0306
Underemployed or unemployed	0.0811	0.0762	0.1182	0.0790
Marginally attached, underemployed or unemployed	0.1313	0.1208	0.1791	0.1427
Education and skills dimension				
Low formal education	0.3341	-	-	0.9541
Low literacy	0.0320	0.0216	0.0221	0.0683
Low numeracy	0.0444	0.0328	0.0357	0.0745
Poor English proficiency	0.0230	0.0128	0.0282	0.0367
Little work experience	0.0534	0.0227	0.1270	0.0656
Health dimension				
Poor general health	0.1897	0.1885	0.1563	0.2518
Poor physical health	0.1100	0.1048	0.0738	0.1778
Poor mental health	0.0966	0.0940	0.1012	0.1166
Long-term health condition	0.2891	0.2931	0.2185	0.3939
Disabled child in the household	0.0325	0.0390	0.0304	0.0343
Social dimension				
Little social support	0.0136	0.0133	0.0128	0.0179
Infrequent social activity	0.1111	0.1247	0.0860	0.1353
Community dimension				
Low neighbourhood quality	0.0159	0.0187	0.0161	0.0192
Low satisfaction with feeling part of community	0.1338	0.1311	0.1614	0.1452
Low satisfaction with neighbourhood	0.0431	0.0413	0.0504	0.0503
Low civic participation – membership	0.1922	0.1578	0.1497	0.3154
Low civic participation – voluntary activity	0.2340	0.2067	0.1823	0.3783
Personal safety dimension				
Victim of violence	0.0127	0.0142	0.0174	0.0118
Victim of property crime	0.0452	0.0506	0.0526	0.0370
Low subjective safety	0.0389	0.0379	0.0390	0.0493

Notes: Data are weighted using longitudinal weights available at each wave. The first column here is identical to table 3.

Table B3 Persistence of social exclusion (%) for the balanced Wave 10 sample (cut-off k = 2)

Years	Higher education	Adv. diploma, diploma	Certificate III or IV	Year 12	Up to Year 11 (incl. cert. I and II)	Total
0	88.98	84.53	78.15	80.65	53.22	74.05
1	5.67	8.42	8.79	8.24	14.15	9.58
2	1.88	2.68	4.56	4.33	8.76	4.99
3	1.12	1.28	2.71	1.49	6.55	3.20
4	1.22	1.08	1.68	1.14	4.42	2.28
5	0.59	0.29	1.53	1.65	3.99	1.95
6	0.18	0.20	0.61	1.09	2.61	1.15
7	0.24	0.48	1.18	1.00	2.25	1.19
8	0.06	0.65	0.59	0.14	1.92	0.82
9	0.00	0.20	0.19	0.27	1.66	0.61
10	0.04	0.18	0.02	0.00	0.47	0.18

Table B4 Breakdown of the adjusted headcount ratio by education level into contributions by each dimension (common components; cut-off k = 2; all waves pooled)

Education level	Population (Share)	Adjusted multi-dimensional poverty headcount (M^2_0)	The H_j^k and the % contribution of each dimension to M^2_0						
			Material resources	Employment	Education and skills	Health	Social	Community	Personal safety
Higher education	23%	0.010	0.022	0.007	0.002	0.011	0.006	0.013	0.010
Percentage contribution		100%	30.68%	10.39%	2.36%	15.76%	8.09%	17.93%	14.78%
Adv. dip., dip.	10%	0.016	0.035	0.011	0.001	0.019	0.010	0.022	0.013
Percentage contribution		100%	31.92%	9.83%	1.06%	17.01%	8.82%	19.92%	11.43%
Cert III or IV	20%	0.025	0.056	0.019	0.003	0.032	0.015	0.034	0.018
Percentage contribution		100%	31.87%	10.56%	1.61%	18.05%	8.38%	19.33%	10.20%
Year 12	14%	0.024	0.053	0.020	0.007	0.024	0.010	0.033	0.019
Percentage contribution		100%	31.92%	11.88%	4.31%	14.43%	6.36%	19.87%	11.23%
Up to Year 11 (incl. cert I/II)	33%	0.077	0.180	0.036	0.076	0.080	0.033	0.100	0.034
Percentage contribution		100%	33.34%	6.72%	14.09%	14.89%	6.07%	18.62%	6.27%
Total	100%	0.037	0.086	0.021	0.027	0.040	0.017	0.049	0.021
Percentage contribution		100%	32.78%	8.08%	10.21%	15.42%	6.65%	18.85%	8.01%

Table B5 Profile of exclusion by other characteristics

	Population (Share)	Income poverty headcount ratio	Based on cut-off $k = 1$			Based on cut-off $k = 2$		
			Multi-dimensional poverty headcount ratio (H^1)	Average breadth of exclusion (A^1)	Adjusted multi-dimensional poverty headcount ratio ($M^1_0 = H^1 * A^1$)	Multi-dimensional poverty headcount ratio (H^2)	Average breadth of exclusion (A^2)	Adjusted multi-dimensional poverty headcount ratio ($M^2_0 = H^2 * A^2$)
Total	**100%**	**0.214**	**0.307**	**0.258**	**0.079**	**0.102**	**0.367**	**0.037**
Gender								
Male	47%	0.194	0.273	0.256	0.070	0.088	0.369	0.033
Female	53%	0.250	0.340	0.259	0.088	0.116	0.365	0.042
Age								
15–24 yrs	17%	0.195	0.292	0.247	0.072	0.077	0.377	0.029
2–34 yrs	16%	0.103	0.182	0.245	0.045	0.051	0.372	0.019
35–44 yrs	20%	0.115	0.203	0.249	0.051	0.059	0.379	0.022
45–54 yrs	19%	0.136	0.229	0.259	0.059	0.076	0.385	0.029
55–64 yrs	13%	0.239	0.368	0.265	0.098	0.141	0.366	0.052
65 yrs+	14%	0.546	0.636	0.264	0.168	0.229	0.352	0.081
Family type								
Couple – no kids	37%	0.219	0.319	0.253	0.081	0.102	0.358	0.036
Couple – dep. kids	37%	0.089	0.183	0.232	0.043	0.042	0.361	0.015
Lone parent – dep. kids	6%	0.312	0.442	0.284	0.125	0.193	0.384	0.074
Lone person	14%	0.465	0.478	0.276	0.132	0.191	0.372	0.071
Other	6%	0.191	0.364	0.268	0.097	0.136	0.381	0.052
Long-term health condition								
Yes	24%	0.388	0.571	0.287	0.163	0.262	0.375	0.098
No	76%	0.155	0.210	0.229	0.048	0.044	0.349	0.015
State								
NSW	29%	0.228	0.318	0.259	0.082	0.108	0.366	0.039
Vic.	25%	0.211	0.284	0.252	0.071	0.087	0.362	0.031
Qld	21%	0.223	0.319	0.258	0.082	0.104	0.370	0.039
SA	9%	0.268	0.338	0.269	0.091	0.129	0.370	0.048
WA	10%	0.209	0.296	0.251	0.074	0.092	0.366	0.034
Tas.	3%	0.294	0.356	0.288	0.102	0.174	0.372	0.065
NT	1%	0.067	0.205	0.216	0.044	0.031	0.348	0.011
ACT	2%	0.091	0.188	0.252	0.047	0.050	0.402	0.020
Level of remoteness								
Major city	62%	0.194	0.280	0.256	0.072	0.091	0.369	0.034
Inner regional Australia	25%	0.267	0.352	0.261	0.092	0.122	0.364	0.045
Outer regional Australia	11%	0.306	0.383	0.260	0.100	0.131	0.364	0.048
Remote and very remote Australia	2%	0.251	0.302	0.238	0.072	0.082	0.346	0.028

Table B6 Breakdown of the adjusted headcount ratio for other subgroups into contributions by each dimension (common components; cut-off k = 2; all waves pooled)

	Population (Share)	Adjusted multi-dimensional poverty headcount (M^2_0)	Material resources	Employment	Education and skills	Health	Social	Community	Personal safety
			% contribution of each dimension to M^2_0						
Total	**100%**	**0.037**	**32.78**	**8.08**	**10.21**	**15.42**	**6.65**	**18.85**	**8.01**
Gender									
Male	47%	0.033	33.21	8.64	9.17	15.90	7.27	18.50	7.32
Female	53%	0.042	32.46	7.66	11.01	15.05	6.17	19.12	8.53
Age									
15–24 yrs	17%	0.029	29.96	15.97	15.36	8.67	4.64	15.87	9.52
25–34 yrs	16%	0.019	27.78	15.15	8.81	11.15	5.92	18.77	12.42
35–44 yrs	20%	0.022	26.92	11.86	8.11	14.42	7.73	18.74	12.22
45–54 yrs	19%	0.029	29.86	11.00	7.96	16.15	8.15	17.22	9.67
55–64 yrs	13%	0.052	33.60	9.17	9.92	16.40	6.42	17.81	6.67
65 yrs+	14%	0.081	37.82	0.86	11.42	17.51	6.34	21.07	4.99
Family type									
Couple – no kids	37%	0.036	33.95	5.58	10.80	16.51	7.07	19.77	6.32
Couple – dep. kids	37%	0.015	27.60	10.65	10.31	14.17	7.34	17.62	12.30
Lone parent – dep. kids	6%	0.074	31.01	13.63	9.76	12.44	5.34	17.85	9.98
Lone person	14%	0.071	36.65	7.81	9.54	15.71	5.74	18.16	6.39
Other	6%	0.052	24.23	10.13	10.23	14.74	8.25	20.13	12.29
Long-term health condition									
Yes	24%	0.098	32.05	6.43	9.58	19.64	6.40	18.77	7.13
No	76%	0.015	34.51	11.97	11.68	5.50	7.24	19.05	10.06
State									
NSW	29%	0.039	32.72	8.18	10.29	15.60	6.17	18.58	8.47
Vic.	25%	0.031	33.00	7.91	10.40	15.60	6.52	19.11	7.46
Qld	21%	0.039	32.34	8.52	10.33	14.94	7.76	18.78	7.33
SA	9%	0.048	33.53	7.91	10.09	15.63	6.98	18.85	7.01
WA	10%	0.034	32.77	7.69	9.08	14.98	5.96	19.38	10.13
Tas.	3%	0.065	35.58	7.74	11.24	15.90	5.72	18.65	5.17
NT	1%	0.011	16.99	7.29	14.99	5.60	8.21	19.67	27.26
ACT	2%	0.020	22.96	6.54	6.58	16.77	9.15	19.97	18.03
Level of remoteness									
Major city	62%	0.034	31.37	7.93	10.03	15.40	6.41	19.34	9.51
Inner regional Australia	25%	0.045	34.43	8.31	10.63	15.42	6.97	18.27	5.97
Outer regional Australia	11%	0.048	35.51	7.98	10.32	15.57	7.20	17.90	5.52
Remote and very remote Australia	2%	0.028	37.16	11.68	8.54	14.61	5.13	17.40	5.47

Appendix C: Formal description of the methodology used

Headcount of social exclusion

We use seven key dimensions that measure social exclusion in our framework, with each dimension itself comprising a number of components. They are: material resources; employment; education and skills; health and disability; social interactions; community; and personal safety. Table 1 in the main body of the report lists the components of each dimension and provides basic information on what constitutes being excluded for each of these components.

To formalise the approach, let i denote individual, d denote dimension and c denote component. The number of dimensions is D (in our case $D = 7$) and each dimension comprises C_d components (for example, the dimension 'personal safety' has three components: being a victim of violent crime, being a victim of property crime, and a low level of satisfaction with how safe one feels). Using this notation, x^c_{id} is a binary indicator that takes the value 1 if individual i is excluded in component c in dimension d and takes the value zero if not excluded. The proportion of components indicating exclusion within dimension d measures the extent, or depth, of exclusion of individual i within dimension d and is expressed by x_{id}. We refer to x_{id} as the 'score' of individual i in dimension d.

$$x_{id} = \frac{\sum_{c=1}^{C_d} x^c_{id}}{C_d} \tag{1}$$

Finally, x_i is calculated as the sum of these scores over all dimensions, and is referred to as the sum-score for individual i.

$$x_i = \sum_{d=1}^{D} x_{id} \tag{2}$$

Since x_{id} lies between 0 and 1 for each dimension, the measured total extent of exclusion (x_i) of an individual lies between 0 and D.

Using formal notation, with $I_{[x_i \geq k]}$ the indicator function returning 1 if $x_i \geq k$ (that is, individual i is socially excluded) and 0 if not, the headcount ratio of social exclusion H^k is defined as:

$$H^k = \frac{\sum_{i}^{N} I_{[x_i \geq k]}}{N} \tag{3}$$

with N the total number of individuals in the population. The numerator is the number of multi-dimensional excluded individuals in the population on the basis of the decision rule that a sum-score x_i greater than k means that this person is deemed to be excluded.

Adjusted headcount of social exclusion

A second alternative specification for measuring multi-dimensional social exclusion uses the identical approach to determine exclusion in the various components, but extends the standard dual cut-off measure of poverty beyond a traditional headcount measure (Alkire & Foster 2010). In equation (3) the headcount ratio of social exclusion (H^k) was defined as the proportion of the population with a sum-score above a given threshold level k. One limitation of this measure is that when a person who is already deemed excluded (that is, has a sum-score above the threshold k) becomes excluded in one or more new dimensions, the headcount measure H^k remains unchanged. A more desirable measure of social exclusion would recognise the deepening of this person's exclusion.

Specifically, we use the adjusted headcount ratio M^k_0 as a measure of social exclusion; it is sensitive to the frequency and breadth of multi-dimensional poverty.

Using formal notation, the adjusted headcount ratio of social exclusion is denoted as:

$$M^k_0 = \frac{\sum_i^N x_i \times I_{[x_i \geq k]}}{N \times 7} = \left(\frac{\sum_i^N x_i \times I_{[x_i \geq k]}}{7 \times \sum_i^N I_{[x_i \geq k]}} \right) \times \left(\frac{\sum_i^N I_{[x_i \geq k]}}{N} \right) = A^k \times H^k \qquad (4)$$

with $D = 7$ the number of dimensions, N the number of individuals, $I_{[..]}$ the indicator function, and k the cut-off for the sum-score x_i. Equation (4) at first glance may look complicated, but can be readily understood by describing each of the elements in words. The numerator of M^k_0 is the total sum-score of all the individuals who are deemed excluded (that is, have a sum-score above k). The denominator is the maximum possible total sum-score in the population, which is the product of the number of individuals (N) and the maximum sum-score an individual can have (which in our case was 7).[31] In other words, the adjusted headcount ratio is the aggregate deprivation experienced by the excluded as a share of the maximum possible range of deprivations across the population.

The adjusted headcount ratio can also be interpreted as the product of two useful concepts: frequency and average breadth. The average breadth of exclusion (A^k) is the total sum-score of all the individuals who are deemed excluded (that is, have a sum-score above k) expressed as a proportion of the maximum possible sum-score across the excluded population (which is the number of excluded persons, times 7). The frequency of exclusion is the familiar headcount ratio defined in equation (3). Expressing the adjusted headcount ratio as the product of average breadth and frequency shows that this measure is sensitive to the breadth of exclusion. That is, when an individual who is already deemed excluded becomes deprived in a further dimension, the adjusted headcount rate will increase because A^k will increase. The headcount ratio (H^k) will remain unchanged.

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[31] The score for each dimension lies between 0 and 1 and hence with seven dimensions the sum-score is at most 7.

Decomposing the adjusted headcount

The adjusted headcount (M^k_0, equation 4) can be decomposed and fully apportioned to reveal how each dimension contributes to the overall adjusted headcount ratio. To formalise this, let H^k_d be the proportion of the population who is both poor (that is, their sum-score exceeds the cut-off k) and deprived in dimension d or

$$H^k_d = \frac{\sum_i^N x_{id} \times I_{[x_i \geq k]}}{N} \qquad (5)$$

where x_{id} is the score of individual i in dimension d that was defined in equation (1) and the indicator function $I_{[.]}$ takes on the value 1 if the expression in brackets is true (that is, individual i is excluded) and 0 if not. The adjusted headcount ratio M^k_0 is then simply the average[32] of these H^k_d over all of the D dimensions (with D = 7), or

$$M^k_0 = \frac{\sum_{d=1}^D H^k_d}{D} \qquad (6)$$

The contribution of each dimension to the adjusted headcount is then defined as the H^k_d for that dimension divided by the sum of the H^k_d over all dimensions, that is, the H^k_d get scaled so that their sum is 1 (or 100%).

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[32] It is not necessary to take the straightforward average. The method allows a generalisation by taking a weighted average where each dimension can have a different weight. The only restriction is that the weights for the dimensions sum to 1.

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