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# The Potential for Poverty to Lower the Self-Efficacy of Adults With Asthma: An Australian Longitudinal Study

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**Purpose:** It is known that strong feelings of self-efficacy are linked with better management of asthma. However, it is not known whether the experience of poverty can detrimentally impact the self-efficacy feelings of asthma patients. This paper aims to determine whether falling into income or multidimensional poverty lowers self-efficacy among people diagnosed with asthma. **Methods:** Longitudinal analysis of Waves 7 to 11 (2007 to 2011) of the nationally representative Household, Income and Labour Dynamics in Australia (HILDA) survey using generalized linear models. The analysis was limited to those who had been diagnosed with asthma. The Freedom Poverty Measure was used to identify those in multidimensional poverty. **Results:** People with asthma who fell into income poverty had significantly lower self-efficacy scores–23% lower (95% CI: -35.1 to -9.1), after falling into income poverty for 3 or 4 years between 2007 and 2011 compared to those who were never in income poverty. Those who fell into multidimensional poverty also had significantly lower self-efficacy scores–25% lower (95% CI: -42.8 to -2.0), after being in multidimensional poverty for 3 or 4 years between 2007 and 2011 compared to those who were never in poverty. **Conclusions:** Asthmatics who fall into poverty are likely to experience a decline in their feelings of self-efficacy. The findings of this study show that experiencing poverty should be a flag to identify those who may need extra assistance in managing their condition.

**Key Words:** Self efficacy; poverty; income; asthma; longitudinal survey

## INTRODUCTION

Self-efficacy is concerned with "people's sense of [their] personal efficacy to produce and regulate events in their life,"1 and views a person's perception of his efficacy as a "self-appraisal of [his] operative capabilities".[1] Self-efficacy is known to be important for asthma management, having been demonstrated that stronger feelings of self-efficacy are associated with better compliance with medication use[2] and reduced visits to emergency departments for asthma, and are associated with having better quality of life for asthmatics.[3,4] Thus, maintaining high levels of personal self-efficacy is important for asthmatics and the management of their condition.

Numerous interventions have been shown to help improve self-efficacy among people with asthma.[5] However, knowing what factors can lead to deterioration in feelings of self-efficacy should also be an important part of asthma management by flagging to medical practitioners the patients that may be at risk of having their ability to manage their asthma. To date, no research has been conducted to explore what can lead to a decline in feelings of self-efficacy among patients with asthma.

Developing asthma is known to carry the risk of falling into poverty.[6] Given that the negative experience of poverty is known to be associated with general psychological distress,[7] it may be possible that falling into poverty may lead to a decline in feelings of self-efficacy for those with asthma. This paper aims to determine whether being in income poverty and multidimensional poverty for extended periods of time results in a decline in feelings of self-efficacy using nationally representative, longitudinal data of Australia adults.

## MATERIALS AND METHODS

### Study design

This analysis tests the effects of falling into poverty (income poverty and multidimensional poverty) on self-efficacy scores of Australian adults who had previously been diagnosed with asthma. The self-efficacy scores in 2007 of people who had asthma and who were not in poverty were measured to give a

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baseline self-efficacy score. Individuals were then followed through 2011, and were divided into 4 groups: (1) those who fell into poverty for 1 year from 2008 through 2011, (2) those who fell into poverty for 2 years from 2008 through to 2011, (3) those who fell into poverty for 3 or 4 years from 2008 through to 2011, and (4) those who were not in poverty at all from 2008 through to 2011 (comparison group). The self-efficacy scores were measured again in 2011 to assess the change in scores from 2007 to determine the influence that falling into poverty for different periods of time had on self-efficacy scores. This analysis was conducted separately initially using an income and then using a multidimensional measure of poverty (the measures are discussed below).

### Data set sampling and weighting

This is a longitudinal study utilizing the Household Income and Labour Dynamics in Australia (HILDA) Survey to assess changes in self-efficacy in the Australian population aged 21 years and over between 2007 (Wave 7 of the survey) and 2011 (Wave 11 of the survey). The HILDA survey is a longitudinal survey of private Australian households conducted annually since 2001 (Wave 1). Self-efficacy was measured in Waves 3, 7, and 11. In order to utilize the most recent data, the change in self-efficacy scores between 2007 and 2011 was measured.

The HILDA data is nationally representative of the Australian adult population living in private dwellings.[8] The survey sampling unit for Wave 1 was the household. Household sampling was conducted in a 3-stage approach. Initially, 488 Census Collection Districts (each containing 200 to 250 households) were selected, and then within each district 22 to 34 dwellings were selected, finally up to 3 households within each dwelling were selected to be part of the sample.

The initial household cross-sectional weights in Wave 1 (upon which the cross-sectional weights in subsequent waves are dependant) were derived from the probability of selecting the household and were calibrated so that the weighted estimates match known benchmarks for number of adults by number of children and state by part of state. The person-level weights were based on the household weights and then calibrated so that person weights match known benchmarks for sex by age, state by part of state, state by labour force status, marital status, and household composition. Longitudinal weights adjust for attrition and were also benchmarked against the characteristics of Wave 1.[9]

This paper focused upon the balanced panel of the continuing person sample from Waves 7 to 11, which only includes those who participated in each wave. In Wave 7, which was conducted in 2007, the HILDA continuing person sample consisted of 5,684 individuals aged 21 to 64 in 2007; however, there were 4,933 records after those with missing self-efficacy data were excluded.

### Self–efficacy variables

Waves 3, 7, and 11 of the HILDA dataset measure self-efficacy based upon the Pearlin and Schooler Mastery Scale.[10] This scale has been noted by the US National Institute of Health as the most widely used measure of personal control.[11] The measure of self-efficacy contains a series of seven ratings on dimensions of self-efficacy, as follows:

1. I have little control over the things that happen to me
2. There is really no way I can solve some of the problems I have
3. There is little I can do to change many of the important things in my life
4. I often feel helpless in dealing with the problems of life
5. Sometimes I feel that I'm being pushed around in life
6. What happens to me in the future mostly depends on me
7. I can do just about anything I really set my mind to do

Respondents were asked to rate on a 1 to 7 scale how much they agree or disagree with each statement (1 being strongly agree, and 7 being strongly disagree).

In line with the recommendation of Pearlin and Schooler,[10] principal component analysis (PCA) was used to create a single measure of self-efficacy from the 7 questions. The PCA scores were then applied to each individual's response to give an aggregate score, which was then rescaled from 0 to 100, with a higher score indicating stronger feelings of self-efficacy. Due to the skewed distribution of the self-efficacy scores, the log value of self-efficacy score was used in the regression modelling.

### Income poverty and multidimensional poverty measurement

Those in income poverty were classified as having an equivalized household income less than 50% of the population median. This is the standard poverty threshold utilised in Australia [12]. Household income was based upon total regular household income, which was composed of regular private income (wages and salary, business income, investment income, and private pensions and transfers), Australian government public transfers (government income support payments and other government payments, such as family or carer payments), other public payments such as scholarships, and foreign pensions. This total income was then equivalized for the number and age of household members using the OECD-modified equivalence scale.[13]

Multidimensional poverty was measured using the Freedom Poverty Measure, which has been used to measure multidimensional poverty in Australia[14-17] and has been used to assess the risk of falling into poverty for those who develop asthma.[6] Those in multidimensional poverty were classified as being in income poverty (as defined above), and having poor health or an insufficient level of education attainment. Health status was measured by the SF-36,[18] which was measured on each wave of the HILDA Survey. Having 'poor health' was defined as having a SF-36 Physical Component Summary Score (MCS) or SF-36


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Mental Component Summary Score less than 75% of the average for the relevant age group. Education attainment was based upon the reported level of highest education attainment, and this was also recorded on each wave of the HILDA survey. Having an 'insufficient level of education attainment' was defined as having achieved less than Year 12 for those aged under 65, or having achieved less than Year 10 for those aged over 65.

### Statistical analysis

The analysis was limited to those with asthma who were not in income poverty in 2007 to assess the impact of falling into income poverty on self-efficacy scores. The mean self-efficacy score in 2007 and 2011 were identified. A series of generalized linear models of the log value of self-efficacy in 2007 were then constructed to assess the difference in mean scores between those with asthma who were not in income poverty in 2007 but were in poverty for 3 or 4 years from 2007 through 2011, for 2 years from 2007 through 2011, for 1 year from 2007 through 2011, and those who were not in poverty at all from 2007 through 2011 (the comparison group). The models were adjusted for age, sex, and marital status. The models were then repeated to measure self-efficacy in 2011, adjusting for age, sex, marital status, and log self-efficacy score in 2007. This analysis was then repeated using the multidimensional poverty measure.

All analyses were undertaken using SAS V9.3 (SAS Institute Inc., Cary, NC, USA). As the HILDA survey was a nationally representative one with population weights, weighted data is discussed unless otherwise stated.

## RESULTS

### Poverty and self-efficacy

There were 810 records of people who stated they had been told by a doctor or a nurse that they have asthma on Wave 7 of the HILDA dataset. Once weighted, these records represented 1,056,300 individuals in the Australian population in 2007. The mean age was 47.3 years (SD=15.4) and 59% were female. The mean self-efficacy score in 2007 was 69, the median score was 74, and standard deviation was 23.

In 2007, 16% of people (198,100 people) with asthma were in income poverty and 13% (162,800 people) were in multidimensional poverty. The mean self-efficacy score in 2007 for those in income poverty with asthma was 60 (SD=24), and for those not in income poverty the average was 71 (SD=22) (t value 4.45, $P<0.001$). The mean self-efficacy score in 2007 for those in multidimensional poverty was 60 (SD=25), and for those not in multidimensional poverty the average was 71 (SD=22) (t value 4.24, $P<0.001$).

### Impact of falling into multidimensional poverty on self-efficacy score

The baseline self-efficacy scores for those with asthma who were not in income poverty in 2007 are shown in Table 1. After adjusting for age, sex, and marital status in 2007, the initial self-efficacy scores at baseline of people with asthma who went on to later fall into income poverty for 1 year between 2007 and 2011 were 12.7% higher (95% CI: 1.25%-25.5%, $P=0.029$), and the self-efficacy score in 2007 of those who went on to fall into income poverty for 2 years between 2007 and 2011 was 19.2% higher (95% CI: 3.3%-37.3%, $P=0.016$) than those who did not fall into income poverty at all between 2007 and 2011. There was no significant difference in the self-efficacy scores at baseline between those who fell into income poverty for 3 to 4 years between 2007 and 2011 ($P=0.399$) and those not in income poverty at all between 2007 and 2011.

Table 1 shows the difference in mean self-efficacy scores in 2011 after individuals with asthma were in income poverty for different periods of time. Those who did not fall into poverty between 2007 and 2011 had an average increase in self-efficacy scores between 2007 and 2011, whereas those who did fall into income poverty had their scores decrease on average.

Compared to people with asthma who were not in income poverty at all between 2007 and 2011, people with asthma who fell into income poverty for 1 year had a self-efficacy score 12.3% lower (95% CI: -19.9% to -3.9%), people who fell into income poverty for 2 years had a self-efficacy score 18.2% lower (95% CI: -27.3% to -7.9%), and those who fell into income poverty for 3 or 4 years had a self-efficacy score 23.2% lower than

**Table 1.** Changes in self-efficacy scores before and after falling into income poverty, Australian population with asthma 2007

| | Self-efficacy scores | | | |
|---|---|---|---|---|
| | Not in income poverty at all 2007-2011 | In income poverty for one year between 2007-2011 | In income poverty for two years between 2007-2011 | In income poverty for three or four years between 2007-2011 |
| Proportion | 81% | 10% | 6% | 3% |
| Baseline (2007), mean (SD) | 70.5 (22.3) | 73.4 (18.6) | 74.5 (19.6) | 61.1 (22.5) |
| Follow-up (2011), mean (SD) | 72.7 (20.0) | 70.6 (23.4) | 63.1 (18.5) | 60.1 (29.1) |
| % difference (95% CI) in 2011* | REFERENCE | -12.3%<br>(-19.9 to -3.9)<br>$P=0.005$ | -18.2%<br>(-27.3 to -7.9)<br>$P<0.001$ | -23.2%<br>(-35.1 to -9.1)<br>$P=0.002$ |

*Adjusted for age, sex, and self-efficacy score in 2007.

**Table 2.** Changes in self-efficacy scores before and after falling into multidimensional poverty, Australian population with asthma 2007

| | Self-efficacy scores | | | |
|---|---|---|---|---|
| | Not in multidimensional poverty at all 2007-2011 | In multidimensional poverty for one year between 2007-2011 | In multidimensional poverty for two years between 2007-2011 | In multidimensional poverty for three or four years between 2007-2011 |
| Proportion | 86% | 7% | 4% | 3% |
| Baseline (2007), Mean (SD) | 70.6 (22.0) | 74.7 (18.9) | 70.1 (21.6) | 60.7 (25.0) |
| Follow-up (2011), Mean (SD) | 72.8 (19.8) | 67.2 (25.0) | 54.2 (20.0) | 58.7 (30.0) |
| % difference (95% CI) in 2011* | REFERENCE | -20.6% (-41.1 to 7.1) $P$=0.130 | -29.4% (-40.4 to -16.3) $P$<0.001 | -25.1% (-42.8 to -2.0) $P$=0.014 |

*Adjusted for age, sex, and self-efficacy score in 2007.

those who has not been in poverty (95% CI: -35.1% to -9.1%), after adjusting for initial self-efficacy scores, marital status, age, and sex.

The baseline self-efficacy scores in 2007 of those who were not in multidimensional poverty in 2007 but were to fall into multidimensional poverty by 2011 are shown below in Table 2, along with those of the comparison group (not in poverty at all between 2007 and 2011).

After adjusting for age, sex, and marital status, those who fell into multidimensional poverty for 1 year between 2008 and 2011 had a baseline self-efficacy score in 2007 (before they fell into poverty) 16.8% (95% CI: 3.0% to 32.4%, $P$=0.016) higher than those who were not in multidimensional poverty at all. There was no significant difference in the baseline self-efficacy score in 2007 between those who fell into multidimensional poverty for 2 years between 2007 and 2011 ($P$=0.264), those who fell into multidimensional poverty for 3 or 4 years between 2007 and 2011, and those who were not in multidimensional poverty at all ($P$=0.454).

Table 2 shows the difference in mean self-efficacy scores in 2011 after individuals were in poverty during different periods of time. Those who were not in multidimensional poverty at all between 2007 and 2011 had an increase in their self-efficacy score between 2007 and 2011. Those who fell into multidimensional poverty for any period of time all had a drop in average self-efficacy scores after having been in poverty.

Table 2 also shows the difference in self-efficacy scores after being in multidimensional poverty for different periods of time, after adjusting for age, sex, marital status, and initial self-efficacy score in 2007. Those who fell into multidimensional poverty for 2 years had a self-efficacy score 29.4% lower (95% CI: -40.4 to -16.3%), and those who fell into multidimensional poverty for 3 or 4 years had a self-efficacy score 25.1% lower (95% CI: -42.8% to -2.0%) than those who has not been in multidimensional poverty at all during this time period. There was no significant difference in self-efficacy scores in 2011 between those who fell into multidimensional poverty for 1 year between 2007 and 2011 and those who were not in multidimensional poverty at all between 2007 and 2011.

## DISCUSSION

This study identified a number of key findings regarding feelings of self-efficacy and poverty dynamics for those diagnosed with asthma. Those who fell into income poverty experienced a decline in self-efficacy scores relative to those who were not in poverty with the decline increasing by length of time in poverty. Those who fell into multidimensional poverty had a greater decline in self-efficacy; however, this was only for those who fell into multidimensional poverty for 2 years or more. Given that this study was conducted using nationally representative data and that the analysis was conducted using the population weights, it is expected that these results are generalizable to the Australian population.

Given the known importance feelings of self-efficacy have for successful management of asthma,[2-4] these findings should be of direct relevance to clinicians concerned with maintaining good asthma management practices amongst patients, which is known to affect future asthma outcomes.[19] These findings show that people with asthma who fall into income poverty, and particularly those who fall into income poverty and also have low level of education attainment or also have poor overall health are likely to experience a decline in their feelings of self-efficacy. In order to prevent this from having adverse impacts upon their asthma management, these patients should be identified as benefitting from the number of interventions that have been shown to successfully improve self-efficacy feelings among asthma patients.[5,20]

In addition to the potential benefits for asthma management, improving feelings of self-efficacy is likely to benefit patients in the management of other aspects of their lives, including undertaking individual action to lift themselves out of poverty. Feelings of self-efficacy are likely to be vital for individual actions to improve chances of labor force participation or improve chances of better paid labor force participation, as people who have strong feelings of self-efficacy are expected to

more readily make life-changing decisions. This is particularly important given high productivity costs associated with asthma, both within Australia and internationally.[12,21] Indeed, this is central to Bandura's argument: people's cognitive process–specifically their perception of efficacy – have "a prominent role in the acquisition and retention of new behavior patterns".[22] Individual action to improve living standards is strongly reflected in Australia's welfare policies,[23] which strongly advocates that individuals in the welfare system must take action to better their living standards by actively seeking employment or undertaking education. Thus any interventions to improve the self-efficacy of people with asthma who are in poverty are likely to yield benefits to both health and financial status.

This paper is limited in that the HILDA survey only asked respondents if they had ever been told by a doctor or a nurse that they have asthma, and therefore relies on self-reported health status, which assumes that the people are accurately able to recall whether they have been told they have asthma. There has been no validation of the self-reported health conditions for the cohort participating in the HILDA survey; however, the questionnaire does ask respondents if a doctor or a nurse has told them they have the condition. Furthermore, self-reported health data in general is seen to be a valid measure.[24]

In spite of this limitation of self-reported data, this study has shown that those with asthma who fall into poverty are more likely to experience a decline in their feelings of self-efficacy. This is important for clinicians who are interested in maintaining good asthma management practices among their patients, as strong feelings of self-efficacy are known to be important for good asthma management. The findings of this study show that experiencing poverty should be a flag to identify those who may need extra assistance in managing their condition.

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