

# Summary Report

## Value of Accredited Exercise Physiologists in Australia

Exercise & Sports Science  
Australia

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# Overview

The value of exercise in the prevention and management of a large range of chronic diseases is well evidenced in the literature. Accredited exercise physiologists are university qualified allied health professionals specialising in the delivery of exercise for the prevention and management of chronic diseases and injuries, with interventions including lifestyle modification and a strong focus on achieving behavioural change and restoring optimal physical function, health or wellness. Stanton (2013) observes that “physical activity and exercise [delivered by an accredited exercise physiologist] assist[s] in the management of a plethora of chronic health conditions including obesity, hypertension and diabetes”.

**Accredited exercise physiologist interventions are a largely underutilised resource in the Australian health setting.** Almost 50% of Australians have some form of chronic disease (Australian Institute of Health and Welfare, 2015), and as many as 13 million Australians are at risk of chronic disease (Cheema et al, 2014), largely attributed to 63.4% of the population being overweight or obese (Australian Bureau of Statistics, 2012). However, it has been estimated that less than 1% of people at risk of chronic disease due to overweight and obesity are referred to an accredited exercise physiologist (Cheema et al, 2014). Similarly, in 2012 the Australian Health Survey showed that over 747,000 Australians had known type 2 diabetes (Australian Bureau of Statistics, 2012), and these individuals are entitled to one Medicare funded assessment service per year. However, only 5,536 such services were conducted in 2012, indicating that less than 0.8% of eligible patients were referred for and received this service (Department of Human Services, 2015).

Exercise & Sports Science Australia (ESSA) is the peak body representing accredited exercise physiologists. **ESSA commissioned Deloitte Access Economics to identify the benefits of employing accredited exercise physiologists in chronic disease management, and in particular, identify economic benefits relating to avoided health system costs, avoided productivity costs and years of life saved attributed to interventions by accredited exercise physiologists.** This document is a summary of the Deloitte Access Economics report “Value of Accredited Exercise Physiologists in Australia”.

Deloitte Access Economics identified that exercise interventions delivered by accredited exercise physiologists are estimated to be efficacious and highly cost effective in the Australian health care setting<sup>1</sup>.

Accredited exercise physiologist interventions provide a high return on investment in treating people with chronic conditions, notably pre-diabetes and type 2 diabetes, mental illness (including physical comorbidities), and cardiovascular disease.

A summary of the benefits and costs for each condition analysed, due to interventions by accredited exercise physiologists, is outlined in Table i.

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<sup>1</sup> Based on a review of academic literature, Deloitte Access Economics’ analysis found that efficacy results translate from clinical settings to community interventions with approximately 50% effectiveness. This is largely dependent on intervention design, and may be a conservative estimate of economic impacts of accredited exercise physiologist interventions as a result.

**Table i: Estimated benefits and costs of accredited exercise physiologist exercise interventions per person**

Condition	Benefits (\$)				Costs (\$) (E)	BCR
	Health system (A)	Productivity & other financial (B)	BoD (C)	Total wellbeing (D = A + B + C)		
Pre-diabetes	1,977	1,520	2,617	6,115	580	6.0 <sup>^</sup>
Type 2 diabetes	5,107	NE	2,860	7,967	580	≥ 8.8 <sup>^</sup>
Mental health (depression)	330	1,909	NE	2,239	824	2.7 <sup>^</sup>
Chronic disease (cardiovascular)	NE	NE	11,847	11,847	1,903	6.2 <sup>#</sup>

Note: BoD is 'burden of disease', NE is 'not estimated due to lack of available data', BCR is 'benefit-cost ratio' ^ BCRs for pre-diabetes, type 2 diabetes and mental health (depression) are reported as the ratio of financial benefits (health system and lost productivity savings) to costs # The BCR for chronic disease is relative to the burden of disease. BCRs which contain NE elements are reported on a "greater than or equal to" basis, as it is assumed that the NE components would add to the benefits.

Source: Deloitte Access Economics calculations.

## Diabetes

There is clear evidence to demonstrate that lifestyle interventions, as delivered by accredited exercise physiologists, are effective for the prevention and management of type 2 diabetes. Benefits accrue across improved insulin sensitivity and glucose management and reductions in weight, blood pressure, total cholesterol, triglycerides and heart disease risk.

Evidence also suggests that services provided by accredited exercise physiologists are likely more effective than non-university qualified professionals or unsupervised exercise alone, partly attributed to accredited exercise physiologists' ability to account for the potential risks and likelihood of the presence of comorbidities in this population (Hordern et al 2012). **Specifically, exercise interventions delivered by accredited exercise physiologists are estimated to reduce the incidence of type 2 diabetes in high risk populations by 31%, on average.** Importantly, these benefits are sustained for a number of years after the intervention has finished.

The use of exercise to manage and prevent type 2 diabetes may be underutilised (O'Hagan et al, 2013). **It is considered that there is no longer an evidence gap, rather there is an implementation gap, with services in Australia slow to implement efficacious interventions for people with pre-diabetes and type 2 diabetes.**

Evidence suggests that exercise interventions, as delivered by accredited exercise physiologists, are efficacious and **highly cost effective to both prevent and manage type 2 diabetes**, resulting in substantial **reductions in health system costs and improved quality of life.**

## Diabetes – health system savings

Expenditure for diabetes exceeded \$1.5 billion in 2008-9 (AIHW, 2013). However, this does not include the large burden on the health system imposed by diabetes related complications. The cost savings due to a reduction in **complications of diabetes** are estimated to be **\$477 per person annually**, attributed to a reduction in microvascular and macrovascular endpoints of 18% and 8% respectively. Complications of diabetes are broadly grouped into microvascular (retinopathy, nephropathy, neuropathy) and macrovascular (coronary heart disease, myocardial infarction, stroke).

For people with **type 2 diabetes** receiving an exercise intervention, as delivered by an accredited exercise physiologist, the expected **annual saving in health system expenditure is \$5,107 per person annually**<sup>2</sup>.

For people with **pre-diabetes** receiving an exercise intervention, as delivered by an accredited exercise physiologist, the **expected annual saving in health system expenditure is \$1,977 per person annually**.

## Diabetes – productivity cost savings

Productivity losses are the cost of production lost when people are unable to work because of a health condition or illness. They may work less than they otherwise would (either being employed less, being absent more often or being less productive while at work) or may die prematurely. The amount of productivity lost due to Type 2 diabetes is equivalent to 13.2 days per person with diabetes per year.

Avoided **productivity impacts** of type 2 diabetes for people with pre-diabetes are estimated to be **\$1,520 per person annually** and for people with type 2 diabetes this may be as high as **\$760 per person annually**.

## Diabetes – quality of life savings

The annual per person **lifetime burden of disease savings** resulting from Australians receiving exercise interventions, as delivered by an accredited exercise physiologist, is estimated to be **\$2,860 and \$2,617** for a person with type 2 diabetes and pre-diabetes, respectively<sup>3</sup>.

Combining the direct costs with the burden of disease avoided annually, the **total annual wellbeing gains** due to accredited exercise physiologist interventions in Australia for people with pre-diabetes and type 2 diabetes are estimated to be **\$6,115 and \$7,967 per person**, respectively.

## Costs of accredited exercise physiologist interventions

Accredited exercise physiologist interventions are very cost-effective. Literature suggests that group-based interventions are more cost effective than individual-based interventions due to lower costs (Li et al, 2015).

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<sup>2</sup> The annual benefits calculated in the report have been calculated for 2015. An intervention delivered by an accredited exercise physiologist in future years will deliver additional benefits.

<sup>3</sup> Burden of disease savings that occur in future years are discounted at 7% per annum to provide lifetime estimates.

The benefit-cost ratio (BCR)<sup>4</sup> with reference to direct health care expenditure and the average cost of exercise interventions, as delivered by accredited exercise physiologists, per person with pre-diabetes is 6.0 to 1. When the burden of disease is accounted for, the indicated BCR becomes 10.5 to 1. For people with type 2 diabetes, the BCRs are 8.8 to 1 and 13.7 to 1, respectively.

## Mental health

Mental health disorders are the leading cause of disability among people of working age in the developed world (World Health Organization, 2015). The Australian Health Survey shows that almost one in ten Australians suffer from long term depression (9.7%), and 3.8% live with anxiety (Australian Bureau of Statistics, 2012). Bartels (2015) identified that adults with serious mental illness represent the single greatest and least recognised health disparity in the nation, reflected in a 13- to 30-year reduced life expectancy. **As a result, health care costs are two to three times greater in adults with serious mental illness compared with general patient populations.**

Clinical depression is the most common mental condition treated by university qualified exercise physiologists (Stanton, 2013). There are a large number of meta-analyses demonstrating that exercise is highly effective and has strong anti-depressive and anxiolytic benefits for both the general population and those living with mental illness (Jayakody et al, 2014; Cooney et al 2013). Individuals with a mental disorder are at higher risk of chronic physical conditions such as heart disease, diabetes, arthritis and asthma (Teesson et al 2011; De Hert et al 2009). Furthermore, some treatments for these patients may contribute to modifiable risk factors, with up to 86% of patients treated with antipsychotic medication experiencing a significant gain in weight (Álvarez-Jiménez et al, 2008).

**Exercise appears to be as efficacious as cognitive behavioural therapy or anti-depressant medication in combatting depression, and is associated with a wide range of physical benefits including stress and weight reduction, decreased blood pressure, reduced risk of cardiovascular and metabolic diseases, and improvements in cognitive functioning** (Josefsson et al, 2014).

In addition, no negative side effects attributed to exercise interventions have thus far been reported, as opposed to antidepressant medication (Josefsson et al, 2014). However, it is important to note that exercise is not a panacea for depression, but in conjunction with psychological and pharmacological interventions, it can be very effective.

### Cost effectiveness of accredited exercise physiologist interventions

A high quality meta-analysis by Rethorst et al (2009) identified the average number of sessions for interventions that successfully treated depression was 34. It is plausible that a much smaller number of individually tailored one on one sessions with an accredited exercise physiologist could achieve the same results, in terms of behavioural modification, as a large number of one size fits all group exercises.

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<sup>4</sup> The BCR indicates the overall value for money of an intervention. A BCR greater than 1.0 indicates that every dollar invested generates more than one dollar of benefits. A BCR less than 1.0 shows that the intervention delivers less than one dollar of benefits for every dollar invested.

Deloitte Access Economics (2013) estimated the **financial costs per case of depression were \$9,622 per year.**

Translating this to 2015 dollars indicates that each case of depression averted through exercise, as delivered by accredited exercise physiologists, saves society **\$10,062 per year.**

McGlinchey et al (2002) found that for people with depression classified as 'recovered', 77% were still classified as recovered at two year follow up. Assuming a linear relapse rate, this implies that **89% would still be in recovery at one year follow up.** This may be further optimised by the specialised behavioural modification skills of the accredited exercise physiologist workforce.

Adjusting the cost of the intervention for patients assumed to still be in recovery at one year follow up, and allowing for translational effects, the **total annual savings** due to exercise interventions, as delivered by accredited exercise physiologists, are estimated to be **\$2,239 per person with a mental health condition.**

Quality Adjusted Life Years (QALYs)<sup>5</sup> are a common outcome measure used in economic evaluations. For QALYs, a disability weight of one represents full health, while zero represents death. A case of depression avoided or managed by exercise, as delivered by accredited exercise physiologists, will avert 0.127 QALYs over the course of the following year (Begg et al, 2007). Indicatively, if the exercise intervention costs \$824 and saves 0.127 QALYs, then **the implied cost is \$6,485 per QALY gained, which is highly cost effective.**

The incremental benefit to cost ratio of exercise interventions delivered by accredited exercise physiologists for people with depression is 2.7.

## Community

### Accredited exercise physiologist interventions for cardiovascular disease

Patients with chronic heart failure (CHF) experience marked reductions in their exercise capacity which has detrimental effects on their activities of daily living, health-related quality of life and ultimately their hospital admission rate and mortality. Further, the efficacy of exercise interventions for cardiovascular disease (CVD) is well established by a large number of meta-analyses. For example, Georgiou et al (2001) reported that for heart failure patients, **exercise interventions were more cost effective compared to usual care by \$1,773 per life year saved.**

While the focus of this report is on exercise for management of chronic disease, rather than prevention, epidemiological data show that low exercise capacity is a strong predictor of all-cause

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<sup>5</sup> Disability adjusted life years (DALYs) combine mortality and morbidity into a single numerical unit, whereby QALYs do not assess mortality. Interventions that cost less to produce a gain in QALYs (health gain) or avert a DALY (avert health loss) are deemed highly cost effective.

mortality, a stronger association than that for smoking, hypertension, hyperlipidaemia, and diabetes (Coombes et al, 2013).

In the Piepoli et al (2004) meta-analysis of exercise in CHF, at two year follow up 22% of the original exercise participants had passed away compared with 26% of the control participants, **representing a significant reduction in mortality and a relative risk of 0.86**. If the mortality rates for the control group had applied to the intervention group, there would have been 14 more deaths by the two year follow up. By inference, 7 deaths, which would otherwise have occurred in the intervention group in the first year, were averted by exercise. Applying these results to an Australian cohort, **17 years of future life<sup>6</sup> are saved per death avoided in 2015**.

Using these results, the **total lifetime burden of disease savings** resulting from exercise interventions in people with CHF, as delivered by accredited exercise physiologists, are estimated to be **\$11,847 per person annually**. As the costs associated with accredited exercise physiologists delivering this intervention are substantially lower at \$1,903 per person, the estimated **BCR of accredited exercise physiologist interventions in people with CHF is 6.2 in community settings**.

### Accredited exercise physiologist interventions for other chronic diseases

Clinical exercise interventions were also found to be **cost effective for chronic back pain, osteoarthritis and rheumatic disorders**, as outlined in Table ii.

**Table ii: Benefits of exercise interventions compared to usual care for chronic conditions**

Condition	\$/QALY	VSLY	BCR
Chronic back pain	12,830	\$187,495	14.6
Osteoarthritis	46,595	\$187,495	4.0
Rheumatologic disorders	44,944	\$187,495	4.2

Note: QALY is 'quality adjusted life year', BCR is 'benefit-cost ratio', VSLY is 'value of a statistical life year'. The VSLY is typically used in cost benefit analysis to provide a monetary value of a healthy life year. Interventions which cost less than the VSLY to produce produce a gain in QALYS, or avert DALYs, are considered cost effective.

Source: Based on literature and Deloitte Access Economics calculations.

## Summary

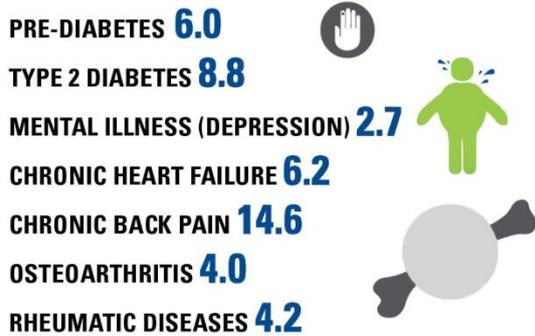
Overall, exercise interventions delivered by accredited exercise physiologists are estimated to be efficacious and highly cost effective in the Australian health care setting.

Deloitte Access Economics has identified a high return on investment for accredited exercise physiology services in treating people with chronic conditions, notably pre-diabetes and diabetes, mental illness and congestive heart failure.

<sup>6</sup> The calculations assumed an average age of people with CHF of 60 years, so at the one year follow up these people would be 61 years old. The average life expectancy in the absence of CHF is 78 years, and thus (78-61) = 17.

The continued uptake and availability of Medicare funded services, and other schemes such as increased funding through private health insurers and referral schemes, would be valuable in overcoming barriers to accessing individualised, evidence based accredited exercise physiologist services for people with chronic conditions.

**BENEFIT TO COST RATIO OF AEP INTERVENTIONS**



**COMBINING THE DIRECT COSTS**

WITH THE BURDEN OF DISEASE AVOIDED ANNUALLY, THE TOTAL ANNUAL WELLBEING GAINS DUE TO AN AEP INTERVENTION IS:



**\$7,967**

per person annually for type 2 diabetes

**\$6,115**

per person annually for pre-diabetes

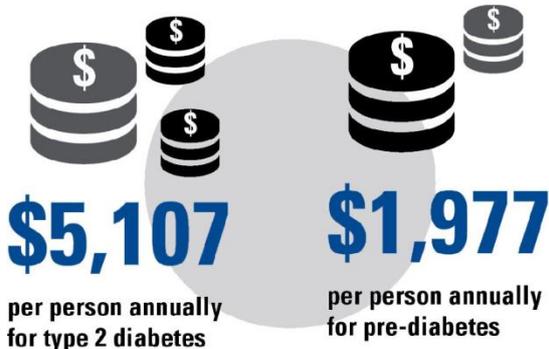


**EXERCISE INTERVENTIONS FOR PEOPLE WITH A MENTAL HEALTH CONDITION, AS DELIVERED BY AEPs, RESULT IN BENEFITS OF**

**\$2,239 PER PERSON.**



**ANNUAL SAVING IN HEALTH SYSTEM EXPENDITURE FROM AN AEP DELIVERED EXERCISE INTERVENTION:**



**\$477**

per person per year



is the cost savings due to a reduction in complications of diabetes

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## Contact us

Deloitte Access Economics  
ACN: 149 633 116

Level 1  
9 Sydney Avenue  
Barton ACT 2600  
PO Box 6334  
Kingston ACT 2604 Australia

Tel: +61 2 6175 2000  
Fax: +61 2 6175 2001

[www.deloitteaccesseconomics.com.au](http://www.deloitteaccesseconomics.com.au)

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