Vocational education and training, health and wellbeing: Is there a relationship?

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Foreword

This research was undertaken as part of the National Centre for Vocational Education Research's (NCVER) inhouse research program. The report focuses on individuals who, together with industry, are at the centre of vocational education and training (VET). What is novel about the research is that it looks further than skills and workforce outcomes by examining health and wellbeing.

Specifically, this report investigates the relationship between education, including vocational education and training, and health and wellbeing. The report argues that education has a positive effect on health and wellbeing through intermediary variables such as employment, income and socialisation. However, the effects are modest and are largest for people with relatively high levels of education, such as degrees and diplomas.

The report will be of interest to people and organisations who have an interest in the broader benefits of education.

Tom Karmel
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To find other material of interest, search VOCED (the UNESCO/NCVER international database <http://www.voced.edu.au>) using the following keywords: health; wellbeing; outcome of education; participation.

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Key messages

Using data from the Household Income and Labour Dynamics Australia (HILDA) Survey, this report explores the relationship between education, including vocational education and training (VET), and health and wellbeing for individuals.

✧ Evidence in the research literature suggests that there is a positive relationship between education and measures of health and wellbeing. However, the relationship is complex and involves intermediate variables such as employment, income and socialisation.

✧ The analysis found that males and females with degrees as their highest qualification were more likely than people with only Year 11 and below to have better physical and mental health, although the size of the effects was small. The magnitude of the effects for males was greater than that of their female counterparts.

✧ Males and females with diplomas or advanced diplomas as their highest qualification were more likely to have better physical and mental health than those with Year 11 and below, although the size of the effect was smaller than that for those with degrees. Once again, the magnitude of effects was greater for males than for females. Males and females with certificate-level qualifications were not found to be substantially different in terms of physical and mental health from their Year 11 and below counterparts.

✧ The analysis also demonstrated the importance of the indirect effects of education on health. To prevent the benefits of education being understated, these need to be taken into consideration when looking at the total effect that education has on health. In particular, a key impact of education on health is through its influence on employment and income.

Executive summary

Apart from well-established economic benefits, education (including vocational education and training [VET]) can confer an array of other benefits. This report investigates the links between education and health and wellbeing for individuals.

The report explores the issues from three perspectives. Firstly, previous research in the area is examined. Secondly, we undertake an analysis of the Household, Income and Labour Dynamics Australia (HILDA) dataset. This longitudinal dataset, which began in 2001, collects a variety of information relating to labour market and family dynamics. In the final component of our research we report the outcome from interviews with practitioners from a selection of organisations with an educational focus in order to get some 'stories from the field' on the wellbeing effects of education.

A variety of issues concerning the relationship between education and health and wellbeing have been identified in previous research and have included different types of education, learner groups and health/wellbeing outcomes. Some of the research that has used longitudinal datasets has found evidence for the existence of a relationship between education and measures of health and wellbeing. For example, one study found an effect of learning (as measured by highest level of education attained) on measures of depression and obesity. There have also been some unusual results reported in the literature. In one study it was found that undertaking accredited vocational and leisure courses reduced alcohol consumption, but undertaking work-related courses increased alcohol consumption.

The literature also indicates that the relationship between education and health and wellbeing is complex and involves intermediate pathways (for example, through occupation and income). As such, indirect as well as direct benefits of education should be taken into account. The literature also points to the importance of the learning environment in helping people to interact with others and to develop networks, which in turn are thought to have positive impacts on health and wellbeing.

In our study, we carried out a path analysis using the HILDA dataset. The path analysis was conducted for physical and mental health outcomes (derived from the SF-36, a standardised and internationally recognised health questionnaire). We used income and a proxy for socialisation (membership of a social club) as intermediate variables and controlled for background variables such as age, disability, parent's occupation and region. Highest level of education was used as our measure of education and ranged across six levels from Year 11 or below to degree level or higher. We ran the analysis separately for males and females.

Our analysis uncovered only small effects of education on health. The clearest finding was that males and females with degree qualifications as their highest qualification were more likely to have better physical and mental health by comparison with the reference group of people with Year 11 or below qualifications. We established our models such that the reference group is set to zero effect. For example, for mental health, there was a total effect of 0.052 for males by comparison with their Year 11 counterparts.

Males and females with diplomas/advanced diplomas as their highest qualification tended to be more likely to have better physical and mental health by comparison with the Year 11 and below

reference group, although the size of the effect is not as large as that for people with degrees.[1] These results indicate a duration effect, that is, the greater the number of years in education, the greater the benefits.

Overall, the magnitude of effects was larger for males than for females.[2] This can be interpreted as meaning that education in this context is more important to males than it is to females. This could be because females are predisposed to having better health or health knowledge—an aspect we were not able to control for in our study. Note however that we are not talking about large absolute differences. In terms of VET qualifications, while there was some small effect for people with diplomas/advanced diplomas[3], for certificate-level courses there was no substantial difference from those with only Year 11 or below.

In several of our models we found that the direct effects of education on health were not significantly different from zero (that is, the reference point). However, our analysis also highlighted the importance of the indirect effects of education. In particular, the indirect effect of education through increased income contributed substantially to the total effect. Apart from the indirect effect through income, we also found some indirect effect through socialisation. Our measure of socialisation did not contribute as much to the total effects as did income. This could be in part due to our fairly crude measure—membership of a social club. However, it was the best measure available in the HILDA dataset.

In the final part of the study we interviewed practitioners in organisations which provide education and training services, primarily in the VET area. In doing so, we picked organisations catering to different client groups, namely mature-aged, Indigenous and intellectually disabled adults, and those involved in prevocational education. While not evidence as such, these interviews were designed to elicit some indication of the wellbeing benefits of those currently participating in education (or at least practitioners' views of the wellbeing benefits), as opposed to the health benefits in the general population measured in our data analysis.

Our discussions with practitioners in these organisations suggested two major types of wellbeing benefits. The first of these can be described as psychological wellbeing benefits. In particular, practitioners identified benefits from training, such as increased confidence, self-esteem and feelings of control. The other main type of benefits discussed by practitioners can be categorised under the general heading of socialisation. These benefits are related to the learning environment rather than the learning itself. Included here are benefits such as social interaction, friendship, concepts of family, solidarity, a sense of belonging and a supportive environment. All of these were believed by practitioners to contribute to a sense of wellbeing—although we did not have any objective information on wellbeing from this source or students' views on the impact of their study on their wellbeing. The practitioners did not volunteer physical health benefits from education.

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[1] For instance, while the total effect for males with degrees was 0.045 for physical health, for males with diplomas/ advanced diplomas it was 0.014.

[2] For males with degrees, there was an effect of 0.045 for physical health and 0.052 for mental health, while for females the effects were 0.022 and 0.013, respectively.

[3] These ranged from 0.027 for male mental health to 0.008 for female mental health.

Introduction

Aims

This report will explore the relationship between education (including vocational education) and health and wellbeing. While much of the previous research on education has focused on the economic benefits of education, there are clearly other benefits to be derived from education. For example, Barr (2000) claims that the primary purpose of education is to develop knowledge and skills, *and also attitudes and values*. Other literature examines individual benefits such as improved health and wellbeing.

Definitions

The literature looks at a variety of economic and non-economic benefits of education, at both the individual and at the societal level (table 1).

Table 1   Types of benefits from education

	Economic benefits	Non-economic benefits
Individual benefits	Higher income	*Increased health and wellbeing*
Societal benefits	Higher national income	Healthier population; better social functioning

Source: Based on Johnston (2004, p.5)

This report focuses on individual non-economic benefits (shown in italics in table 1). But what do we mean by health and wellbeing? The Australian Bureau of Statistics (ABS 2001) notes that there is no single measure, but rather that there are a variety of measures, depending on the area of interest. Table 2 provides a sample of the types of measures of health and wellbeing considered by the research.

Table 2   Examples of measures of health and wellbeing explored in the research

Reference	Outcomes measured
Blanchflower & Oswald (2000)	Happiness and life satisfaction
Feinstein (2002)	Depression and obesity
Kennedy (2002)	Self-assessed health status, smoking status, exercise
Dench & Reagan (2000)	Various wellbeing measures, including self-confidence, ability to cope, satisfaction with life and increased social interaction

Research questions and methods

The research questions addressed in this report are:

✧   Does education confer health and wellbeing benefits on the individual?

✧   Does vocational education and training confer health and wellbeing benefits on the individual?

We investigated these questions from three perspectives: an examination of existing literature in the area; an analysis of the Household Income and Labour Dynamics Australia (HILDA)[4] dataset; and interviews with a selection of education practitioners on the topic of students' health and wellbeing. These are given in more detail below.

✧ *Review of previous research*: previous research on the relationship between education and measures of health and wellbeing was reviewed to determine what is already known and to set the scene for the quantitative analysis that follows. Although this review discusses some of the major studies in the area, it is not intended to be exhaustive.

✧ *Data analyses*: analyses for this project focused on the first and fourth waves of the HILDA dataset. Path analysis was used to determine effects. Models compared different levels of education, physical and mental health outcomes, and males and females.

✧ *Interviews*: interviews with education practitioners were undertaken with a variety of organisations with an educational focus. These organisations were chosen with a view to gaining perspectives on different types of learners. In the end, practitioners in five organisations catering to different client groups were interviewed: a prevocational area of technical and further education (TAFE), an organisation catering for mature-aged students; another catering for people with intellectual disabilities; one catering for Indigenous students; and an adult and community education organisation. The evidence obtained from these organisations is anecdotal in nature. However, they do provide illustrations of the wellbeing benefits of education from a practitioners' perspective.

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4 HILDA is a household-based panel survey that aims to track all members of an initial sample of random and representative households over an indefinite life. The survey collects data on economic and subjective wellbeing, labour market dynamics and family dynamics.

Background and context

This chapter explores some of the issues involved in looking for evidence of a relationship between education and measures of health and wellbeing. Firstly, what are the salient methodological issues that need to be considered, and secondly, what do we already know from previous research?

Methodological issues

Models of the relationship

Figure 1 shows three models that could account for the relationship between education and health and wellbeing.

Figure 1   Three models explaining how education is related to individual health and wellbeing
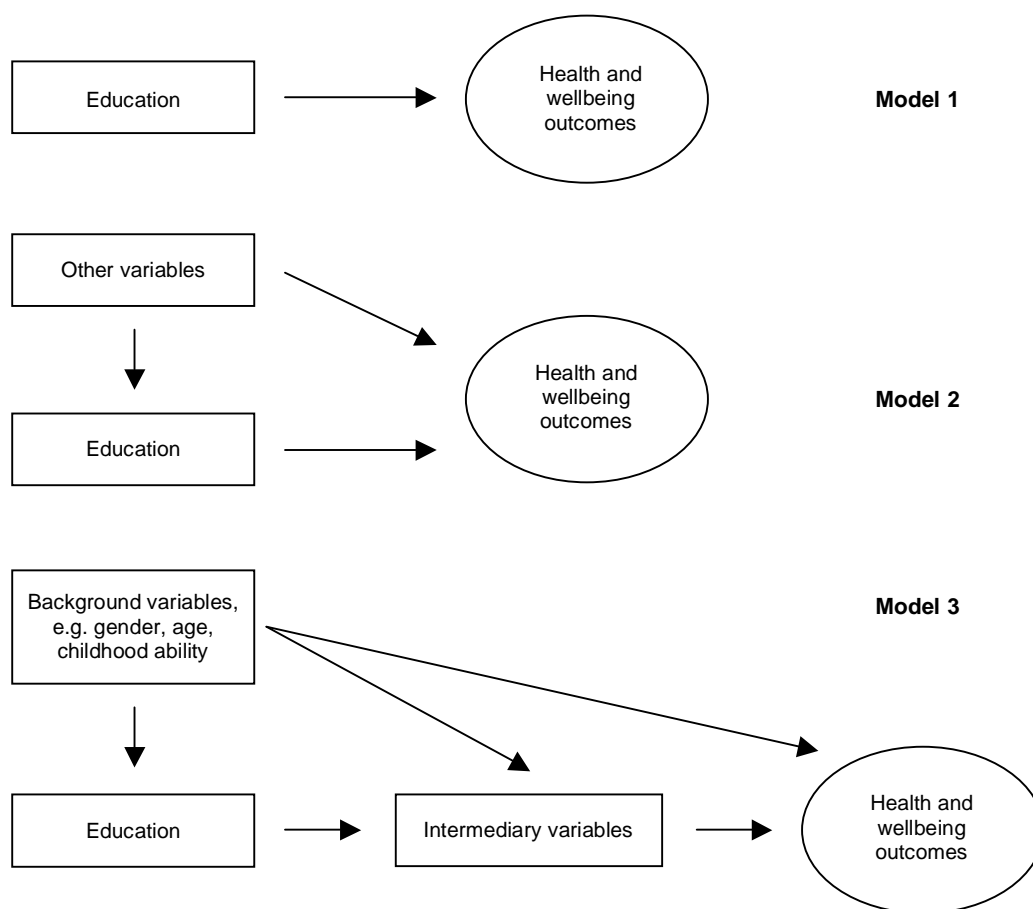
Sources: Based on Hammond (2002); Chandola et al. (2004); Singh-Manoux, Clarke and Marmot (2002)

The first model assumes a direct relationship between education and health and wellbeing; that is, changes in the level of education directly improve the level of health and wellbeing. However, this does not take into account other factors which may influence both education and health and wellbeing. The second model on the other hand does propose other variables that affect the education and health and wellbeing relationship. These can include variables related to a person's background such as age, gender, childhood ability, parent's socio-economic status etc. Other variables also affect the relationship, for example, a person's income and occupation. However, what the second model does not take into account is temporal ordering of variables. That is, some of the variables may be influenced by education. These could typically include measures of labour force status or income.

The third explanation in figure 1 shows that health and wellbeing outcomes do not necessarily arise immediately or directly from educational inputs. More particularly, the figure shows the presence of intermediary or mediating variables between education and health. We can theorise that better education leads to, for example, more income and a better occupation, and this in turn leads to better health and wellbeing. This third model intuitively makes more sense, in that education is an antecedent to variables such as income and labour force status and thus would provide a better explanation of the relationship between education and health and wellbeing. This path approach has been used by other authors (see Chandola et al. 2004 and Singh-Manoux, Clarke & Marmot 2002). We will also use this approach in our analysis of the HILDA dataset.

Data availability

If we have extensive data on variables of interest, particularly longitudinal data, we can estimate the effect of background and intermediary variables on the education and health and wellbeing relationship. However, there is little in the way of good-quality longitudinal data in an Australian context apart from the emerging HILDA dataset. Even if we had a well-established longitudinal survey, such as the National Child Development Study from the United Kingdom, it would be unable to capture all of the variables that may affect outcomes of education. For example, Behrman and Stacey (1997) note that much research in the area has used measures such as schooling attainment rather than measures such as problem-solving ability and level of knowledge. In addition, Hammond (2002) found that most of the studies use years of education or qualifications obtained as measures of education. This excludes many other types of learning such as informal learning and non-accredited learning. For our analysis this means that there will be effects not captured. In particular, we have no measure of childhood ability in our analysis. Nevertheless, the data should be robust enough to capture the main influences of education on health and wellbeing.

What previous research has found

We already know something about the health and wellbeing outcomes of education from previous research. Table 3 provides a brief summary of some of the myriad issues covered in the research, in terms of types of education examined, learner groups, outcomes measured, research methods and types of analyses used. More detailed information on these studies is contained in appendix A.

Table 3   Types of issues covered in the research

Types of education examined	Years of education, highest level of education, adult learning, cohorts in specific learning programs, higher education, third age/informal learning, vocational education and training
Learner groups	School students, adult learners, further education students, higher education students, mature-aged learners, Indigenous learners, women, general population
Outcomes measured	Happiness and life satisfaction, attitude change, depression and obesity, take-up of preventative health services, smoking status, cultural outcomes of VET
Research methods and analysis	Multivariate analyses of longitudinal surveys, descriptive analyses of surveys, in-depth and semi-structured interviews, systematic reviews of literature, meta-analyses

Table 3 shows the extent of issues covered by the research. We see for example that there is not one measure of health or wellbeing that is tested, but rather a variety of measures, such as depression, obesity, smoking status and life satisfaction. Much of the research is not methodologically rigorous, relying on descriptive analyses of surveys, or semi-structured interviews. These studies by their nature cannot explore issues of causality. Some of the studies that have taken a more rigorous quantitative approach are described below.

One report from the Centre for the Wider Benefits of Learning[5] looked at the effects of learning on two measures of health; depression and obesity (Feinstein 2002). Using data from the latest survey of the 1958 and 1970 cohorts from the United Kingdom National Child Development Study[6], Feinstein found evidence of the effects of learning[7] on depression and obesity, although the effects on obesity were not strong. Using a matching methodology[8], they found evidence that level 1 (lower-level) qualifications had a significant effect in reducing depression, by comparison with no qualifications. This applied to both academic and vocational qualifications, and males and females. However, the effects are less robust for those with higher-level academic and vocational qualifications. There were no strong effects of learning on obesity, with the exception, for the 1958 cohort, of males moving from no qualifications to level 1 academic qualifications, and females from no qualifications to level 1 vocational qualifications.

To obtain the estimate for the effect of education in their model, they controlled for variables measuring childhood physical health, mental health, ability and family background. The report also provides estimates of costing the health benefits of learning, albeit with a variety of simplifying assumptions and cautions. For example, the study suggests that, if 10% of women with no educational qualification progressed to a lower-level vocational qualification (level 1), then a saving in the costs associated with depression of between five and 23 million pounds per annum would result.

Another study from the centre (Feinstein et al. 2003) investigated the effects of adult learning on measures of health and social capital, once again using data from the National Child Development Study. To measure adult learning, they used a variety of measures—academic and vocational courses, work-related courses and leisure courses. This study therefore looked at non-accredited, in addition to accredited training, and controlled for variables such as gender, highest prior education level, social class and life changes. The study found that overall adult learning has a positive effect on various health and social outcomes. However, for health outcomes, results were equivocal when analysed by type of course undertaken and by type of health. For example, undertaking vocational accredited or leisure courses was found to reduce alcohol consumption, but undertaking work-related courses was found to increase alcohol consumption. Similarly, those undertaking few courses were more likely to give up smoking than those undertaking many courses. One possible explanation for this result is socialisation. That is, people undertaking many courses have increased social activity and hence are more likely to drink or smoke. In relation to depression, this study found both positive and negative associations. There were significant effects on both taking exercise and on measures of life satisfaction.

Chandola et al. (2004) specifically examined pathways between education and health[9], once again using the National Child Development Study. To do this, they set up a path model that attempted to explain the relationship between education at age 23 and health at age 41. In their model, they controlled for the background variables of cognitive ability at age 7, childhood social class at age 7,

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[5] This centre is dedicated to researching the benefits of learning to individuals and society as a whole. The research aims to inform policy on the wider range of benefits of learning. Its website address is <www.learningbenefits.net>.

[6] This is a longitudinal study of people born in Great Britain between the 3rd and 9th of March 1958. To date there have been six administrations of the survey, monitoring subjects' physical, educational, social and economic development.

[7] The measures of learning used in this study were highest academic and vocational qualifications attained.

[8] The matching method takes account of differences between learners by pairing learners with non-learners who have similar observable characteristics (Feinstein 2002).

[9] To do this they used a technique known as structural equation modelling. This technique specifies models in terms of cause and effect, rather than association. As such, equations in the structural model represent causal links.

and adolescent health at age 16. In addition to measuring a direct effect of education on health, they also mediated the relationship using adult social class at age 33, sense of control at age 33, and healthy behaviours at age 41. They found that there was a non-significant negative direct relationship for men between education and adult health, while for women there was a significant negative direct relationship. However, the total effect of education, which includes a composite of pathways, was found to be positive. Specifically, adolescent health, sense of control and adult healthy behaviours contributed significantly to the relationship between education and health.

Another study by Singh-Manoux, Clarke and Marmot (2002)[10] supports these findings, in that pathways need to be taken into account when examining the education–health relationship. In their study they used measures for occupation and income as intermediary variables between education and psychosocial health. They found that education has a stronger indirect effect (as mediated by income and occupation) on psychosocial health by comparison with its direct effect.

In exploring the education–health relationship in Australia and Canada, Kennedy (2002) undertook an economic analysis of datasets in Australia and Canada.[11] In particular, his paper used measures of efficiency (technical and allocative) and time preference. Here, technical efficiency referred to additional education to produce an increased ability to have better health (in their study, self-reported health), whereas allocative efficiency referred to additional education providing a person with improved ability to make good choices regarding health. Time preference, on the other hand, means that people are prepared to invest in education now for payoffs (for example, increased health) later. The study found some evidence for both efficiency and time preference explanations, with there being some slight variations by, for example, age and education level. In this study, Kennedy controlled for variables such as marital status, labour force status, age and gender.

In addition to multivariate analyses of large datasets, there are also numerous survey and qualitative studies which examine the impact of education on health and wellbeing, many of which have direct relevance to VET. The findings of these studies tend to support the multivariate studies, in that education was found to have a positive effect on health and wellbeing. For example, an evaluation of an adult and community learning fund in the United Kingdom[12] (Tyers & Aston 2002) found that the most positive effects of the learning fund were increased levels of confidence and self-esteem, in particular, learning projects that targeted users of the mental health system. Similarly, Preston and Hammond (2002), in a survey of the views of further education practitioners found the most important non-economic benefit of learning to be increased self-esteem. They also found wider social interaction and having more control over/being better able to manage one's life to be major benefits. In terms of which groups of students benefited the most, those in access and basic skills courses, as well as second chancers were thought to have been most likely to realise these benefits.

Schuller et al. (2002), in a study involving interviews with 145 adults, argued that education has a sustaining effect which then allows people to better cope with life. Using the same sample of adults, Hammond (2002) argued that self-esteem, being in control, gaining a sense of purpose and hope, gaining competencies, and social integration were immediate outcomes of education which help individuals to cope with difficult situations. This in turn leads to better health and wellbeing. This reasoning is similar to the pathways approach taken by Chandola et al. (2002).

Schuller et al. (2002) also commented on particular sub-groups of students. For example, this study found that learning English as a second or other language was very important for migrants in terms of enabling them to cope with everyday life and also for socialising and forming networks with

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[10] This study also used structural equation modelling.

[11] In Australia the ABS National Health Survey run from January 1995 – January 1996 was used, while in Canada the Canadian National Population Health Survey run from 1994–95 was used. Self-assessed health status, smoking status and an exercise index was used as the measure of health in both surveys, and highest level of education, ranging in groups from no post-school qualifications through to higher education was used as the measure of education.

[12] This fund was made available for projects that reached parts of the community outside the traditional education sectors. Many of the projects targeted people traditionally disengaged from learning, for example, the homeless, mental health users and refugees.

other migrants. For those with low levels of confidence, non-accredited and less formal approaches to learning were very important. (This is supported by the findings in the Preston and Hammond 2002 study.)

Some of the studies also discuss possible disadvantages of education. That is, for some, education could have a negative effect on health and wellbeing. Aldridge and Lavender (2000), in analysing a survey of individuals and groups who were nominated for an Adult Learners' Week award in the United Kingdom, found that possible negative effects of education included stress, anxiety and mental ill health. However, they also point out that these disadvantages are usually associated with benefits of learning. Schuller et al. (2002) also found stress and, in addition, peer group pressure to engage in undesirable activities to be a disadvantage of learning. Succeeding in education can bolster self-esteem and confidence, although Hammond (2004) argued that failure to succeed can have the opposite effect and that this can be long-lasting.

There have also been studies on the effect of education on health and wellbeing in an Australian context. Although none has undertaken analyses of longitudinal datasets, they are useful in exploring the education and health and wellbeing relationship in varying contexts and most have relevance to VET.

An Australian study by Mitchell, Legge and Sinclair-Legge (1997) looked at the wellbeing of people engaged in the University of the Third Age (U3A).[13] To gather data for their analyses, the authors administered the SF-36, a standardised health questionnaire, to 975 members of U3A in Sydney. Their analyses found that members of U3A had better-than-average general, physical and mental health and concluded that membership of U3A can assist in a more positive perception of wellbeing. However, not tested by the survey was the possibility that people with a positive perception of wellbeing were more likely to engage in U3A activities.

At the other end of the age scale, a study by Teese, Davies and Walstab (2002) explored the 'cultural' benefits of VET for early school leavers using a questionnaire administered to students who had left school in Year 11. In this study, Teese and colleagues refer to cultural benefits as the wider non-economic benefits of education, such as those related to personal development and social integration. Analysis of results found that, overall, four in five school leavers surveyed reported cultural benefits of VET across a range of issues, such as having an improved capacity for self-direction and an increased capacity to relate well to others. There was also an effect regarding duration in VET. What this means is that the longer students spent in VET, the more benefits accrued, particularly, it seems, for males.

Wider benefits of learning were also investigated for VET students who re-enrol in enabling, also called preparatory courses. Dawe (2004), using a case study approach in various TAFE institutes, found that students who re-enrol in enabling courses can benefit through increased self-esteem and confidence. The study also found that some students, especially mature-aged students, re-enrolled to maintain ongoing social contacts. Other reasons why students were found to re-enrol in these courses included to develop support networks and to feel a sense of belonging.

Finally, there are some studies on the relationship between education and health and wellbeing in the context of Indigenous Australians. A couple of these studies, which took place in Indigenous communities, indicate that specific factors in the community, such as social conditions in the community and Aboriginal culture and identity, may have a bearing on this relationship (Ewald & Boughton 2002; Lowell, Maypilama & Biritjalawuy 2003). Taking this further, Lowell and colleagues in their study reported that western-style education did not have a positive effect on health in the Indigenous community they were researching. Participants in this study felt that health problems were a result of cultural change leading to a loss of health knowledge, particularly in the areas of hygiene and nutrition. Participants believed that strengthening education in *their* health knowledge,

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[13] Universities of the Third Age, a concept that began in France, are aimed at learning for people who are in the 'third age', i.e. aged 50 and over. There are no entry standards other than age and there are no qualifications conferred.

systems and practices would lead to improved health. This indicates that sociocultural contexts influence the education–health relationship. Obviously, what may be applicable in the United Kingdom is not necessarily applicable to Indigenous communities.

By contrast, Biddle (2005), who used the 2001 National Health Survey conducted by the ABS to analyse whether completing high school has an effect on health, found that completing high school generally had the same effect on health for both Indigenous and non-Indigenous people. However, there were some variations. Completing high school was found to have a more significant effect on limiting alcohol consumption for young Indigenous people and limiting smoking for older Indigenous people by comparison with their non-Indigenous counterparts. Nevertheless, completing high school was associated with an increased probability of unhealthy weight and high alcohol consumption for older Indigenous people. When controlling for income, these associations generally remain. The findings of this study do not contradict the findings of Lowell, Maypilama and Biritjalawuy (2003) as Biddle's study is an analysis of a general population survey, whereas Lowell and colleagues' study was undertaken in a specific Indigenous community, where community conditions play a role. These conditions are unlikely to be reflected in a general survey.

Furthermore, a national survey conducted by the National Centre for Vocational Education Research (NCVER) on Indigenous Australians' training experiences indicated that about 90% of respondents had reported that they had gained more confidence/felt better about themselves and/or communicated or related better to people as a result of their VET course (Butler et al. forthcoming). There were slight variations to these findings by sub-groups of respondents, with Indigenous students in remote regions and students aged 45 and over most likely to report these benefits. In addition, students who had discontinued the course and who were no longer studying were less likely to report these benefits than students who had completed the course or who were still studying. Teese, Davies and Walstab (2002), discussed previously, had a similar finding in relation to early school leavers.

This discussion of research has shown that there is a relationship between education, including vocational education, and measures of health and wellbeing. However, the relationship is not straightforward and involves pathways through intermediary variables such as income. We have also seen that there may be variations to this relationship, depending on the context, for example, the sociocultural context of Indigenous communities in Australia. We have also seen in several of the studies that it is not only the actual learning which exerts an effect, but also the learning environment (particularly in some contexts).

Results of analyses

Introduction

The results are reported in two sections. In the first section we present the results of our quantitative analysis using the HILDA dataset. The second section presents the findings from our interviews.

Quantitative analysis

The quantitative analysis is based on HILDA version 4.1. Data from both waves (wave 1 undertaken in 2001, and wave 4 in 2004) are used. We included in our sample only people aged 25–64. That is, we focused on people likely to be in the labour force and to have had time to complete at least their initial education. In total, there were 7553 respondents who answered both waves 1 and 4 of the survey in this age group; this is the sample we use for our analyses. Further information on the survey is contained in appendix B.

Variables used in the analyses

Outcome and education variables

We initially specified three outcome variables to investigate the relationship between education and health and wellbeing. The first two are measures of physical and mental health and the third is self-reported satisfaction with life.

The physical and mental health scores were derived from eight scales in the SF-36, an internationally recognised health questionnaire. The scores for each scale from the survey were transformed in HILDA as per the SF-36 manual into scores ranging from 0–100. Four scales—physical functioning, role-physical, bodily pain, and general health—were averaged to derive the physical health score, and the other four scales—vitality, social functioning, role-emotional and mental health—were averaged to derive the mental health score, as per the SF-36 physical and mental health summary scales (Ware, Kosinski & Keller 1994). Satisfaction with life was a self-report measure on a scale of 0–10 with 0 = totally unsatisfied and 10 = totally satisfied. We subsequently dropped the analysis for life satisfaction from our overall analysis as there was no discernable pattern to the results. This may be because life satisfaction is a subjective self-report measure.

The measure of education used in the models is highest level of education attained. For our analysis, we decided on six levels of education: Year 11 and below; certificates I and II, Year 12, certificates III and IV; diploma or advanced diploma; and bachelor degree or higher.

Background (control variables)

Several control variables, that is, variables that may influence participation in education, were included in our analysis. These include age (25–64), a measure of social class (in our study, parent's occupation), regionality and disability status. These variables are well documented in the literature (see, for example, Schuller et al. 2001, Feinstein et al. 2003, Sabates & Feinstein 2004). We also considered including Indigenous status and non-English speaking background status. However people of these backgrounds were virtually absent from the sample we analysed, and consequently

the variables were not included in our analysis. In addition, we considered using marital status as a control variable, but this is problematic in path analysis as it is a dynamic variable. Indeed, 13.9% of respondents aged 25–64 had changed their marital status between waves 1 and 4 of HILDA. It could also be argued that marital status is a mediating variable. We consequently dropped marital status as a control variable on our analysis. However, we also ran the path analysis to include marital status as a control variable for physical health for respondents earning $10 000 or more per year (both males and females). The results indicated no substantial difference from the path analysis that did not include marital status as a control variable.

Details of the background variables are contained in appendix C. As mentioned previously, we are limited by the variables measured in the HILDA dataset, so sources of bias may still exist due to the effect of unmeasured variables (for example, no measure of childhood ability).

Mediating variables

In our analysis we used two mediating variables—income and socialisation. These are both documented in the literature. For example, Singh-Manoux, Clarke and Marmot (2002) used income as one of the intermediary variables in their study. Further, Hammond (2002) argued that social integration was an outcome of education which in turn would lead to better health and wellbeing outcomes. In addition Baum et al. (2001, cited in Johnson, Heady & Jensen 2005) found that social participation had a strong link to health.

Annual income was initially split into two groups. This was because there was a large proportion of people in the sample reporting no or very little income (38%, and a continuous income variable would make little sense for this group). Hence we partitioned income into those who earned less than $10 000 per year and those who earned $10 000 or more per year. The two income levels are brought together in our final analysis using logistic regression, a technique which enables us to assign weights to the income groups based on the probability of a person belonging to one income group or the other. To measure socialisation, we used a proxy variable. This was whether a person was a member of a social club. This was the best measure relating to socialisation that we could identify in the HILDA dataset.

Physical and mental health scores

The graphs given in figures 2 and 3 show the mean scores for physical and mental health by education level. There are separate graphs for males and females.

Figure 2   Means for physical and mental health by education level for males
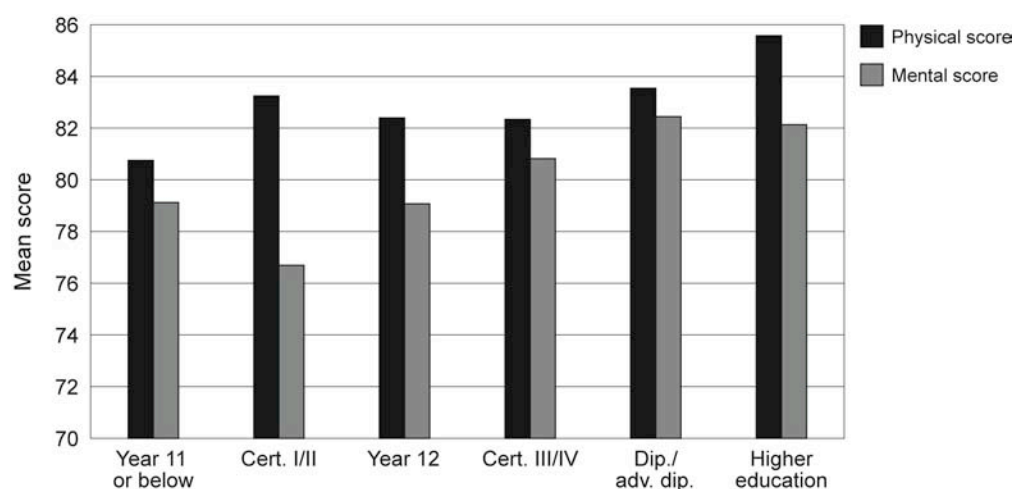
Figure 3   Means for physical and mental health by education level for females
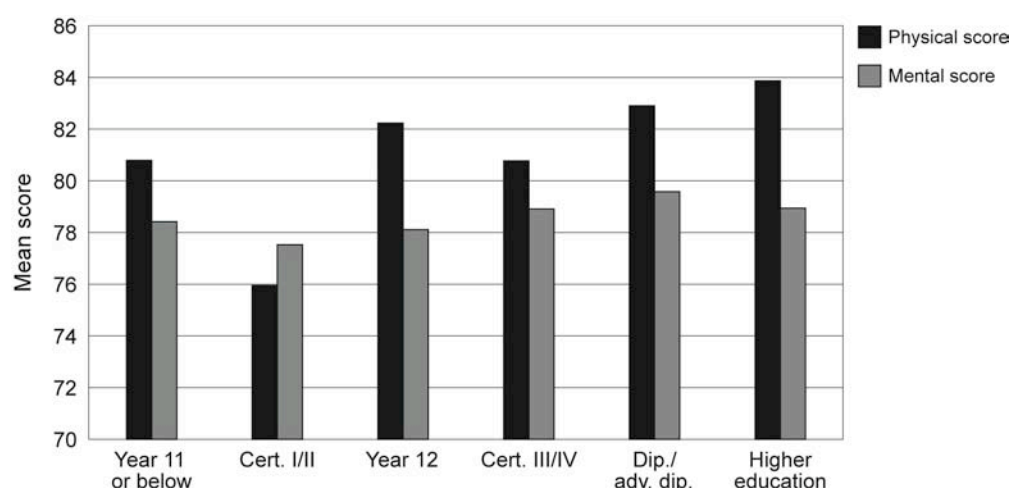
These figures show a slight trend for higher physical and mental health scores at diploma and degree level as highest qualification, and more so for males than females. Overall, however, the scores are quite closely bunched. This should not be surprising, given that the Australian population is generally quite healthy, by comparison with many other populations.

Statistical modelling

For our analysis, we used a technique known as path analysis, which incorporates the mediating variables, income and socialisation. A pictorial representation of our path model is presented in figure 2. The path model presented here is a simple one since we did not consider other forms of education such as learning not leading to qualifications, or other mediating variables, for example, those used by Chandola et al. (2004). However, it does consider prime variables of interest which previous research has used.

Figure 4   Path diagram showing the relationship between education and health[14]

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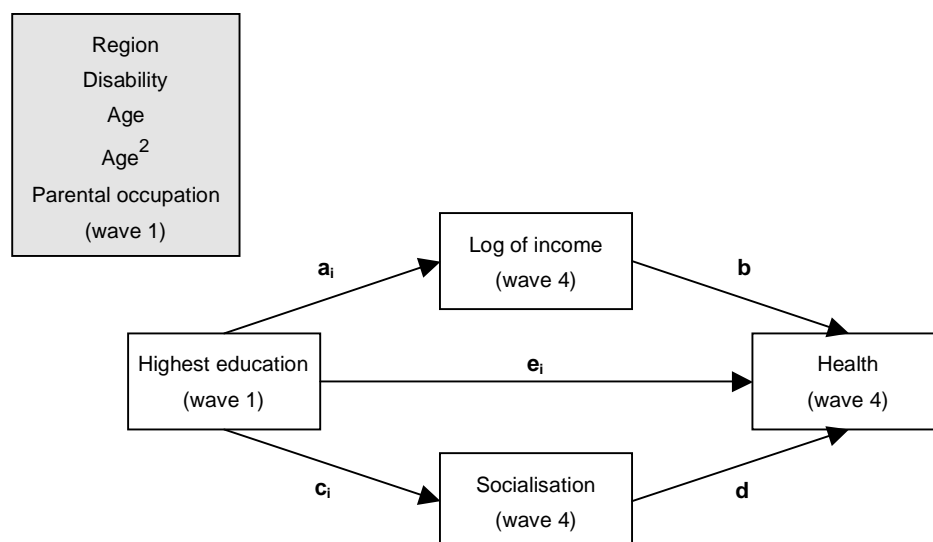
[14] Our path diagram shows age^2 and log of income as variables in the path. The variables, age and income, are transformed so as to make them more linear in relation to the outcome (health) variables.

The path begins with our background variables, which are used as controls for the other variables in the path. These are taken from wave 1 of HILDA. Our measure of education is also derived from wave 1 of HILDA. There are three paths leading from education. The first is the direct path from education to health. However, we also have paths leading from education to income, and also from education to socialisation. Subsequent to this are paths leading from income to health, and also from socialisation to health. Due to the temporal nature of the path, our data on income, socialisation and physical and mental health are taken from wave 4 of HILDA.

Note also that the arrows indicate the direction of the path. Figure 4 is a simple diagram in that the arrows all proceed in the same direction and reflect the general consensus on the direction of causality.

Coefficients for the various paths are derived through a series of regression analyses. To measure the coefficients for paths e_i, b and d in figure 4, we set up an equation in which the health outcome is the dependent variable (on the left-hand side of the equation) and education, income and socialisation independent variables (on the right-hand side of the equation). There were also equations to measure paths a_i and c_i where income and socialisation become the dependent variables. All of our equations also included the background or control variables. Our regression models used weighted data, specifically the respondent longitudinal weights in HILDA.

The coefficients used for the path analyses are what are known as standardised regression coefficients. These are used because they account for different units of measurement and so the coefficients can be compared directly. The standardised regression coefficients are interpreted as meaning the standard deviation change in the outcome variable (for example, mental health) for a one standard deviation change in the predictor variable (for example, education). For example, if the standardised coefficient for the relationship between education and health was 0.2, this is interpreted as meaning that an increase of one standard deviation in education level would result in an increase of 0.2 of a standard deviation in the health score.

The total effects for the path analysis are equal to the direct effect of education on health added to the total of the indirect effects. An indirect effect is calculated as the product of the paths leading from education to health. For example, the indirect effect through income is the product of the coefficients for the path leading from education to income, and from income to health. In the path diagram (figure 4) total effects $= e_i + ((a_i \times b) + (c_i \times d))$.

Results for the path analysis are calculated for each education level. In our analysis we have set Year 11 and below as the reference group for the analysis and as such the total effects for Year 11 and below are set to zero. The size of the effects for the other education levels are interpreted as relative to the reference group—Year 11 and below. For the group of people with income less than $10 000 per annum, we excluded income as a mediating variable[15], and used only socialisation as a mediating variable.

Results by income levels

Tables 4–11 present the results of the path analysis by level of income (income =< $10 000 and income > $10 000). In the tables the indirect effects through income and socialisation have already been multiplied out. Coefficients for all the paths in the analysis are shown in appendix E, and detailed results of the regression models are provided in appendix D.

We ran F-tests for all of our models to determine whether the education levels were significantly different from 0 across our different equations. In addition, we ran t-tests to determine whether the income and socialisation variables were significantly different from 0.[16] For both of these we used a cut-off significance of 0.1 to determine whether coefficients were significantly different from 0.

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[15] As income of less than $10 000 per year was set to zero in our analysis, it cannot be used as a mediating variable.
[16] F-tests and t-tests are both tests of difference.

Where the F- and t-tests showed that coefficients were not significantly different from 0, the coefficients were set to 0.

Results of the F- and t-tests are shown in appendix D. In summary, six of the F-tests were not significant at the 0.1 level. These were for females for both income levels where the dependent variables were physical and mental health, and for males earning more than $10 000 per annum, where the dependent variables were physical and mental health. In addition, the t-test for income (> $10 000 per annum) for females where the dependent variable was mental health was not significant.

Results for physical health

Table 4   Males with an income less than or equal to $10 000 per annum

Education level	Direct effects	Effect through socialisation	Total effects
Degree	.0793	.0137	.0931
Diploma	.0100	.0065	.0166
Certificate III/IV	-.0530	.0077	-.0452
Year 12	-.0469	.0092	-.0377
Certificate I/II	-.0030	.0000	-.0030

Table 5   Females with an income less than or equal to $10 000 per annum

Education level	Direct effects	Effect through socialisation	Total effects
Degree	0	.0082	.0082
Diploma	0	.0073	.0073
Certificate III/IV	0	.0022	.0022
Year 12	0	.0024	.0024
Certificate I/II	0	-.0003	-.0003

Table 6   Males with an income greater than $10 000 per annum

Education level	Direct effects	Effect through income	Effect through socialisation	Total effects
Degree	0	.0283	.0069	.0352
Diploma	0	.0109	.0024	.0133
Certificate III/IV	0	.0098	.0002	.0100
Year 12	0	.0080	-.0021	.0059
Certificate I/II	0	-.0031	-.0026	-.0058

Table 7   Females with an income greater than $10 000 per annum

Education level	Direct effects	Effect through income	Effect through socialisation	Total effects
Degree	0	.0155	.0137	.0293
Diploma	0	.0077	.0074	.0151
Certificate III/IV	0	.0016	.0057	.0072
Year 12	0	.0033	.0074	.0107
Certificate I/II	0	.0002	-.0027	-.0024

Results for mental health

Table 8   Males with an income less than or equal to $10 000 per annum

Education level	Direct effects	Effect through socialisation	Total effects
Degree	.1052	.0134	.1186
Diploma	.0645	.0064	.0709
Certificate III/IV	.0075	.0075	.0150
Year 12	.0046	.0090	.0135
Certificate I/II	-.0887	.0000	-.0887

Table 9   Females with an income less than or equal to $10 000 per annum

Education level	Direct effects	Effect through socialisation	Total effects
Degree	0	.0086	.0086
Diploma	0	.0077	.0077
Certificate III/IV	0	.0023	.0023
Year 12	0	.0025	.0025
Certificate I/II	0	-.0004	-.0004

Table 10   Males with an income greater than $10 000 per annum

Education level	Direct effects	Effect through income	Effect through socialisation	Total effects
Degree	0	.0324	.0064	.0388
Diploma	0	.0125	.0022	.0147
Certificate III/IV	0	.0112	.0002	.0114
Year 12	0	.0091	-.0019	.0072
Certificate I/II	0	-.0036	-.0024	-.0060

Table 11   Females with an income greater than $10 000 per annum

Education level	Direct effects	Effect through income	Effect through socialisation	Total effects
Degree	0	0	.0146	.0146
Diploma	0	0	.0079	.0079
Certificate III/IV	0	0	.0060	.0060
Year 12	0	0	.0079	.0079
Certificate I/II	0	0	-.0029	-.0029

We see from these tables that, overall, the total effects compared with our Year 11 and below reference group are of quite a small magnitude. That is, they do not show big differences between education levels. These results are consistent with figures 2 and 3, which showed the physical and mental health scores quite closely bunched across the education levels.

The clearest picture from the tables is that the greatest positive effect of education on physical and mental health is for people with degrees (by comparison with Year 11 and below). This is consistent across all the tables. There is also a consistent positive effect for people who have a diploma as their highest level of qualification, although the magnitude of the effect is less than for degrees. There are some slight variations for the other education levels. For example, for males earning $10 000 or less per year, there are negative effects for physical health for those with Year 12 or certificate III to IV qualifications, by comparison with their Year 11 counterparts, although the reasons for this are not clear.

We also see from the tables that, apart from males earning $10 000 or less per year, there were no significant direct effects of education on physical and mental health. This illustrates the importance of considering the indirect effects of education, particularly it seems through income, in our results.

Overall results from the path analysis

We can now bring the results for the two income levels together by assigning weights based on the probability of a person belonging to one income group or the other. The probabilities are determined using logistic regression, in which the income group is the dependent variable (less than or equal to $10 000, or greater than $10 000), and the independent variables are the background variables in our path analysis. Probabilities are calculated for each education level, for both males and females, and for both physical and mental health. The probabilities (weights) and associated regression statistics derived from this procedure are shown in appendix F.

We applied the weights on the total effect for each of the income groups. The resulting total effects are shown in table 12.

Table 12   Total effect of education on physical and mental health

Education level	Physical health		Mental health	
	Males	Females	Males	Females
Degree	.045	.022	.052	.013
Diploma	.014	.012	.027	.008
Certificate III/IV	-.007	.005	.012	.005
Year 12	-.005	.007	.009	.005
Certificate I/II	-.005	-.001	-.025	-.001

As mentioned previously, the overall effects were of quite small magnitude, but how do we interpret these? Earlier we mentioned that the effects are to be interpreted in terms of increases in standard deviations. Where the data are normally distributed, approximately 68% of the observations fall within one standard deviation of either side of the mean, or 34% on each side of the mean.

If we look, for example, at the total effects for mental health for males, we see an effect of .052 (of a standard deviation) for males who had completed at least a degree-level qualification by comparison with our Year 11 and below reference group. We have also seen that one standard deviation accounts for about 34% of observations on each side of the mean. We can use this as a rough calculation to obtain a percentage increase in health score, that is, 34%×.052 of a standard deviation = an increase of 1.8% in the physical health score for males with at least degree-level qualifications by comparison with Year 11 or below qualifications.

The table shows quite clearly that the largest education effect on health is for people with degrees, with the second largest effect being for people with diplomas (with the possible exception being for female mental health). The size of effects for people with certificates I to IV and Year 12 as their highest level of education, apart from the male mental health model, are so small as to be not substantively different from the Year 11 and below reference group.

There was a negative effect for males with certificate I or II in the mental health model compared with their Year 11 and below counterparts. Further examination reveals that this was due to the direct effect of education on mental health for males earning $10 000 or less per year. The reason for this is hard to pinpoint, but it may be that there is some characteristic of this group that we have not captured in our control variables. There was also some effect on mental health for males with certificate III or IV as their highest level of education. (The effect was a combination of the direct and socialisation effects for males earning $10 000 or less per year and the income effect for males earning more than $10 000 per year.)

The other feature of table 12 is that the effect of education, in terms of males with university qualifications and to some extent diplomas, is greater than that for females. In fact, the effects of education on mental health for females were very small. This is partly accounted for by our results by income level, in that there were significant direct effects of education on physical and mental health for males earning $10 000 or less per annum, but not for females.

We can make a few comments based on these results. Firstly, there is a duration effect of education. The fact that the effects are strongest for males and females with higher education, followed by diplomas, means that more years in education are associated with a higher probability of better physical and mental health, although we are only looking at small increases.

Secondly, there are differences between males and females, with education seemingly being more important for males. We can speculate that females are more predisposed to better health, or better health knowledge than males. Once again, the differences are quite small in the Australian context.

In terms of VET qualifications, the strongest effect on health (albeit a rather small effect) is for diploma/advanced diploma holders, which is consistent with the duration effect of education argument. Apart from males' mental health outcomes, our findings indicate no real difference, for health outcomes between certificate-level holders relative to those who had completed Year 11 or below.

Our analysis has also shown the contribution of indirect effects (see tables 4–11). This is the most salient part of a path analysis approach. We saw that, in particular, the path through income contributes to the overall effect.[17] Firstly, there is plenty of research around that shows that higher levels of education lead to better jobs, which tend to have healthier work environments and also confer higher levels of income. Secondly, more income provides the resources to enable basic needs to be met and so a higher probability of better health (Singh-Manoux, Clarke & Marmot 2002). So we expect that, indirectly, more education leads to better health.

There was also some indirect effect attributable to socialisation. More education can lead to better social skills, which in turn can lead to the support mechanisms and feelings of belonging that can lead to better health. However, the indirect effects in our study realised through socialisation were rather small. This could be partly attributable to the proxy measure we used—membership of a social club. This is not an ideal measure of socialisation as it does not capture many of the aspects of socialisation. Nevertheless, this was the best measure we could find in HILDA.

The importance of the indirect relationship is demonstrated in our analysis, since the direct effects of education on health were not found to be significantly different from zero for six of the eight models run, where physical and mental health were the dependent variable.[18] However, we did obtain indirect effects through income and socialisation. Singh-Manoux, Clarke and Marmot (2002) found a similar result in their analysis of links between education and psychosocial health; they found small negative direct effects of education on psychosocial health for males and females. However, they found substantial indirect effects using occupation and income as mediating variables, demonstrating the importance of taking these into account.

Qualitative results

In this section we summarise the main issues arising from our interviews with the practitioners who offered us their perspectives. As mentioned, these were intended to provide stories from the field in different contexts and are not meant to be representative of the population. These interview findings focus more on the wellbeing benefits of education rather than on the physical and mental

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[17] This is apart from the income effect on females' mental health, which not found to be significantly different from 0.
[18] The exception being the direct effect on physical and mental health for males earning $10 000 or less per year.

health benefits covered in our quantitative analysis since the practitioners are not really in a position to comment on the health benefits for students.

The schedule of questions for the interviews is contained in appendix G. For these interviews, we attempted to get views from different contexts. Therefore, we deliberately selected organisations which varied slightly in their target client group. Brief descriptions of the organisations are provided in table 13.

Table 13   Type and aim of organisations interviewed

Type and aim
1   An independent, voluntary organisation providing non-vocational programs of education for mature-aged people
2   Prevocational areas of an institute of TAFE catering for people who did not succeed in formal schooling and who are lacking confidence
3   An independent community-controlled VET provider catering for Indigenous people
4   An organisation dedicated to training and work opportunities for people with disabilities to enable them to achieve their goals and fulfil their potential
5   A non-government adult community education organisation providing vocational and non-vocational courses for people aged 15 and over

We see from the table that each of the organisations we interviewed caters for different types of students, ranging from young people to mature-aged, mainstream VET to 'leisure' courses, government and community-owned organisations, and particular equity groups, such as Indigenous people and people with a disability. Despite the range of organisations, there was considerable similarity in the types of non-economic benefits that were seen to derive from education.

Overall, the benefits which were mentioned can be grouped under two main headings. The first we call 'socialisation' and the second 'psychological wellbeing'. These are discussed in more detail below.

Socialisation

A variety of issues which can be subsumed under the broad heading of socialisation were discussed by practitioners in relation to how the learning environment contributed to an individual's wellbeing. These included social interaction, friendship, concepts of family, solidarity, a sense of belonging and a supportive environment.

In organisation 1, social interaction is seen as being very important. People enrolling in courses in this organisation are generally retired and may be missing friends or simply don't know what to do with themselves. Getting together with people with similar interests can spark social networks and provide an opportunity to make new friends.

> The courses give a chance to meet a group of people with similar interests and make friends. I see social interaction as being very desirable.   (Organisation 1)

Similarly, in organisation 5, social interaction was a consequence of the learning environment.

> Women in the class network like mad. But the end of the course they have often formed quite strong friendships and it's not unusual to see them swapping phone numbers.
> (Organisation 5)

In organisation 3, students are made to feel as part of a community or part of a family. This organisation, a community-controlled Indigenous training organisation, delivers accredited training with a vocational emphasis. However, it also places great importance on community and on creating a family environment. One practitioner in this organisation discussed how social interaction was critical in this organisation, with a great deal of time being spent just talking to people.

> The most successful courses are those courses where there is a sense of community created, and camaraderie is developed.   (Organisation 3)

The organisation also provides easy access for students to Indigenous culture and engenders feelings of belonging.

> (Organisation 3) builds tradition and brings stability to people's lives. There is a bringing of
> order, a sense of belonging and pride. (Organisation 3)

The practitioner in organisation 2 also discussed issues of family and, in addition, how class solidarity means a lot to the students. Being a teacher in the prevocational area of a TAFE institute, this practitioner deals with students who are generally disadvantaged in some way. To illustrate the issue of class solidarity, the practitioner gave an example of a class where there were incidents of anti-social behaviour by some of the students in the class. This anti-social behaviour continued throughout the semester. On one occasion one of the boys in the class ran away from home and could not be located by family members. However, he appeared the next day at class after having spent the night at the school and was found by the classmates who had previously engaged in anti-social behaviour. These classmates had also provided him with breakfast. The practitioner said that the point of this story was that, although there were problems with the students, they wanted to be there and displayed solidarity with their class mates.

> If there was anything learnt from the class it was to look out for each other. (Organisation 2)

Psychological wellbeing

The practitioners all believed that education could lead to a variety of what could be termed psychological wellbeing benefits, such as improved confidence, self-esteem and a feeling of being in control.

This impact on psychological wellbeing is an important outcome of education in organisation 4. The organisation caters for people with learning or intellectual disabilities and who do not fit into mainstream education. They may have had negative experiences with the education system in the past and were deterred by education and training. However, the practitioner believed that the competency-based training delivered in organisation 4 brings benefits to people with a disability, not only in terms of learning, but also in health and wellbeing.

> Once a person realises that their abilities are being recognised, that they do have the skills and
> are competent, it gives a great boost to their confidence and self-esteem. (Organisation 4)

The practitioner from organisation 2 related a story of a former student whose levels of confidence increased as a result of undertaking training. This student was encouraged by the practitioner to undertake a certificate II course in cooking. This was in the context of students becoming dependent on prevocational courses and being reluctant to move on. Before embarking on the certificate II course the student was described as being 'at best unkempt'. However, his appearance changed rapidly after completing the course and the student has now gone on to 'front of house' courses. The practitioner said that he now has high levels of confidence and sees himself as a worthwhile person, whereas in the past he didn't.

This practitioner also showed a letter from a former student. The letter outlined how the student had started the course with very low self-esteem and confidence, but subsequently the student's self-esteem and confidence had improved dramatically as a result of the course.

> With each week my confidence grew and I came to realise that I wasn't as stupid as I thought.
> (Former student, Organisation 2)

In a different context, the practitioner from organisation 5 related a story of middle managers who came to his organisation to undertake a course on using computers, as they were suddenly forced to do their own computer work. This caused a considerable degree of apprehension. Completing the course reduced the apprehension about using computers and provided the students with a sense of achievement and increased confidence in their abilities.

One of the practitioners in organisation 3 discussed how undertaking accredited courses in this organisation had built up people's self-esteem and allowed them to have control of their life.

> There have been drug addicts who have found culture and identity and have boosted their self-esteem and now have more control over their own culture. (Organisation 3)

Possible negative effects

Practitioners were also asked whether they had come across any aspects of education detrimental to wellbeing. Overall, practitioners could think of few cases of this.

However, the following issues were raised. One practitioner (organisation 5) said that he had seen a few cases of people experiencing negative outcomes from their learning but, where he had, it amounted to people feeling that they were not going to succeed and dropping out. Similarly, the practitioner in organisation 2 indicated that some students drop out after taking on too much and have an attitude that life is not worth living.

The nature of organisation 3 with its supportive community environment means, according to a practitioner from this organisation, that some students become dependent on the organisation and are not willing to take risks. This means that transitions to work or higher education don't work well unless support is provided.

All in all, the interviews indicated that the practitioners perceive very considerable benefits to students in terms of self-esteem and confidence.

Conclusions

At the beginning of this report we argued that, apart from economic outcomes, there are worthwhile outcomes of education, such as better health and wellbeing.

A great deal of the available research indicates that education has a positive effect on health and wellbeing, although not necessarily in a direct way. In particular, some research (for example, Singh-Manoux, Clarke & Marmot 2002; Chandola et al. 2004) suggests the use of a pathway approach involving intermediary variables between education and health and wellbeing. Hence, there are also indirect effects (through intermediary variables) of education on health and wellbeing.

In our report we also adopted a pathway approach, using the HILDA dataset, and settled on income and socialisation as intermediary variables to compare six education levels, ranging from Year 11 and below through to degree level. We examined only physical and mental health outcomes in our analysis, since the measure of wellbeing in HILDA, a self-report measure of life satisfaction, was not robust.

Our analysis found only small effects of education on health. The clearest finding was that males and females with degrees are more likely to have better physical and mental health than people with only Year 11 or below, but the differences in average health between those with degrees and less educated people are relatively small. Education provides more resources, be they income, a good job (and healthy work environment), social resources or health knowledge, to enable people to obtain better levels of health.

We also noted that the magnitude of effects was larger for males than females at the higher education levels (degrees and diplomas). Possible reasons why education makes more of a difference to males may be that females are inherently healthier or generally have better health knowledge. However, the overall difference was not large.

On the whole we did not uncover effects regarding people with VET qualifications, although there was some effect for males and females with diploma/advanced diploma qualifications (with the exception of the effect on female mental health). These people were more likely to have better physical and mental health than people with Year 11 and below qualifications. However, our interviews with practitioners, although not direct evidence as such, suggest that vocational education confers wellbeing benefits on those with poorer educational backgrounds.

Our report has also shown the importance of the indirect effects of learning, through income, but also to a lesser extent through socialisation. Accounting for these indirect effects is important, as direct effects of education on health are not always apparent.

In terms of the indirect effects realised through income, people primarily undertake education to get a good job (and more money), and these 'good' jobs in turn tend to have healthier work environments. In addition, income provides the resources for people to meet their health needs. In addition, education and the learning environment can lead to greater levels of socialisation, which in turn can lead to higher levels of health.

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Appendix A: Literature review

What the research has found

International studies

Table A.1   Studies exploring the link between education and measures of health and wellbeing

Reference	Outcome measured	Type of education/ learning	Type of learner/ subjects	Method/analysis
Aldridge & Lavender (2000)	Self-reported benefits of learning	All	Individuals and groups nominated for an Adult Learners Week award	Basic analysis of postal questionnaire
Preston & Feinstein (2004)	Attitude change	Adult learning	Adults aged between 33 and 42	Longitudinal analysis of the NCDS
Kiiskinen (2002)	Health knowledge	Years of education	Respondents to Finnish health examination survey	Systematic review of literature and multivariate analysis of survey
Melin (2003)	Life satisfaction	Highest level of education	Random sample of people for one study and somatically disabled job-seekers for the other	Univariate and multivariate analysis of survey results
Blanchflower & Oswald (2000)	Happiness and life satisfaction	Years of education	Random selection of people in USA and UK	Multivariate analysis of social surveys
Grossman & Kaestner (1997)	Various health measures	Mainly schooling	Various mainly at school level	Meta-analysis
Feinstein et al. (2003)	Range of health and social capital measures	Self-report participation in adult learning	Adult learners aged 33–42 in NCDS	Multivariate analysis of NCDS database
Hammond (2002)	Various indicators of physical and mental health	Generally years of study or highest level of education	Mainly adults	Meta-analysis
Preston & Hammond (2002)	Wider benefits of further education as perceived by practitioners	Further education	Further education students (as seen through eyes of practitioner)	Basic analysis of survey
Schuller et al. (2002)	Diversity of the effects of learning	Wide range from community education to higher education	Adults from a variety of different learning contexts	In-depth interviews
Tyers & Aston (2002)	Impact of ACLF on the lives of individuals	ACLF projects	Participants of ACLF projects. Mainly adults disengaged from learning	Univariate analysis of survey of project managers Case studies of participants
Feinstein (2002)	Depression and obesity	Academic and vocational qualifications gained	Participants in the 1958 and 1970 cohorts of Britain's NCDS	Multivariate analysis of NCDS
Rowley & Hurtado (2002)	Non-monetary returns of higher education	Higher education	First year students at University of Minnesota	Univariate analysis of 1st year undergraduates

Reference	Outcome measured	Type of education/ learning	Type of learner/ subjects	Method/analysis
Dench & Regan (2000)	Various measures of health and wellbeing	Taught and non-taught activities in two years prior to survey	Sample of people aged 50–71 in Great Britain	Univariate analysis of structured interview results
Johnston (2004)	Explores a variety of measures	Variety	Variety	Meta-analysis focusing more on longitudinal studies
Sabates & Feinstein (2004)	Take-up of preventative health services, particularly screening for cervical cancer	Highest level of education	Women	Multivariate analysis of NCDS
Helliwell (2002)	International and interpersonal differences in subjective wellbeing. Includes education as an intermediary variable	Level of education attained	Variety	Longitudinal analysis of World Values Survey
Chandola et al. (2004)	Adult health, adolescent health, healthy behaviours, sense of control, childhood and adult social class, childhood cognitive ability	Highest level of education	People born in the UK in 1958	Structural equation modelling using the NCDS
Singh-Manoux et al. (2002)	Psychosocial health (hostility, hopelessness, general health questionnaire and self-rated health)	Highest level of education	London-based civil service staff aged 35–55	Structural equation modelling using the Whitehall II study (cohort study of British public servants)
Hammond (2004)	A range of health outcomes	Education and learning throughout life	Adults living in rural parts of Essex, Nottingham and North London	Biographical interviews with individual adults and group interviews

Note: NCDS = National Child Development Study; ACLF = Adult and Community Learning Fund

Australian studies

Table A.2 Australian studies on the relationship between education and health and wellbeing

Reference	Outcome measured	Type of education/ learning	Type of learner	Method
Mackean (2002)	Maintaining health and wellbeing	University of the Third Age/informal	Mature-aged	Opinion
Kennedy (2002)	Self-assessed health status, smoking status, exercise	Highest level of educational attainment	Respondents to National Health Survey	Multivariate analysis of survey—cross-sectional
Mitchell, Legge & Sinclair-Legge (1997)	Self-assessed health status	University of the Third Age	Mature-aged	Quantitative analysis of survey
National Health Strategy (1992)	Health status indicators, risk factor indicators, health service use	Education level (high, medium, low)	Children and working-age adults	Quantitative analysis of ABS survey data and National Heart Foundation Risk Factor Prevalence Survey—cross-sectional
Teese et al. (2002)	Cultural outcomes of VET	VET	Early school leavers who went on to VET	Univariate analysis of survey results
Considine & Watson (2003)	Attitudes towards school and learning	Year 11 students in Learning for Life Program, and from general population	Learning for Life Program participants vs LSAY respondents	Multivariate analysis of Learning for Life Survey and LSAY—cross-sectional
Dawe (2004)	Further skills and experience from the course	Enabling or preparatory-type courses	Students re-enrolling in preparatory-type courses	Interview/case study methodology
Ewald & Boughton (2002)	Child health (e.g. underweight, scabies, infectious trachoma)	Schooling and post-schooling qualifications of 'carer-mothers'	Aboriginal children aged under 13 in a large Central Australian community	Quantitative analysis of a systematic screening, including regression analyses and interviews with community members, both Aboriginal and non-Aboriginal
Lowell et al. (2003)	Indigenous health issues	Western-style education	Members of a remote Aboriginal community	Action research approach involving community members and organisations
Biddle (2005)	Self-assessed health, chronic conditions and health risk factors	High school education	Indigenous and non-Indigenous Australians aged between 20 and 64	Multivariate analysis of the 2001 National Health Survey
Butler et al. (forthcoming)	A variety of benefits of training	Vocational education and training	Indigenous students who had undertaken VET	Descriptive analysis of survey

Note: LSAY = Longitudinal Survey of Australian Youth

Appendix B: HILDA survey data

The survey

The quantitative analysis of this report utilised the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The first wave of this survey commenced in 2001 and was designed to follow respondents over time. Information such as economic and subjective wellbeing, labour market dynamics and family dynamics are the main focus of data collection.

The survey datasets can be viewed at the following levels:

✧ Household = information collected or aggregated for the household as a whole; data from the household form and household questionnaire.

✧ Eperson = Enumerated person (household member of a fully or partly responding household, irrespective of whether a personal interview was completed or if they are aged less than 15).

✧ Rperson = Responding person (personal interview completed; data from the New Person Questionnaire, the Continuing Person Questionnaire and Self Completion Questionnaires).

The data

For the purpose of this research, the Rperson dataset was used. Four waves of data were available at the time this research began. Our sample is limited to those who participated in the survey in both waves 1 and 4, aged between 25 and 64 in wave 4. Of the 9704 individuals who completed a personal interview in wave 1, 77.8% (7553) participated in wave 4. It is this subset of respondents on which we placed our focus.

Table B.1   Number of respondents[19] in the HILDA dataset, 2001 and 2004, aged 25–64

Wave	Number of respondents
Wave 1 (2001)	9704
Wave 4 (2004)	8326
Waves 1 and 4	7553

Derived variables

Seven variables were derived from the HILDA dataset for use in the path analysis.

✧ *Parental occupation* assumes the father's occupation by default. If this value is missing, it then follows the mother's occupation. Categories used for occupation were 1=Manual, 2=Clerical, 3=Professionals, 4=Managers and administrators.

✧ *Age squared* is simply the square of the respondents' age.

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[19] In the context of this report, respondents are individuals who completed a personal interview.

- ✧ *Income* was split into low income (<=$10 000) and $10 000 or more. For those with low income, income was not used as an intermediary variable in the path analysis. For those with income more than $10 000, the log of income was used in the path analysis.

- ✧ *Highest education level* was coded into six categories. The categories were 1=Year 11 and below, 2=certificate I/II, 3=Year 12, 4=certificate III/IV, 5=diploma or above, 6=higher education.

- ✧ *Regionality* was coded as a binary variable where 0=netropolitan and 1=non-metropolitan, inner regional, outer regional, remote, very remote.

- ✧ *Socialisation* was coded into whether a person was a member of a social club or not.

- ✧ *Disability* was coded into 1=reported and 0=did not report a disability.

Appendix C: Descriptive statistics for variables used in the modelling

Table C.1   Descriptive statistics for categorical attributes

Characteristics	%
Gender	
Female	50.5
Male	49.5
All	100.0
Remoteness area	
Metropolitan	63.2
Remote/regional	36.8
All	100.0
Disability status	
No	80.6
Yes	19.4
All	100.0
Parental occupation	
Manual	9.6
Clerical	45.5
Professionals	22.8
Managers & administrators	17.2
Unknown	4.9
All	100.0
Highest education level (Wave 1)	
Year 11 and below	34.8
Certificate I/II	0.7
Year 12	13.7
Certificate III/IV	20.3
Diploma and above	9.5
Higher education	20.3
Unknown	0.8
All	100.0
Annual income (Wave 4)	
High income earner (>=$10 000)	59.3
Low income earner (<$10 000)	38.4
Unknown	2.3
All	100.0
Social club member (Wave 4)	
No	58.4
Yes	34.5
Unknown	7.1
All	100.0

Table C.2   Summary for continuous variables

Variable	Mean	Std dev.	Minimum	Maximum
Age	42.9	10.9	25.0	64.0
Physical health score	82.3	14.3	16.8	100.0
Mental health score	79.6	13.6	17.0	100.0
Annual income (all earners)	29 475.9	34 312.2	0.0	461 679.0
Annual income (>$10 000 earners only)	48 111.1	32 453.7	10 000.0	461 679.0

Appendix D: Regression modelling results

The equations for our models are as follows:

Physical/
mental health $= b_0 + b_1E_1 + b_2E_2 + b_3E_3 + b_4E_4 + b_5E_5 + b_6\text{income} + b_7\text{socialisation} + b_8\text{area} + b_9\text{disability} + b_{10}\text{age} + b_{11}\text{age}^2 + b_{12}\text{parentocc}$

Income $= b_0 + b_1E_1 + b_2E_2 + b_3E_3 + b_4E_4 + b_5E_5 + b_6\text{area} + b_7\text{disability} + b_8\text{age} + b_9\text{age}^2 + b_{10}\text{parentocc}$

Socialisation $= b_0 + b_1E_1 + b_2E_2 + b_3E_3 + b_4E_4 + b_5E_5 + b_6\text{area} + b_7\text{disability} + b_8\text{age} + b_9\text{age}^2 + b_{10}\text{parentocc}$

Where

Physical/
mental health $=$ 0-100 on standardised SF-36 scores

Income $=$ 0 if income less than or equal to \$10 000
Log of income variable where income > \$10 000

Socialisation $=$ 1 if member of a social club
0 if not a member

E_1 $=$ 1 if highest education level = degree level
0 otherwise

E_2 $=$ 1 if highest education level = diploma/advanced diploma
0 otherwise

E_3 $=$ 1 if highest education level = certificate III/IV
0 otherwise

E_4 $=$ 1 if highest education level = Year 12
0 otherwise

E_5 $=$ 1 if highest education level = certificate I/II
0 otherwise

Area $=$ 1 if metropolitan
0 otherwise

Disability $=$ 1 if reported a disability
0 otherwise

Age $=$ Age last birthday as of 30 June 2001

Age^2 $=$ square of age

Parentocc $=$ 1 =Manual, 2=Clerical, 3=Professionals, 4=Managers and administrators

Models were run separately for males and females, and physical and mental health.

Table D.1   Regression results for physical health equation for males with income <=$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	97.23	11.75	0	8.28	<0.0001
b_1	E1	3.94	2.03	0.0793	1.94	0.053
b_2	E2	0.59	2.29	0.0100	0.26	0.796
b_3	E3	-1.95	1.54	-0.0530	-1.27	0.21
b_4	E4	-2.69	2.26	-0.0469	-1.19	0.23
b_5	E5	-1.08	12.92	-0.0030	-0.08	0.934
b_6	Income	n/a				
b_7	Socialisation	4.11	1.30	0.1169	3.16	0.002
b_8	Area	-0.76	1.28	-0.0219	-0.59	0.555
b_9	Disability	-13.97	1.41	-0.3675	-9.92	<0.0001
b_{10}	Age	-0.49	0.51	-0.3210	-0.96	0.336
b_{11}	Age^2	(a)	0.01	0.1836	0.55	0.582
b_{12}	parentocc	0.04	0.66	0.0024	0.07	0.948

Note: $R^2 = 0.196$ Adj $R^2 = 0.182$; F = 13.74, P<.0001
(a)   Number is between 0.005 and 0

Table D.2   Regression results for physical health equation for males with income >$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	75.76	6.89	0	10.99	<.0001
b_1	E1	2.17	0.82	0.0797	2.65	0.008
b_2	E2	1.90	1.01	0.0480	1.88	0.060
b_3	E3	1.30	0.73	0.0504	1.78	0.075
b_4	E4	1.30	0.95	0.0362	1.38	0.167
b_5	E5	2.45	3.44	0.0160	0.71	0.477
b_6	Income	2.03	0.53	0.0910	3.86	0.0001
b_7	Socialisation	1.93	0.53	0.0807	3.62	0.0003
b_8	Area	0.84	0.57	0.0339	1.48	0.140
b_9	Disability	-6.32	0.84	-0.1674	-7.50	<0.0001
b_{10}	Age	-0.75	0.24	-0.6094	-3.15	0.002
b_{11}	Age^2	0.01	0.00	0.5728	2.97	0.003
b_{12}	parentocc	0.40	0.31	0.0300	1.32	0.186

Note: $R^2 = 0.062$, Adj $R^2 = 0.056$; F = 10.57, P <.0001

Table D.3   Regression results for physical health equation for females with income <=$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	107.16	7.27	0	14.74	<0.0001
b_1	E1	1.80	1.35	0.0383	1.34	0.182
b_2	E2	-0.14	1.52	-0.0025	-0.09	0.928
b_3	E3	-0.06	1.54	-0.0011	-0.04	0.969
b_4	E4	-1.33	1.35	-0.0280	-0.98	0.326
b_5	E5	-3.93	4.03	-0.0258	-0.98	0.329
b_6	Income	n/a				
b_7	Socialisation	3.66	0.90	0.1087	4.07	<0.0001
b_8	Area	1.13	0.89	0.0340	1.28	0.202
b_9	Disability	-13.64	1.19	-0.3077	-11.46	<0.0001
b_{10}	Age	-1.04	0.33	-0.7475	-3.10	0.002
b_{11}	Age^2	0.01	(a)	0.6037	2.5	0.012
b_{12}	parentocc	-0.51	0.49	-0.0279	-1.04	0.301

Note: R^2 = 0.149, Adj R^2 = 0.142; F = 19.72, P <.0001
(a)   Number is between 0.005 and 0

Table D.4   Regression results for physical health equation for females with income >$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	87.17	8.55	0	10.20	<0.0001
b_1	E1	-0.08	0.89	-0.0029	-0.10	0.924
b_2	E2	-0.09	1.10	-0.0022	-0.08	0.934
b_3	E3	-1.85	1.11	-0.0444	-1.72	0.086
b_4	E4	-0.61	0.96	-0.0175	-0.64	0.521
b_5	E5	3.51	5.11	0.0163	0.69	0.491
b_6	Income	1.11	0.62	0.0447	1.78	0.075
b_7	Socialisation	2.83	0.66	0.1020	4.29	<0.0001
b_8	Area	1.40	0.67	0.0504	2.10	0.036
b_9	Disability	-10.10	1.03	-0.2333	-9.81	<0.0001
b_{10}	Age	-0.56	0.29	-0.3863	-1.95	0.051
b_{11}	Age^2	(a)	(a)	0.2736	1.38	0.167
b_{12}	parentocc	-0.13	0.36	-0.0088	-0.36	0.726

Note: R^2 = 0.086, Adj R^2 = 0.080; F = 13.00, P <.0001
(a)   Number is between 0.005 and 0

Table D.5   Regression results for mental health equation for males with income <=$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	97.55	9.55	0	10.22	<0.0001
b_1	E1	4.30	1.60	0.1052	2.70	0.007
b_2	E2	3.10	1.77	0.0645	1.73	0.083
b_3	E3	0.22	1.19	0.0075	0.19	0.851
b_4	E4	0.21	1.77	0.0046	0.12	0.904
b_5	E5	-16.55	6.54	-0.0887	-2.53	0.012
b_6	Income	n/a				
b_7	Socialisation	3.23	1.00	0.1137	3.22	0.001
b_8	Area	0.37	0.99	0.0132	0.37	0.713
b_9	Disability	-9.03	1.05	-0.3063	-8.61	<0.0001
b_{10}	Age	-0.92	0.41	-0.7216	-2.23	0.026
b_{11}	Age^2	0.01	(a)	0.7662	2.36	0.018
b_{12}	parentocc	0.16	0.51	0.0110	0.31	0.756

Note: $R^2 = 0.145$, Adj $R^2 = 0.132$; F = 10.98, P <.0001
(a)   Number is between 0.005 and 0

Table D.6   Regression results for mental health equation for males with income >$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	61.07	7.32	0	8.35	<0.0001
b_1	E1	-0.11	0.86	-0.0039	-0.13	0.897
b_2	E2	1.15	1.08	0.0268	1.06	0.291
b_3	E3	0.17	0.77	0.0066	0.23	0.816
b_4	E4	-1.23	1.00	-0.0323	-1.23	0.218
b_5	E5	0.98	3.30	0.0067	0.30	0.767
b_6	Income	2.45	0.55	0.1043	4.44	<0.0001
b_7	Socialisation	1.87	0.57	0.0739	3.31	0.001
b_8	Area	0.78	0.61	0.0297	1.29	0.198
b_9	Disability	-4.67	0.88	-0.1190	-5.31	<0.0001
b_{10}	Age	-0.47	0.25	-0.3662	-1.88	0.060
b_{11}	Age^2	0.01	(a)	0.4613	2.38	0.018
b_{12}	parentocc	0.22	0.32	0.0158	0.69	0.488

Note: $R^2 = 0.046$, Adj $R^2 = 0.040$; F = 7.69, P <.0001
(a)   Number is between 0.005 and 0

Table D.7   Regression results for mental health equation for females with income <=$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	91.95	6.71	0	13.70	<0.0001
b_1	E1	0.77	1.22	0.0183	0.64	0.524
b_2	E2	0.21	1.40	0.0041	0.15	0.880
b_3	E3	1.51	1.38	0.0300	1.09	0.274
b_4	E4	0.13	1.23	0.0031	0.11	0.915
b_5	E5	2.23	3.89	0.0152	0.57	0.567
b_6	Income	n/a				
b_7	Socialisation	3.43	0.81	0.1137	4.24	<0.0001
b_8	Area	0.69	0.80	0.0231	0.86	0.388
b_9	Disability	-10.06	1.00	-0.2731	-10.08	<0.0001
b_{10}	Age	-0.76	0.31	-0.6049	-2.47	0.014
b_{11}	Age^2	0.01	(a)	0.6784	2.78	0.006
b_{12}	parentocc	-0.14	0.45	-0.0085	-0.31	0.755

Note: $R^2 = 0.095$, Adj $R^2 = 0.088$; F = 12.46, P <.0001
(a)   Number is between 0.005 and 0

Table D.8   Regression results for mental health equation for females with income >$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	83.86	8.81	0	9.52	<0.0001
b_1	E1	0.67	0.91	0.0022	0.73	0.470
b_2	E2	1.07	1.14	0.0254	0.94	0.349
b_3	E3	0.06	1.10	0.0014	0.05	0.956
b_4	E4	-0.24	0.98	-0.0067	-0.24	0.809
b_5	E5	2.74	5.02	0.0131	0.55	0.585
b_6	Income	0.13	0.64	0.0051	0.20	0.842
b_7	Socialisation	3.05	0.68	0.1091	4.49	<0.0001
b_8	Area	1.85	0.68	0.0667	2.71	0.007
b_9	Disability	-3.95	1.06	-0.0901	-3.72	0.0002
b_{10}	Age	-0.47	0.29	-0.3260	-1.61	0.108
b_{11}	Age^2	0.01	(a)	0.4086	2.01	0.44
b_{12}	parentocc	-0.12	0.37	-0.0078	-0.32	0.751

Note: $R^2 = 0.033$, Adj $R^2 = 0.026$; F = 4.74, P <.0001
(a)   Number is between 0.005 and 0

Table D.9   Regression results for income equation for males

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	9.16	0.20	0	45.25	<0.0001
b_1	E1	0.39	0.03	0.3109	11.75	<0.0001
b_2	E2	0.22	0.04	0.1196	5.16	<0.0001
b_3	E3	0.13	0.03	0.1073	4.16	<0.0001
b_4	E4	0.14	0.04	0.0874	3.64	0.0003
b_5	E5	-0.23	0.14	-0.0342	-1.67	0.095
b_6	Area	-0.03	0.02	-0.0288	-1.38	0.169
b_7	Disability	-0.15	0.03	-0.0892	-4.38	<0.0001
b_8	Age	0.07	0.01	1.2859	7.34	<0.0001
b_9	Age^2	(a)	(a)	-1.2653	-7.23	<0.0001
b_{10}	parentocc	0.02	0.01	0.0279	1.35	0.178

Note: $R^2 = 0.108$, Adj $R^2 = 0.104$; F = 26.43, P <.0001
(a)   Number is between 0.005 and 0

Table D.10   Regression results for income equation for females

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	9.94	0.22	0	45.49	<0.0001
b_1	E1	0.42	0.03	0.3482	13.29	<0.0001
b_2	E2	0.29	0.04	0.1725	7.17	<0.0001
b_3	E3	0.06	0.04	0.0349	1.47	0.141
b_4	E4	0.11	0.04	0.0741	2.99	0.003
b_5	E5	0.05	0.18	0.0054	0.25	0.804
b_6	Area	-0.09	0.02	-0.0807	-3.67	0.0002
b_7	Disability	-0.02	0.04	-0.0141	-0.65	0.518
b_8	Age	0.01	0.01	0.1899	1.05	0.296
b_9	Age^2	(a)	(a)	-0.1282	-0.71	0.480
b_{10}	parentocc	(a)	0.01	0.0081	0.37	0.713

Note: $R^2 = 0.118$, Adj $R^2 = 0.114$; F = 25.46, P <.0001
(a)   Number is between 0.005 and 0

Table D.11   Regression results for socialisation equation for males with income <=$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	0.06	0.32	0	0.20	0.841
b_1	E1	0.18	0.06	0.1175	3.24	0.001
b_2	E2	0.10	0.06	0.0559	1.59	0.112
b_3	E3	0.07	0.04	0.0662	1.76	0.079
b_4	E4	0.13	0.06	0.0788	2.20	0.028
b_5	E5	(a)	0.21	0.0004	0.01	0.991
b_6	Area	0.04	0.03	0.0372	1.10	0.272
b_7	Disability	-0.06	0.03	-0.0639	-1.89	0.059
b_8	Age	(a)	0.01	0.1106	0.36	0.720
b_9	Age^2	(a)	(a)	0.0071	0.02	0.982
b_{10}	parentocc	(a)	0.02	-0.0032	-0.10	0.924

Note: $R^2 = 0.031$, Adj $R^2 = 0.020$; F = 2.87, P =.002
(a)   Number is between 0.005 and 0

Table D.12   Regression results for socialisation equation for males with income >$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	0.28	0.20	0	1.41	0.158
b_1	E1	0.10	0.03	0.0860	3.00	0.003
b_2	E2	0.05	0.04	0.0303	1.21	0.226
b_3	E3	(a)	0.30	0.0023	0.08	0.934
b_4	E4	-0.04	0.04	-0.0255	-0.99	0.325
b_5	E5	-0.19	0.13	-0.0328	-1.48	0.140
b_6	Area	0.04	0.02	0.0372	1.64	0.102
b_7	Disability	-0.01	0.03	-0.0042	-0.19	0.849
b_8	Age	(a)	0.01	0.0672	0.35	0.723
b_9	Age^2	(b)	(a)	-0.0248	-0.13	0.896
b_{10}	parentocc	-0.01	0.01	-0.0207	-0.92	0.358

Note:　R^2 = 0.012, Adj R^2 = 0.007; F = 2.46, P = .006
(a)   Number is between 0.005 and 0
(b)   Number is between 0 and -0.005

Table D.13   Regression results for socialisation equation for females with income <=$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	0.45	0.21	0	2.15	0.032
b_1	E1	0.11	0.04	0.0758	2.80	0.005
b_2	E2	0.12	0.05	0.0679	2.61	0.009
b_3	E3	0.03	0.04	0.0204	0.78	0.433
b_4	E4	0.03	0.04	0.0221	0.81	0.416
b_5	E5	-0.01	0.11	-0.0031	-0.12	0.903
b_6	Area	0.08	0.02	0.0765	3.02	0.003
b_7	Disability	-0.03	0.03	-0.0273	-1.06	0.291
b_8	Age	-0.01	0.01	-0.3197	-1.39	0.165
b_9	Age^2	(a)	(a)	0.4421	1.93	0.054
b_{10}	parentocc	0.02	0.01	0.0294	1.15	0.252

Note:　R^2 = 0.029, Adj R^2 = 0.022; F = 4.59, P <.0001
(a)   Number is between 0.005 and 0

Table D.14   Regression results for socialisation equation for females with income >$10 000 per annum

Variables		Unstandardised coefficients		Standardised coefficients	t	Sig.
		Value	Std error	Value		
b_0	Intercept	(b)	0.21	0	-0.01	0.996
b_1	E1	0.14	0.03	0.1343	4.79	<0.0001
b_2	E2	0.11	0.04	0.0721	2.79	0.005
b_3	E3	0.08	0.04	0.0554	2.18	0.030
b_4	E4	0.09	0.03	0.0726	2.72	0.007
b_5	E5	-0.19	0.17	-0.0263	-1.13	0.257
b_6	Area	0.01	0.02	0.0135	0.57	0.568
b_7	Disability	-0.01	0.03	-0.0083	-0.36	0.720
b_8	Age	(a)	0.01	0.0632	0.32	0.746
b_9	Age^2	(a)	(a)	0.0398	0.20	0.839
b_{10}	parentocc	0.03	0.01	0.0601	2.54	0.011

Note: $R^2 = 0.0268$, Adj $R^2 = 0.0214$; F = 5.00, P <.0001
     (a)   Number is between 0.005 and 0
     (b)   Number is between 0 and -0.005

Table D.15   Results of F-tests for whether coefficients for education levels are significantly different from 0

Dependent variables	Males		Females	
	F Value	P	F Value	P
Income <=$10K				
Physical health	2.06	0.068	0.95	0.450
Mental health	3.45	0.004	0.34	0.890
Socialisation	2.64	0.022	2.49	0.030
Income >$10K				
Physical health	1.59	0.159	0.79	0.554
Mental health	0.84	0.522	0.38	0.864
Income	31.02	<0.0001	40.85	<0.0001
Socialisation	4.05	0.001	5.37	<0.0001

Appendix E: Detailed path analysis coefficients

Physical health

Table E.1   Males with an income <=$10 000 per annum

Highest education	Education on income	Income on physical health	Education on socialisation	Socialisation on physical health	Education on physical health
Degree	n/a	n/a	0.1175	0.1169	0.0793
Diploma	n/a	n/a	0.0559	0.1169	0.0100
Certificate III/IV	n/a	n/a	0.0662	0.1169	-0.0530
Year 12	n/a	n/a	0.0788	0.1169	-0.0469
Certificate I/II	n/a	n/a	0.0004	0.1169	-0.0030

Table E.2   Males with an income >$10 000 per annum

Highest education	Education on income	Income on physical health	Education on socialisation	Socialisation on physical health	Education on physical health
Degree	0.3109	0.0910	0.0860	0.0807	0.0000
Diploma	0.1196	0.0910	0.0303	0.0807	0.0000
Certificate III/IV	0.1073	0.0910	0.0023	0.0807	0.0000
Year 12	0.0874	0.0910	-0.0255	0.0807	0.0000
Certificate I/II	-0.0342	0.0910	-0.0328	0.0807	0.0000

Table E.3   Females with an income <=$10 000 per annum

Highest education	Education on income	Income on physical health	Education on socialisation	Socialisation on physical health	Education on physical health
Degree	n/a	n/a	0.0759	0.1087	0.0000
Diploma	n/a	n/a	0.0679	0.1087	0.0000
Certificate III/IV	n/a	n/a	0.0204	0.1087	0.0000
Year 12	n/a	n/a	0.0221	0.1087	0.0000
Certificate I/II	n/a	n/a	-0.0031	0.1087	0.0000

Table E.4   Females with an income >$10 000 per annum

Highest education	Education on income	Income on physical health	Education on socialisation	Socialisation on physical health	Education on physical health
Degree	0.3482	0.0447	0.1343	0.1020	0.0000
Diploma	0.1725	0.0447	0.0721	0.1020	0.0000
Certificate III/IV	0.0349	0.0447	0.0554	0.1020	0.0000
Year 12	0.0741	0.0447	0.0726	0.1020	0.0000
Certificate I/II	0.0054	0.0447	-0.0263	0.1020	0.0000

Mental health

Table E.5   Males with an income <=$10 000 per annum

Highest education	Education on income	Income on mental health	Education on socialisation	Socialisation on mental health	Education on mental health
Degree	n/a	n/a	0.1175	0.1137	0.1052
Diploma	n/a	n/a	0.0559	0.1137	0.0645
Certificate III/IV	n/a	n/a	0.0662	0.1137	0.0075
Year 12	n/a	n/a	0.0788	0.1137	0.0046
Certificate I/II	n/a	n/a	0.0004	0.1137	-0.0887

Table E.6   Males with an income >$10 000 per annum

Highest education	Education on income	Income on mental health	Education on socialisation	Socialisation on mental health	Education on mental health
Degree	0.3109	0.1043	0.0860	0.0739	0.0000
Diploma	0.1196	0.1043	0.0303	0.0739	0.0000
Certificate III/IV	0.1073	0.1043	0.0023	0.0739	0.0000
Year 12	0.0874	0.1043	-0.0255	0.0739	0.0000
Certificate I/II	-0.0342	0.1043	-0.0328	0.0739	0.0000

Table E.7   Females with an income <=$10 000 per annum

Highest education	Education on income	Income on mental health	Education on socialisation	Socialisation on mental health	Education on mental health
Degree	n/a	n/a	0.0759	0.1139	0.0000
Diploma	n/a	n/a	0.0679	0.1139	0.0000
Certificate III/IV	n/a	n/a	0.0204	0.1139	0.0000
Year 12	n/a	n/a	0.0221	0.1139	0.0000
Certificate I/II	n/a	n/a	-0.0031	0.1139	0.0000

Table E.8   Females with an income >$10 000 per annum

Highest education	Education on income	Income on mental health	Education on socialisation	Socialisation on mental health	Education on mental health
Degree	0.3482	0.0000	0.1343	0.1091	0.0000
Diploma	0.1725	0.0000	0.0721	0.1091	0.0000
Certificate III/IV	0.0349	0.0000	0.0554	0.1091	0.0000
Year 12	0.0741	0.0000	0.0726	0.1091	0.0000
Certificate I/II	0.0054	0.0000	-0.0263	0.1091	0.0000

Appendix F:
Probabilities of a person falling into a particular income group

Table F.1   Probabilities of a person falling in to the different income groups by gender

Education level	Males		Females	
	<=$10k	>$10k	<=$10k	>$10k
Year 11 and below	.3400	.6600	.5648	.4352
Certificate I/II	.2293	.7707	.6864	.3136
Year 12	.2465	.7535	.4770	.5230
Certificate III/IV	.3000	.7000	.4110	.5890
Diploma	.2212	.7788	.4325	.5675
Degree	.1607	.8393	.3214	.6786

Table F.2   Beta coefficients, standard errors and significance levels for variables in logistic regression

	Females			Males		
	b	Std error	Pr > ChiSq	b	Std error	Pr > ChiSq
Area of residence						
Metropolitan	0.0000	–	–	0.0000	–	–
Non-metropolitan	0.197	0.00205	<.0001	0.1996	0.0024	<.0001
Disability status						
Without disability	0.0000	–	–	0.0000	–	–
Disabled	0.7764	0.00269	<.0001	1.2896	0.0027	<.0001
Age	0.0307	0.000097	<.0001	0.0741	0.0001	<.0001
Parental occupation						
Manual	0.0000	–	–	0.0000	–	–
Clerical	-0.3876	0.00344	<.0001	-0.3053	0.0038	<.0001
Professional	-0.1873	0.00379	<.0001	-0.1312	0.0043	<.0001
Managers & administrators	-0.4438	0.00393	<.0001	-0.0709	0.0043	<.0001
Highest education level						
Year 11 or below	0.0000	–	–	0.0000	–	–
Certificate I/II	0.5227	0.0123	<.0001	-0.5493	0.0138	<.0001
Year 12	-0.3524	0.00293	<.0001	-0.4541	0.0042	<.0001
Certificate III/IV	-0.6205	0.00334	<.0001	-0.1842	0.0029	<.0001
Diploma/advanced diploma	-0.5323	0.00345	<.0001	-0.5955	0.0044	<.0001
Higher education	-1.0079	0.00286	<.0001	-0.9897	0.0037	<.0001
Constant	-0.9478	0.0055	<.0001	-3.9965	0.0068	<.0001

Appendix G: Interview schedule

1 Background on the organisation, their role in helping people, their role in education, particularly vocational education and training (VET).

2 What do you perceive to be the wider (or non-economic) benefits of undertaking education (particularly VET), for example, happiness, life satisfaction, self-esteem, better health, social functioning, reduced crime etc.?

3 What are your thoughts on how education and wellbeing interact? Do you see direct effects or do you think that there is a more complex indirect relationship?

4 What experiences has the organisation had in terms of people's participation in VET and improvements to their health and wellbeing? What kind of people do you mainly deal with?

5 Can you provide any case examples of these wider benefits in your experience?

6 Does your organisation provide any student support services? If so, how do they benefit your students in terms of their wellbeing?

7 Are there particular types of people for whom education seems to be particularly beneficial toward their health and wellbeing?

8 What aspects of the courses do you think are particularly beneficial? For example, course content, interaction between students, student being responsible for own learning, sense of purpose.

9 In your experience, have there been any detrimental outcomes for people undertaking courses? For example, stress and related illnesses, dissatisfaction with former life, effects on family and relationships, tiredness.

10 Any there any other issues that you think are pertinent, or wish to discuss?