



Research

The economic value of an investment in physiotherapy education: a net present value analysis

George Rivers^a, Jonathan Foo^b, Dragan Ilic^c, Peter Nicklen^b, Scott Reeves^d, Kieran Walsh^e, Stephen Maloney^b

^aFaculty of Business and Economics; ^bDepartment of Physiotherapy; ^cMedical Education, Research and Quality Unit, School of Public Health and Preventive Medicine, Monash University, Australia; ^dCentre for Health and Social Care Research, Kingston University and St George's University of London; ^eBMJ Learning, BMJ Group, UK

KEY WORDS

Cost-benefit analysis
Economic evaluation
Education
Physiotherapy



ABSTRACT

Questions: What is the economic value for an individual to invest in physiotherapy undergraduate education in Australia? How is this affected by increased education costs or decreased wages? **Design:** A cost-benefit analysis using a net present value (NPV) approach was conducted and reported in Australian dollars. In relation to physiotherapy education, the NPV represents future earnings as a physiotherapist minus the direct and indirect costs in obtaining the degree. Sensitivity analyses were conducted to consider varying levels of experience, public versus private sector, and domestic versus international student fees. Comparable calculations were made for educational investments in medicine and nursing/midwifery. **Results:** Assuming an expected discount rate of 9.675%, investment in education by domestic students with approximately 34 years of average work experience yields a NPV estimated at \$784,000 for public sector physiotherapists and \$815,000 for private sector therapists. In relation to international students, the NPV results for an investment and career as a physiotherapist is estimated at \$705,000 in the public sector and \$736,000 in the private sector. **Conclusion:** With an approximate payback period of 4 years, coupled with strong and positive NPV values, physiotherapy education in Australia is a financially attractive prospect and a viable value proposition for those considering a career in this field. **[Rivers G, Foo J, Ilic D, Nicklen P, Reeves S, Walsh K, Maloney S (2015) The economic value of an investment in physiotherapy education: a net present value analysis. *Journal of Physiotherapy* 61: 148–154]**

© 2015 Australian Physiotherapy Association. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

In Australia, the number of students choosing to invest in knowledge through higher education is increasing, reaching over half a million in 2012.¹ Physiotherapy, in particular, has grown rapidly, with a 35% increase in students graduating from Australian programs between 2004 and 2006.² These graduating students have enjoyed a job market in which there is a shortage of physiotherapists.³ Physiotherapy shortages are expected to continue as demand grows due to an aging population, population growth and rising incidence of chronic disease.⁴ Despite this growth in the profession, a South Australian survey of 561 physiotherapists found that more than 60% of respondents believed that their remuneration was too low.⁵

Cost-benefit analysis, which is often used to evaluate policies and projects,⁶ can be used to understand the economic value of pursuing physiotherapy education in the context of a lifelong career. In cost-benefit analysis, time-dependent costs and benefits are expressed in money terms, which are based on the preferences of the individuals affected. The main measure of the total value of an economic decision in cost-benefit analysis is its net present value (NPV). NPV is

expressed as the total discounted benefit (value of consumption gained) less the total discounted cost (value of consumption foregone). This comparison is enabled by applying a discount rate to convert future costs and benefits to present values. NPV is consistent with the ideas of both individual time preference, where consumption today is preferred over consumption tomorrow, and risk, in that future cash flows are not guaranteed. In relation to physiotherapy education, the NPV measure compares the future earnings as a physiotherapist minus the costs of obtaining the degree.

Economic analysis of education is not a new concept. Studies have been conducted on the costs of American medical education, as the fees are often prohibitive, with the average student graduating with US\$167,000 of debt.⁷ Using an NPV measure of medical education in 2010, Kahn and Nelling⁸ found that a medical degree is a worthwhile investment up to costs of US\$140,000 per year of study. However, the calculations in these studies have been based on broad assumptions, using modelled data in the absence of actual data. No study of this type has been conducted on physiotherapy in Australia or in any other country.

Physiotherapy education in Australia is growing; there are 17 accredited courses ranging from 4-year undergraduate

baccalaureates to 2-year or 3-year Master or Doctor of Physiotherapy degrees.⁹ Qualified physiotherapists enjoy a wide scope of practice in both the public and private sector, including sports, cardiorespiratory, neurological and paediatrics.¹⁰ A cross-sectional study of 273 Swedish physiotherapy students by Öhman and colleagues¹¹ explored the reasons for choosing a career in physiotherapy. These included an interest in sports and athletics, in working with people, being influenced by interaction with physiotherapists and seeing it as an appealing profession. In that study, none of the students reported having chosen the profession to make a good living. However, it should be considered that higher education in Sweden is free of charge for Swedish students, while Australian physiotherapy students contribute in excess of AUD8,000 per year.^{12,13} If the government funding cuts and fee deregulation occur, these contributions could soon increase to as much as international students pay.¹⁴ McMeeken¹⁵ argues that physiotherapy education is already disadvantaged through funding mechanisms, with its low attrition rates and the high cost of clinical education. As a highly popular course, this would make physiotherapy a prime target for fee increases in a deregulated education market.

Despite the lack of economic data, Szuster and Carson⁵ found that 75% of physiotherapists chose their profession in order to be financially secure. To better understand this concept of economic incentives in career choice, the present study aimed to model the value of physiotherapy education through analysing real survey data using a NPV approach. In doing so, this study was intended to present the financial motivation associated with choosing an investment in physiotherapy education, and how this would be affected by increased education costs or decreased wages. Therefore, the research questions for this study were:

1. What is the economic value for an individual to invest in physiotherapy undergraduate education in Australia?
2. How is this affected by increased education costs or decreased wages?

Method

Design

This study utilised a cost-benefit analysis with a NPV approach. All dollar values presented in the paper are Australian dollars unless otherwise stated. The calculation of NPV was made using

three independent formulas that model present value and are based on known data and listed assumptions (Box 1). These three formulas were combined using the following equation to estimate overall NPV:

$$NPV = PV_{\text{future earnings}} - (PV_{\text{direct costs}} + PV_{\text{indirect costs}})$$

Present values (PV) were calculated for future earnings, as well as both the direct and indirect costs, reflecting the full opportunity cost of undertaking the investment in physiotherapy education. Opportunity costs represent the cost of the option forgone as a result of the decision to undertake the physiotherapy degree. In each formula, future cash flows (C) were weighted by a nominal discount rate (r) to calculate the present value, factoring in risk and time preference. Following recommendations from the Office of Best Practice Regulation,¹⁶ r-values were adjusted to align with market expectation for consumer price index of 2.5%. A sensitivity analysis was conducted for low-risk, expected-risk and high-risk scenarios.¹⁷ These r-values were 5.575%, 9.675% and 12.750%, respectively. Public and private salary growth rates (g) of 3.84% and 3.95%, respectively, were used to estimate future cash-flow earnings. The calculations were modelled for a domestic student commencing a 4-year physiotherapy degree in 2012 and commencing work at 22 years old.

Present value of direct costs

$$PV_{\text{direct costs}} = \frac{C_d(1+r)}{r-g} \left[1 - \left(\frac{1+g}{1+r} \right)^4 \right]$$

Direct costs are the amounts incurred by students as a direct result of undertaking the university degree. This was modelled as a 4-year growing annuity. This includes university fees, required textbooks, uniform and documentation necessary to obtain the degree. Course fees represent an average of three advertised fees for domestic students for a 4-year undergraduate physiotherapy degree in an Australian university. Other cash flows were calculated based on known figures from a leading Australian physiotherapy program. Net cash flow was calculated to be \$8,527 for 1 year. A growth rate (g) of 2.5% was applied to account for inflation, aligning with market expectations for consumer price index.¹⁷

Box 1. Key values and assumptions used in net present value model.

| Variable | Values | Assumptions |
|------------------------------|--|--|
| Discount rate (r) | <ul style="list-style-type: none"> • Low risk = 5.575% • Expected risk = 9.675% • High risk = 12.75% | |
| Growth rate (g) | <ul style="list-style-type: none"> • Consumer price index = 2.5% • Public salary = 3.84% • Private salary = 3.96% | |
| Direct cash flow (C_d) | <ul style="list-style-type: none"> • Domestic fee = \$7,960/yr • International fee = \$29,786/yr • Other expenses = \$567/yr | <ul style="list-style-type: none"> • Direct costs increase with consumer price index |
| Indirect cash flow (C_i) | <ul style="list-style-type: none"> • Value of time = \$22/hr • Total course time = 3504.5 hr | |
| Earnings cash flow (C_e) | <ul style="list-style-type: none"> • Anticipated annual salary increase <ul style="list-style-type: none"> Public = 3.84% Private = 3.96% • Continuing professional development and annual registration costs = \$1,159 | <ul style="list-style-type: none"> • Working full time in either public or private sector • Taxed at Australian tax rates for 2014 to 2015 |
| Time (t) | | <ul style="list-style-type: none"> • 4-year degree from 2012 to 2015 without impeded progress • Commence working at 22 years of age |
| Cost of living | <ul style="list-style-type: none"> • \$25,009 per year | |

Present value of indirect costs

$$PV_{\text{indirect costs}} = \sum_{t=1}^4 \frac{C_i}{(1+r)^t}$$

The value of time spent obtaining the physiotherapy degree was represented in dollar terms as indirect costs. Seventy-three third-year Australian physiotherapy students from one university cohort were surveyed, being asked: 'If you had to place a dollar value on your time, what would you give it?' and 'How many hours would you estimate in total, that you spent engaged in learning activities and study for the 10 weeks of the semester?' The response rate was 93% ($n = 68$). From this, the median value that students placed on their time was \$22 per hour, with an interquartile range of \$20 to \$30 per hour. The median time spent on learning activities was 300 hours, with an interquartile range of 245 to 400 hours. This information, together with timetable information from an Australian physiotherapy program, was used to calculate the financial value of time spent per year attributed to the physiotherapy degree.

Present value of future earnings

$$PV_{\text{future earnings}} = \sum_{t=1}^t \frac{C_e}{(1+r)^t}$$

Upon obtaining their degree, physiotherapists may take any number of career pathways, including a mix of public and private sector roles, management, research and/or education. In order to make the results generalisable, we have only modelled for individuals who chose to work exclusively as physiotherapists in either the public sector or private sector. Expected full-time wage in both the public and private sector was calculated from the Australian Bureau of Statistics data.¹⁸ Wages are expected to increase due to two factors: increases in experience and position; and increases due to inflation over time. Experience-based wage increase was estimated by analysing wage data in 5-year increments. Inflation was applied using the 20-year Australian average of annual wage increases of 3.84% for public growth and 3.96% for private growth. Weekly wages were then converted to an annual amount allowing for 4 weeks of annual leave, 9.5% compulsory employer superannuation contribution and Australian Tax Office tax rates for 2014 to 2015.^{19,20} The amounts for annual professional registration and continuing professional development were estimated and deducted to calculate net cash flow.

The amount of return from the physiotherapy degree is dependent on how long an individual continues to work. The average years of work (t) were estimated using Service and Workforce Planning 2007 survey data²¹ and found to be 33.86 years; additional sensitivity analysis was completed for individuals who spend more or less time in the profession. Calculations using cost of living were based on the 2010 Australian Bureau of Statistics data on household expenditure, which were adjusted to the individual and increased with the consumer price index.²²

A break-even analysis was conducted to determine the hypothetical minimum requirement for year-1 earnings ($t = 1$),

at which the present value of total costs equals the present value of future earnings (ie, where NPV equals \$0). This calculation utilises expected wage growth with experience and inflation, as well as average career length. Values are calculated using the 'what-if analysis' function in Excel software^a. Investment in education for careers in medicine and nursing/midwifery were also chosen for comparison purposes. University fees and course structures were based on advertised values from an Australian university for a 5-year undergraduate bachelor's medical degree and a 3-year undergraduate nursing/midwifery bachelor's degree. Other direct costs were taken to be the same as physiotherapy education. Indirect costs were based on extrapolation from the direct observations of physiotherapy students and applied on a pro rata basis to varying course structures. Future earnings were based on the same Australian Bureau of Statistics source data as physiotherapy, and expected career length from the Australian Health Practitioner Regulation Agency survey data.^{18,23} Wage increases were set at the average of public and private growth. All other values and calculations were identical to physiotherapy.

Results

Net present value for domestic students

The results of NPV calculations for investments in education by domestic students are shown in Table 1. They represent the low-risk (5.575%), expected-risk (9.675%) and high-risk (12.75%) after-tax future cash flows. For an average of 33.86 years of work as a physiotherapist, the NPV results range from \$541,000 in the public sector to \$1,492,000 in the private sector (Table 1). All NPV measures include an average annual direct cost of attendance of \$8,527 per annum, and are dependent on years of experience (t), discount rate (r) and salary growth rate (g) for the public and private sectors. Importantly, the NPV results are based on an individual's experience and competency level, as future earnings reflect jumps to a new salary scale achieved with promotion at 5-year intervals.

Net present value for international students

For international students, the indirect opportunity cost of education (time cost) was taken to be identical to domestic students; however, the direct attendance cost is higher at \$30,354 per annum. The higher direct attendance cost takes into account the higher fees for international students compared to domestic students. For an average of 33.86 years of work, the NPV results range from \$464,000 in the public sector to \$1,400,000 in the private sector (Table 2).

Payback analysis

A payback analysis was conducted to determine the number of years it would take a physiotherapy student to recover the direct and indirect costs of their education investment offset by cost of living. The payback period for domestic students is between 3.77 years and 4.08 years, depending on the risk to future cash flows and whether they are working in the public or private sector

Table 1
Net present value of investment in physiotherapy education by domestic students who commence work in public or private sectors, for different years of experience (t) and discount rates (r).

| Years worked | Public sector (Salary growth rate $g=3.84\%$) | | | Private sector (Salary growth rate $g=3.96\%$) | | |
|--------------|--|---------------------------|-----------------------|---|---------------------------|-----------------------|
| | Low risk $r=5.575\%$ | Expected risk $r=9.675\%$ | High risk $r=12.75\%$ | Low risk $r=5.575\%$ | Expected risk $r=9.675\%$ | High risk $r=12.75\%$ |
| $t=10$ | \$398,880 | \$313,231 | \$264,343 | \$415,266 | \$326,524 | \$275,864 |
| $t=20$ | \$886,721 | \$586,160 | \$444,724 | \$919,842 | \$608,936 | \$462,578 |
| $t=30$ | \$1,296,862 | \$743,242 | \$523,585 | \$1,347,397 | \$772,722 | \$544,813 |
| $t=33.86$ | \$1,437,528 | \$784,233 | \$540,876 | \$1,492,371 | \$814,967 | \$562,093 |
| $t=40$ | \$1,643,725 | \$833,893 | \$558,073 | \$1,687,475 | \$862,000 | \$578,885 |
| $t=48$ | \$1,883,023 | \$878,219 | \$571,172 | \$1,904,707 | \$902,221 | \$590,768 |

Table 2

Net present value of investment in physiotherapy education by international students who commence work in public or private sectors, for different years of experience (t), and discount rates (r).

| Years worked | Public sector (Salary growth rate $g=3.84\%$) | | | Private sector (Salary growth rate $g=3.96\%$) | | |
|--------------|--|---------------------------|-----------------------|---|---------------------------|-----------------------|
| | Low risk $r=5.575\%$ | Expected risk $r=9.675\%$ | High risk $r=12.75\%$ | Low risk $r=5.575\%$ | Expected risk $r=9.675\%$ | High risk $r=12.75\%$ |
| $t=10$ | \$315,315 | \$234,125 | \$188,238 | \$331,702 | \$247,419 | \$199,758 |
| $t=20$ | \$803,156 | \$507,054 | \$368,619 | \$836,277 | \$529,831 | \$386,473 |
| $t=30$ | \$1,213,297 | \$664,136 | \$447,479 | \$1,263,832 | \$693,617 | \$468,708 |
| $t=33.86$ | \$1,353,963 | \$705,127 | \$464,771 | \$1,408,806 | \$735,862 | \$485,988 |
| $t=40$ | \$1,560,160 | \$754,787 | \$481,968 | \$1,603,910 | \$782,894 | \$502,780 |
| $t=48$ | \$1,799,458 | \$799,113 | \$495,067 | \$1,821,143 | \$823,116 | \$514,663 |

(Table 3). Given the higher direct cost of education for international students, the payback period is slightly longer: between 6.37 years and 7.91 years. Importantly, the payback period for both domestic and international students was estimated taking into account the individual's time preference and 5-year earning increases due to experience.

Break-even analysis

For domestic students, break-even wages range from \$3,280 to \$8,543, depending on the sector of employment and risk profile (Table 3). For international students, direct costs are higher, resulting in higher break-even values ranging from \$6,062 to \$16,150. Break-even values in the private sector are consistently higher than the public sector, indicating that there is less percentage growth in wages attributed to experience in the private sector. The starting wage needed to break even is higher for those who spend less time in the profession.

Net present value for public versus private sectors

At all discount rates and levels of experience, the NPV for the private sector was found to be higher than in the public sector. However, as shown in Figure 1, when comparing effective rates of pay per hour, the public sector is shown to be consistently higher for any age group over 24 years. That is: while salaries are higher in the private sector, the number of hours worked is also higher, ranging from 1.0 to 5.6 additional hours per week compared to public-sector therapists. The age groups 55 to 59 years and 65 to 69 years show the largest difference in hours worked per week, with an additional 4.2 and 5.6 private hours worked, respectively. Subsequently, the respective public hourly earnings were higher by approximately \$5.70 and \$9.70.

Comparison to medicine and nursing/midwifery

For medical professionals, and assuming an average career length of 42.01 years, NPV amounts range from approximately \$661,000 to \$2,146,000, based on risk profile (Table 4). The average career length in nursing/midwifery is 39.64 years, resulting in NPV amounts of approximately \$652,000 to \$1,445,000, based on risk profile (Table 4). Despite having an expected career length of almost 6 years more than physiotherapy, nursing/midwifery still

has a lower expected career NPV. With a matched comparison of years worked, up to $t=10$, public physiotherapy has the higher NPV. After 10 years, medical practitioners have the highest NPV values, followed by private physiotherapy, public physiotherapy, then nursing/midwifery (Figure 2).

Discussion

Whilst less tangible benefits of undertaking an investment in physiotherapy education are not considered, this study suggests that an investment in education as a physiotherapist makes good financial sense. The longer the time spent in the profession, and with subsequent increases in experience level, the greater the benefit. This is consistent with the fact that over 75% of physiotherapists indicated that they chose their profession in order to be financially secure.⁵ Assuming an expected discount rate of 9.675%, investment in education by domestic students who work for approximately 34 years yields a NPV of around \$784,000 for public-sector physiotherapists and \$815,000 for private-sector physiotherapists. Lower discount rates would only increase the NPVs of such an investment. Moreover, the small difference in NPVs for careers in the public and private sectors means very little financial advantage of one sector over the other. For international students, the NPVs for an investment and career as a physiotherapist are estimated to be \$705,000 in the public sector and \$736,000 in the private sector. This variation in NPVs for domestic and international student cohorts is driven by the difference in the present value of direct and indirect costs of education, which is around \$90,700 for domestic students and nearly double at around \$169,800 for international students.

Anecdotally, many physiotherapists believe that careers in the private sector yield higher returns than careers in the public sector, with the majority of students aspiring to work in private practice.²⁴ However, whilst NPV figures are consistently greater in the private sector than in the public sector, effective hourly earnings are higher in the public sector than in the private sector. This result is not unusual, given that private therapists work longer hours – anywhere between 1.0 and 5.6 hours per week more, depending on

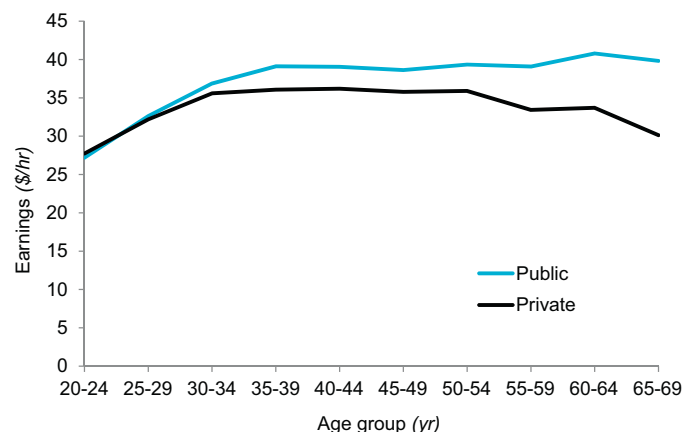


Figure 1. Earnings per hour in public and private sectors, by age group.

Table 3

Present value of costs with payback period and break-even wage after physiotherapy education for domestic and international students.

| | Low risk | Expected risk | High risk |
|--|-----------|---------------|-----------|
| Domestic student cost present value | \$98,527 | \$90,659 | \$85,462 |
| Public payback period, (yr) | 3.99 | 4.04 | 4.08 |
| Private payback period, (yr) | 3.77 | 3.80 | 3.82 |
| Public break-even wage | \$3,280 | \$5,108 | \$6,564 |
| Private break-even wage | \$5,053 | \$7,062 | \$8,543 |
| International student cost present value | \$182,092 | \$169,764 | \$161,568 |
| Public payback period, (yr) | 6.70 | 7.30 | 7.91 |
| Private payback period, (yr) | 6.37 | 6.91 | 7.39 |
| Public break-even wage | \$6,062 | \$9,565 | \$12,409 |
| Private break-even wage | \$9,338 | \$13,224 | \$16,150 |

Table 4

Costs, salary and average career duration for physiotherapy, medicine, and nursing/midwifery, with net present value data for different years of experience (t) with expected risk ($r=9.675\%$).

| | Physiotherapy public sector | Physiotherapy private sector | Medicine all sectors | Nursing/Midwifery all sectors |
|------------------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|
| Direct costs | \$30,906 | \$30,906 | \$47,529 | \$20,547 |
| Indirect costs | \$59,753 | \$59,753 | \$126,830 | \$51,862 |
| Salary (\$/hr), range | 27.19 to 40.79 | 27.73 to 36.18 | 27.53 to 45.53 | 26.50 to 32.51 |
| Career length (yr), average | 33.86 | 33.86 | 42.01 | 39.64 |
| Net present value, by years worked | | | | |
| $t=10$ | \$313,231 | \$326,524 | \$325,555 | \$300,027 |
| $t=20$ | \$586,160 | \$608,936 | \$676,123 | \$536,161 |
| $t=30$ | \$743,242 | \$772,722 | \$886,825 | \$670,345 |
| $t=40$ | \$833,893 | \$862,000 | \$1,008,078 | \$747,167 |
| $t=\text{expected}$ | \$784,233 ($t=33.86$) | \$814,967 ($t=33.86$) | \$1,025,512 ($t=42.01$) | \$745,146 ($t=39.64$) |

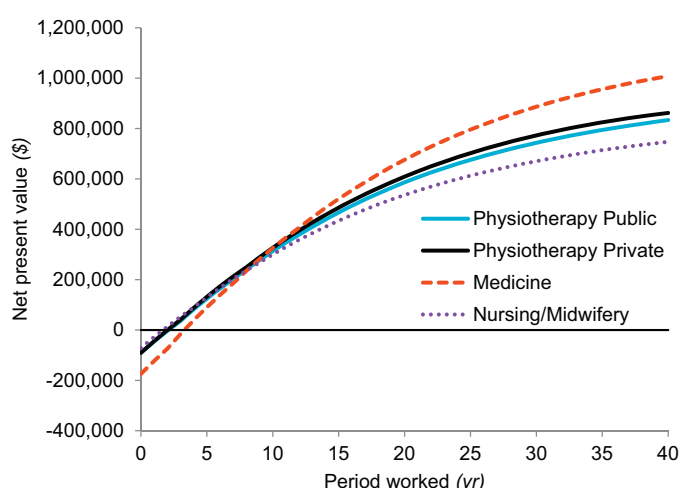


Figure 2. Net present value comparison of physiotherapy, medicine and nursing/midwifery over years worked.

the age cohort. Physiotherapists may consider whether a lifetime NPV difference of \$31,000 is worth working the extra hours, given that over 30% of physiotherapists indicated that they worked more hours than they would like.⁵ In the same cross-sectional study, over 50% of doctors agreed that they worked more hours than they would like. Career length should be considered with the higher

financial prospects of a career in medicine, lasting an average of 10 years more than physiotherapy, resulting in \$200,000 greater NPV. Various other models have been used to measure the NPV of medical education in the United States, with values ranging from US\$430,000 to US\$2,233,000.⁸ Differences can be attributed to different estimates of career length, different risk and growth models and different source data. Importantly, these studies are not comparable to Australian data, as university fee structure and wages are inherently different.

Taking an expected risk of future cash flows, this study reveals that the first year earnings required to breakeven with the investment in physiotherapy education would only need to be \$5,100 in the public sector and \$7,100 in the private sector (Table 4). Break-even estimates represent the theoretical limit to which wages could be decreased and still break even. Whilst it would be unrealistic to see wages decrease to such low break-even values, these values indicate that regardless of wage changes, physiotherapy is likely to remain a positive financial investment. Coupled with strong and positive NPVs, this makes physiotherapy education in Australia for both domestic and international students a financially attractive prospect.

An international comparison of country profiles in relation to the physiotherapy sector shows that Australian education is not excessively expensive in terms of direct costs (see Table 5). The direct cost of attendance in Australia reflects 53% of annual salaries, as compared to other countries: ranging from 21 to 152% in Singapore and India, respectively. In a deregulated market with

Table 5

Physiotherapy course duration and cost, absolute salary, as salary as a percentage of the cost of education, by country.

| Country | Years of study ^a | Cost of education ^a | Salary ^b | Cost % of salary |
|--------------------------|-----------------------------|--------------------------------|---------------------|------------------|
| United States of America | 3 year PG | \$87,831 | \$78,766 | 112% |
| Australia | 4 year UG | \$31,840 | \$60,280 | 53% |
| Canada | 2 year PG | \$15,924 | \$64,361 | 25% |
| Netherlands | 4 year UG | \$17,620 | \$51,976 | 34% |
| India | 4.5 year UG | \$5,256 | \$3,458 | 152% |
| Singapore | 3 year UG | \$6,972 | \$32,904 | 21% |
| United Kingdom | 3 year UG | \$51,810 | \$49,276 | 105% |

PG = postgraduate, UG = undergraduate.

^a Data based on randomly selected higher education programs.

^b All figures from www.payscale.com converted to AUD in December 2014.

Table 6

Sensitivity analysis with variable direct costs of net present value, payback period and break-even analysis using expected time (t), growth rate (g) and risk (r), by sector.

| Total direct cost | Public sector | | | Private sector | | |
|-------------------|---------------------------------|----------------|-----------------|---------------------------------|----------------|-----------------|
| | Net present value ($t=33.86$) | Payback period | Break-even wage | Net present value ($t=33.86$) | Payback period | Break-even wage |
| \$50,000 | \$765,138 | 4.76 | \$6,184 | \$795,873 | 4.49 | \$8,549 |
| \$75,000 | \$740,138 | 5.78 | \$7,592 | \$770,873 | 5.45 | \$10,497 |
| \$100,000 | \$715,138 | 6.86 | \$9,001 | \$745,873 | 6.47 | \$12,444 |
| \$125,000 | \$690,138 | 8.01 | \$10,409 | \$720,873 | 7.53 | \$14,391 |
| \$150,000 | \$665,138 | 9.02 | \$11,818 | \$695,873 | 8.54 | \$16,339 |

increased education fees, economic incentives in physiotherapy would see significant changes. Table 6 presents a sensitivity analysis of direct costs ranging from \$50,000 to \$150,000, revealing significantly lower NPVs assuming expected career length and risk profile. This is associated with longer payback periods ranging from 4.49 to 9.02 years, which in a workforce where 10% of physiotherapists under 25 years of age expect to work less than 5 years, may deter potential applicants.²¹

The results in this paper are based on real survey data relating to the indirect costs of education, the direct cost data of Australian physiotherapy degrees and the earnings data from the Australian Bureau of Statistics. The use of real survey data allows for a more accurate estimation of indirect costs and, in doing so, provides a comprehensive estimate of full opportunity costs of the education investment. Estimates of NPV are likely to be conservative due to the ceiling effects of assumptions around Australian Bureau of Statistics data relating to earnings data of wage levels over \$2000 per week. The ceiling effect is most pronounced in medicine, followed by physiotherapy then nursing, as the percentage of the workforce falling into the ceiling category is 70%, 12% and 5%, respectively. Additionally, combined with the ceiling effect relating to the upper limit of Australian Bureau of Statistics data of over 49 hours per week, estimations of earnings per hour are also likely to be conservative. Finally, to improve the accuracy of NPV, calculations the majority of cost data used was modelled from real data. However, no data were available on the cost of ongoing professional development, and it was therefore taken to be \$1,000 per year. Typically, however, there is a wide range of options for development, including obtaining higher university degrees and attending workshops or online seminars. As a result, costs are likely to vary from year to year and from individual to individual.

This analysis did not consider the effects of non-linear or alternative career pathways such as mixed public/private career profiles, non-clinical roles and part-time work. It is worth considering the impact of maternity leave and family formation on the financial viability of physiotherapy, given that Health Workforce Australia notes hours worked per week is on average approximately 10 hours less for females – a difference most pronounced in the age bracket 35 to 44 years.²³ It is hypothesised that many females may choose to return to the workforce on a part-time basis during family formation, which is reflected in that 87% of part-time physiotherapists are female. This is disproportionate to the general workforce, which is 69% female.¹⁸ It is not possible, nor was it the intention, for this study to determine the financial viability of all career pathways. However, given that the payback period for domestic students is approximately 4 years, it is likely that many forms of part-time work or career structures would result in a positive investment.

There are many reasons why individuals choose to join a profession and many factors may influence the decision to stay in or leave that profession. However, the purpose of this study was to focus on the financial incentives of physiotherapy and to inform decision-making. From a purely economic perspective, an investment in medical education is superior to physiotherapy when working for longer than 10 years. Nonetheless, it is acknowledged that there are many non-financial factors such as job security, intellectual stimulation, personal preference, and contribution to improving the human condition. Therefore, an interest in studying physiotherapy does not necessarily equate to an interest in similar health-related fields. Studies have been conducted on the motivating factors for physiotherapy in other countries, as well as for other professions,^{11,25,26} but none for physiotherapy in Australia, which presents options for future research.

The NPV approach has provided a new perspective on the return on investment for undertaking physiotherapy education. An extension of this approach could be to contrast the NPV with career satisfaction data, to give unique insights into the financial and non-financial incentives to career choices within the profession. Such

information may allow for a better understanding of why physiotherapists choose particular specialties, settings, locations, or career longevity.

What is already known on this topic: The number of students investing in tertiary education in physiotherapy is increasing. Most students aspire to work in private practice. Many physiotherapists believe that their remuneration is too low.

What this study adds: An investment in education as a physiotherapist makes good sense financially, with a brief pay-back period. The small difference in net present values for careers in the public and private sectors means little financial advantage of working in one sector over the other.

Footnotes: ^aMicrosoft, Redmond, USA.

Ethics approval: Ethics approval for the attainment of student financial data was obtained through the Monash University Human Research Ethics Committee, approval number CF14/307 – 2014000115.

Competing interests: None.

Source of support: None.

Acknowledgements: None.

Provenance: Not invited. Peer-reviewed.

Correspondence: Stephen Maloney, Department of Physiotherapy, Monash University, Frankston, Australia. Email: stephen.maloney@monash.edu.au

References

- Department of Education. *Selected Higher Education Statistics - 2012 Student Data*. <http://www.education.gov.au/selected-higher-education-statistics-2012-student-data> [accessed 1/11/2014].
- McMeeken J, Grant R, Webb G, Krause K-L, Garnett R. Australian physiotherapy student intake is increasing and attrition remains lower than the university average: a demographic study. *Aust J Physiother*. 2008;54:65–71.
- Australian Physiotherapy Association. 2012–13 Pre-budget Submission. Melbourne, Australia; Australian Physiotherapy Association; 2012.
- Schofield DJ, Fletcher SL. The physiotherapy workforce is ageing, becoming more masculinised, and is working longer hours: a demographic study. *Aust J Physiother*. 2007;53:121–126.
- Szuster F, Carson E. *Career study of South Australian medical, dental and physiotherapy graduates*. Adelaide, Australia: South Australian Department of Health; 2007.
- Abelson P. *Public Economics - Principles and practices*. Sydney, Australia: Applied Economics; 2003.
- Doroghazi R, Alpert JS. A medical education as an investment: financial food for thought. *Am J Med*. 2014;127:7–11.
- Kahn MJ, Nelling EF. Estimating the value of medical education: a net present value approach. *Teach Learn Med*. 2010;22:205–208.
- Australian Health Practitioner Regulation Agency. Approved Programs of Study – Physiotherapy, 2013. <http://www.ahpra.gov.au/Education/Approved-Programs-of-Study.aspx?ref=Physiotherapist> [accessed 1/11/2014].
- Australian Physiotherapy Association. APA National Groups. www.physiotherapy.asn.au/APAWCM/The_APA/National_Groups/APAWCM/The_APA/National_Groups/National_Groups.aspx?hkey=a0e8ec8b-8b21-4432-9ea8-14ecc722da35 [accessed 1/12/2014].
- Öhman A, Stenlund H, Dahlgren L. Career choice, professional preferences and gender? The case of Swedish physiotherapy students. *Adv Physiother*. 2001;3:94–107.
- Monash University. Bachelor of Physiotherapy (Honours) for 2015. <http://www.monash.edu.au/study/coursefinder/course/M3002/> [accessed 1/2/2015].
- Swedish Higher Education Authority. Funding. <http://english.uka.se/highereducation/funding.4.4149f55713bbd917563800011054.html#h-StudentfinanceforstudentsstudyinginSweden> [accessed 1/2/2015].
- Dow C. Reform of the higher education demand driven system (revised). Budget review 2014–2015: Parliament of Australia.
- McMeeken J. Physiotherapy education – what are the costs? *Aust J Physiother*. 2008;54:85–86.
- Office of Best Practice Regulation. *Guidance Note - Cost Benefit Analysis*. Canberra, Australia: Office of Best Practice Regulation; 2014.
- National Centre for Social and Economic Modelling. *NATSEM HELP repayment Modelling Methodology*. Canberra, Australia: National Centre for Social and Economic Modelling; 2014.
- Australian Bureau of Statistics. Census of Population and Housing, cat. no. 2940.0. Canberra, Australia: ABS; 2011.
- Australian Taxation Office. Individual income tax rates. <https://www.ato.gov.au/individuals/income-and-deductions/how-much-income-tax-you-pay/individual-income-tax-rates/#> [accessed 12/11/2014].
- Australian Taxation Office. Super. <https://www.ato.gov.au/Individuals/Super/Compulsory-employer-contributions/> [accessed 12/11/2014].

21. Service and Workforce Planning. Physiotherapy Labour Force - Victoria 2006. Melbourne, Australia: Victorian Department of Human Services; 2007
22. Australian Bureau of Statistics. Household Expenditure Survey, Australia: Summary of Results 2009-10: cat. no. 6530.0. Canberra, Australia: ABS; 2011.
23. Health Workforce Australia. National Health Workforce Dataset - Australian Health Practitioner Regulation Agency (AHPRA). Adelaide, Australia: Health Workforce Australia; 2013.
24. Struber JC. Physiotherapy in Australia - Where to now? *Internet J Allied Health Sci Pract.* 2003;1:2.
25. Eley R, Eley D, Rogers-Clark C. Reasons for entering and leaving nursing: an Australian regional study. *Aust J Adv Nurs.* 2010;28:6.
26. McManus I, Livingston G, Katona C. The attractions of medicine: the generic motivations of medical school applicants in relation to demography, personality and achievement. *BMC Med Ed.* 2006;6:11.