Table 1: Physical activities and splits between active recreation and sport

			Number of exercise sessions		Total estimated session time per year	
Major activities	**Population 15 and over ('000)**	**Proportion of adult population doing activity at least once**	**Number of sessions—whole population ('000)**	**Proportion of sessions assigned as active recreation**	**Active recreation ('000 hours)**	**Sport ('000 hours)**
Total	4,838	81.1%	836,895	87%	612,236	161,524
Walking	1,979	41%	367,568	100%	285,383	0
Gymnasium workouts	714	15%	83,108	100%	67,188	0
Swimming	600	12%	32,443	82%	15,088	4,927
Cycling	515	11%	45,121	85%	27,592	9,551
Golf	350	7%	16,420	75%	38,236	12,745
Aerobics/exercising/other	329	7%	38,968	100%	21,862	0
Tennis (outdoor)	289	6%	13,055	70%	15,082	6,464
Walking—bush	247	5%	11,909	100%	14,777	0
Running (for example, marathon)	228	5%	24,434	77%	12,149	3,708
Jogging	203	4%	20,272	100%	10,545	0
Yoga	177	4%	12,333	100%	10,195	0
Basketball (indoor and outdoor)	165	3%	11,007	19%	1,738	7,170
Football—Australian rules	163	3%	11,514	12%	879	11,444
Cricket (outdoor)	140	3%	7,285	14%	1,196	11,226
Weight training for fitness	120	2%	14,159	100%	9,593	0
Lawn bowls	116	2%	10,404	2%	481	28,355
Football—soccer (outdoor)	113	2%	6,926	27%	2,652	6,216
Dancing—other	103	2%	7,388	100%	13,762	0
Exercise bike	71	1%	9,964	100%	3,907	0
Treadmill	65	1%	9,435	100%	4,623	0
All other	677	14%	83,180	47%	55,308	59,718

Headline estimates

We estimate that Victorians and visitors aged 15+ did around 612 million hours of active recreation in Victoria in 2017, or around 156 hours on average by each physically active adult. At least $8 billion is spent each year on active recreation and equipment, including $3.8 billion on active recreation tourism.

Making all Victorian adults physically active would deliver lifetime healthcare system and production benefits to Victoria potentially worth more than $3.35 billion.

Headline estimates from our active recreation economic evaluation are summarised in Table 5. Our estimates underscore the significance of the active recreation sector to Victoria's economy and the wellbeing of Victorians. We unpack the headline estimates in more detail in the following sections.

Because some of these estimates overlap, the values are not additive. Also, because the headline estimates are based on constructed data for activities where actual data is not available, the values in Table 5 are order of magnitude estimates based on the best available data.

Our analysis shows that active recreation is the physical activity most preferred by Victorians, measured by overall participation, participation hours and metabolic expenditure. Victoria's 4.8 million residents aged 15+ (adults) enjoy around 612 million hours of active recreation activities each year, compared to 162 million hours in organised sport (Table 1 and

Table 6). The total metabolic equivalent of task (MET)[3] from this active recreation is in the order of 3,071 million MET hours, compared to 1,098 million MET hours for sport.

We estimate that total expenditure related to active recreation currently generates in the order of $8.3 billion in sales within Victoria each year. Around $3.8 billion of that expenditure comes from active recreation tourism. Those sales generate substantial wages, profits and rents for Victoria of around $5.2 billion (as a GVA direct contribution) and another $2.9 billion in supply-chain activity to generate active recreation goods and services (an indirect GVA contribution).

Approximately 51,000 FTE positions are supported in Victoria as a result of active recreation activity expenditure. This estimate includes full-time and part-time positions and does not distinguish between them or identify the number of hours worked in each type of position.

[3] Metabolic equivalent of task (MET) is a physiological measure expressing the energy cost (or calories) of physical activities. One MET is equivalent to the energy expended by a person while seated at rest. While a person is exercising, the MET is the energy expended compared to that expended at rest, so MET values indicate the intensity of the activity. A person engaging in an activity with a MET value of 5 is expending five times the energy (the number of calories) that they would expend at rest.

In addition to its direct and indirect economic contribution, active recreation in Victoria is estimated to generate significant health and wellbeing values for Victorians. We estimate that the recreation benefits of active recreation were worth $3.8 billion in Victoria in 2017. Eliminating insufficient physical activity from the 2016 Victorian adult population would deliver healthcare system benefits worth $245 million and workforce production benefits worth $3.1 billion to Victoria over the population's lifetime.

Table 5: Headline estimates of the economic value of Victorian active recreation

Participation (incidences of active recreation activity) by Victorians aged 15+ each year	725 million
Hours of physical activity by Victorians aged 15+ each year	612 million
Metabolic equivalent of task (MET) hours	3,071 million
Active recreation annual expenditures—all sources ($ 2014)	$8.3 billion
– Tourism-related expenditure	$3.8 billion
– All other expenditure	$4.5 billion
Gross value added in 2017	**$8.1 billion**
– Direct	$5.2 billion
– Indirect	$2.9 billion
FTE positions in 2017	**51,000**
– Direct	39,400
– Indirect	11,600
Recreation value (consumer surplus per year, $ 2017)	$3.8 billion
Lifetime impact of becoming physically active in Victorian 15+ population	
Avoided healthcare costs (one-off, $ 2016)	$245 million
Workforce labour production benefits (one-off, human capital approach, $ 2016)	$3.1 billion
Home-based labour production benefits (one-off)	$125 million

Active recreation participation

Our estimates show that active recreation is Victorians' most preferred type of physical activity, measured as overall participation, participation hours and total metabolic expenditure.

Our estimates of active recreation participation, participation hours and metabolic expenditure are summarised in

Table 6, based on ERASS data for Victoria from 2007 to 2010, which is the latest available data for that survey. The key assumption made here is that those ERASS activities that respondents classified as being unorganised are proxies for active recreation, as opposed to organised competition sport.

We found that active recreation activities are Victorians' most preferred type of physical activity, based on several key measures:

- We estimate that there are around 837 million physical activity (sport and active recreation) sessions each year in Victoria. Around 87% of those activities are classified as active recreation activities.
- We estimate that Victorian adults do around 773 million hours of physical activity each year. Around 79% of those hours are active recreation hours.
- We estimate that the different levels of intensity of physical activity result in metabolic expenditure of around 4.2 billion MET hours each year by the Victorian adult population. Around 3.1 billion of total MET expenditure occurs through active recreation.

The most popular physical activity in Victoria is walking. Around 41% of the adult Victorian population walks at least once for physical activity each year. Walking for active recreation accounts for around 37% of total physical activity hours each year and for 24% of total estimated MET hours.

We know that rates of physical activity and sedentary behaviours are not evenly distributed across the Australian and Victorian population. Higher socioeconomic status, living in metropolitan areas, being non-Indigenous, living in neighbourhoods with high walkability and lower crime are all correlated to higher levels of physical activity (VicHealth, 2016). We also know that the physical activity of Victorians and Australians generally declines with age, and that females of all ages generally have lower physical activity rates than males (VicHealth, 2016).

Tables 7 and Table 8 show that many of these social, regional, economic and demographic factors are correlates with active recreation participation, frequency and metabolic expenditure.

Table 6: How Victorians exercise each year

						Active recreation			
	Proportion of adult Victorians who exercised at least once	Total activity sessions (millions)	Total activity hours (millions)	Total METs (millions)	Proportion of all activity sessions	Proportion of activity sessions classified as active recreation	Estimated number of active recreation exercise sessions (millions)	Estimated number of active recreation exercise hours (millions)	Estimated active recreation METs (millions)
Population (15+ years) 4.8 million									
Did not exercise in the past year	19%								
Total	81%	837	774	4,169		87%	726	612	3,071
Walking—other	41%	368	285	999	44%	100%	368	285	999
Gymnasium workouts	15%	83	67	370	10%	100%	83	67	370
Swimming	12%	32	20	166	4%	82%	27	15	125
Cycling	11%	45	37	322	5%	85%	39	28	207
Golf	7%	16	51	245	2%	75%	12	38	184
Aerobics/exercising/other	7%	39	22	120	5%	100%	39	22	120
Tennis (outdoor)	6%	13	22	157	2%	70%	9	15	110
Walking—bush	5%	12	15	78	1%	100%	12	15	78
Running (for example, marathon)	5%	24	16	209	3%	77%	19	12	156
Jogging	4%	20	11	74	2%	100%	20	11	74
Yoga	4%	12	10	51	1%	100%	12	10	51
Basketball (indoor and outdoor)	3%	11	9	69	1%	19%	2	2	11
Football—Australian rules	3%	12	12	99	1%	12%	1	1	7
Cricket (outdoor), vigoro	3%	7	12	60	1%	14%	1	1	6
Weight training for fitness—other	2%	14	10	48	2%	100%	14	10	48
Lawn bowls	2%	10	29	95	1%	2%	0	0	2
Football—soccer (outdoor)	2%	7	9	81	1%	27%	2	3	19
Dancing—other	2%	7	14	107	1%	100%	7	14	107
Exercise bike	1%	10	4	27	1%	100%	10	4	27
Treadmill	1%	9	5	42	1%	100%	9	5	42
All rest	14%	83	115	751	10%	27	39	55	329

Table 7: How physical and active recreation participation changes by age and gender (per year, whole of Victoria)

Age	Population 15 and over ('000)	Proportion of Victorians who participated in physical activity at least once	Proportion of Victorians who are physically inactive	Total physical activity sessions per year (millions)	Total physical activity hours per year (millions)	Total METs per year (millions)	Average physical activity hours per capita	Average physical activity MET hours per capita	Proportion of activity sessions classified as active recreation	Estimated number of active recreation exercise hours (millions)	Estimated active recreation MET hours (millions)	Average active recreation hours per capita	Average active recreation METs per capita
Total	4838.2	81%	**50%**	837	774	4,169	160	862	87%	662	2,654	127	577
Females	2,628	81%	51%	484	386	2,085	147	794	87%	421	1,520	118	118
15 to 17	105	91%	51%	22	19	143	182	1,356	54%	12	58	91	91
18 to 19	78	88%	51%	15	13	91	173	1,179	69%	10	57	127	127
20 to 24	228	84%	51%	40	31	189	134	830	88%	35	153	116	116
25 to 29	250	84%	51%	43	31	179	123	717	88%	38	142	106	106
30 to 34	249	83%	51%	47	37	205	150	824	88%	41	163	131	131
35 to 39	218	84%	51%	39	31	167	143	763	90%	35	132	124	124
40 to 44	208	84%	51%	37	25	141	121	680	90%	33	109	103	103
45 to 49	217	83%	51%	41	32	167	146	771	92%	38	123	121	121
50 to 54	198	82%	51%	39	30	155	153	782	91%	35	121	130	130
55 to 59	191	81%	51%	39	32	158	169	825	92%	36	117	136	136
60 to 64	171	79%	51%	32	27	132	159	775	90%	29	97	128	128
65 to 69	152	80%	51%	30	25	120	166	788	87%	26	81	123	123
70 to 98	362	69%	51%	60	52	237	143	654	86%	52	166	107	107
Males	2,529	83%	49%	423	439	2,599	174	1,028	76%	320	1,495	108	591
15 to 17	110	95%	49%	26	33	238	298	2,164	42%	11	96	125	873
18 to 19	81	92%	49%	15	19	126	233	1,554	55%	8	58	119	710
20 to 24	237	88%	49%	43	51	348	215	1,465	64%	28	176	119	742
25 to 29	249	86%	49%	38	37	246	150	988	72%	27	144	96	577
30 to 34	244	86%	49%	37	36	246	148	1,010	74%	27	133	95	545
35 to 39	218	87%	49%	34	32	201	145	919	80%	28	131	103	598
40 to 44	205	86%	49%	33	30	185	145	899	83%	28	123	104	597
45 to 49	206	81%	49%	31	27	159	134	775	83%	26	103	93	501
50 to 54	190	82%	49%	32	31	178	164	936	82%	26	113	115	594
55 to 59	183	79%	49%	31	30	150	163	821	85%	26	99	113	544
60 to 64	161	77%	49%	26	27	129	166	799	86%	23	83	111	518
65 to 69	144	77%	49%	26	29	137	204	956	84%	22	85	128	588
70 to 98	301	70%	49%	51	57	256	190	852	81%	41	152	109	504

Table 8: How physical and active recreation participation changes (per year, by region)

Region	Population 15 and over ('000)	Proportion of Victorians who participated in physical activity at least once	Proportion of Victorians who are physically inactive	Total physical activity sessions per year (millions)	Total physical activity hours per year (millions)	Total MET hours per year (millions)	Average physical activity hours per capita	Average physical activity METs per capita	Proportion of activity sessions classified as active recreation	Estimated number of active recreation exercise hours (millions)	Estimated active recreation MET hours (millions)	Average active recreation hours per capita	Average active recreation METs per capita
Victoria total	4,838	81%	50%	837	772	4,169	160	862	87%	582	2,654	127	577
Barwon	234.3	83%	44%	43	42	224	178	958	86%	33	169	140	719
Bayside Peninsula	735.7	84%	44%	143	132	684	180	930	88%	106	544	144	740
Brimbank Melton	260.6	72%	61%	37	32	176	121	675	87%	26	140	100	538
Central Highlands	153.2	81%	48%	27	23	120	153	786	85%	18	87	117	571
Goulburn	127.8	79%	53%	20	20	103	160	803	85%	15	73	116	573
Hume Moreland	289.9	78%	56%	49	42	221	145	763	89%	35	180	122	622
Inner East Melbourne	524.5	84%	50%	92	85	448	161	854	86%	66	331	125	630
Inner Gippsland	150.3	80%	44%	26	24	122	161	812	83%	18	85	117	562
Loddon	189.6	80%	47%	30	26	128	136	674	87%	20	95	105	502
Mallee	74.4	76%	47%	11	10	52	138	699	86%	8	39	108	522
North East Melbourne	504.6	82%	55%	89	83	437	165	867	89%	69	349	137	692
Outer East Melbourne	337.9	83%	47%	57	51	267	151	790	86%	39	193	115	572
Outer Gippsland	73.2	82%	44%	13	13	63	182	866	85%	10	47	132	644
Ovens Murray	101.7	82%	44%	18	17	85	168	838	86%	14	66	136	649
Southern Melbourne	428.5	75%	61%	65	63	325	147	758	87%	50	249	116	581
Western District	122.7	79%	45%	19	19	90	155	731	85%	15	68	119	555
Western Melbourne	529.2	82%	48%	94	89	466	168	880	87%	74	372	139	704

Economic contribution

We estimate that Victorian residents and visitors to Victoria spend around $8.3 billion in the active recreation sector. By far the largest proportion of that spending is in the form of consumer spending. Some $7.9 billion is spent each year on active recreation and equipment, including around $3.8 billion in inter-regional tourism and travel-related expenditure.

Consumer spending

Victoria's active recreation sector is driven by the spending of Victorians and non-Victorians. This spending takes two main forms: the purchase of gear and equipment (including apparel, footwear, equipment and vehicles), and dollars spent in Victoria on trips, travel and activities (including for food and drink, transportation, fees, activities, accommodation and other services).

Our evaluation estimates that readily identifiable equipment and trip- and travel-related expenditure by Victorians and non-Victorians totals around $7.9 billion a year, based on available data and current active recreation participation rates (Table 9).

Tourism represents a smaller but still significant contribution to activity.[4] Much of it is intrastate tourism, which reflects the local preferences of Victorians in spending their money. Interstate tourism expenditure involving active recreation contributes some $1.0 billion each year to the Victorian economy. General expenditure by Victorians on active recreation activities, including on vehicles and equipment, totals some $4.1 billion. Of this, we estimate that about $1.1 billion each year is on equipment purchased primarily for active recreation.

Table 9: Equipment and recreation expenditure consumer spending (direct and indirect)

	Expenditure ($ billion)	GVA ($ billion)	FTE positions
Total	$7.9	$7.8	47,900
Tourism intrastate	$2.9	$2.8	17,400
Tourism interstate	$1.0	$0.9	5,700
General expenditure	$4.1	$4.0	24,800

Infrastructure

Victoria's active recreation sector is supported by extensive public and private infrastructure. The infrastructure includes outdoor activity provider infrastructure, such as camps and activity grounds, 'grey' infrastructure, such as bicycle and walking trails, and green infrastructure, which is the natural environment where the active recreation activities occur.

[4] Tourism is defined as domestic day and overnight visits. Day visitors are those people who travel for a round-trip distance of at least 50 kilometres and who do not spend a night away from home as part of their travel. Same-day travel as part of overnight travel is excluded. Overnight visitors are those who travel more than 50 kilometres and spend one or more nights away from home. These definitions are consistent with the definitions used by Tourism Research Australia (TRA). We have not included international visitors in this evaluation because to be able to attribute international tourism to active recreation, active recreation needs to be the primary purpose of the visit; in addition, it is challenging to identify active recreation at the regional level in TRA data for international visitors.

In addition, local government spends significant resources in developing and maintaining recreation centres, many of which include pools.

Public and private infrastructure supports Victoria's economy and adds to our state's natural and built asset base. It also generates demand for maintenance and other services and resulting economic activity.

Based on Treasury budget and Parks Victoria annual report data, we estimate that the Victorian Government alone spent some $320 million on specific active recreation infrastructure and on supporting public outdoor areas in 2016–17. Those investments contributed to an estimated $300 million in GVA and some 2,800 FTE positions in Victoria. This is a partial reflection of the economic contribution of active recreation infrastructure in the state.

Economic contribution, by region

Our economic contribution analysis of the Victorian DHHS areas found that active recreation makes significant contributions to many of the state's regional economies. Tables 11 and 12 show active recreation participation hours, GVA and FTE contributions by DHHS area.

These estimates were developed using regional primary data where it was available (for example, surveys of participation and expenditure completed by an industry group). Where primary data was not available for regions, we used Australian Bureau of Statistics (ABS) and Tourism Research Australia (TRA) activity data and distributed activities by region, largely based on within-region population data. Appendix C discusses this disaggregation approach in more detail.

Table 10: Regional active recreation activity gross value-added (direct and indirect, $ billion)

Sector	Local tourism	Interstate tourism	Other consumer spending	All spending GVA
Victoria total	2.9	1.0	4.1	7.9
Barwon	0.5	0.1	0.3	0.9
Bayside Peninsula	0.3	0.1	0.4	0.7
Brimbank Melton	0.0	0.0	0.1	0.1
Central Highlands	0.1	0.0	0.1	0.3
Goulburn	0.1	0.1	0.3	0.4
Hume Moreland	0.0	0.0	0.0	0.1
Inner Eastern Melbourne	0.1	0.1	0.2	0.3
Inner Gippsland	0.6	0.1	0.6	1.3
Loddon	0.1	0.0	0.2	0.3
Mallee	0.1	0.0	0.2	0.3
North Eastern Melbourne	0.1	0.0	0.2	0.3
Outer Eastern Melbourne	0.0	0.0	0.1	0.2
Outer Gippsland	0.2	0.0	0.2	0.5
Ovens Murray	0.4	0.1	0.8	1.3
Southern Melbourne	0.0	0.0	0.1	0.2
Western District	0.3	0.1	0.2	0.5
Western Melbourne	0.0	0.0	0.2	0.3

Table 11: Regional active recreation FTE contribution (direct and indirect)

DHHS area	FTE positions
Victoria total	51,000
Barwon	5,800
Bayside Peninsula	4,600
Brimbank Melton	1,000
Central Highlands	1,600
Goulburn	2,800
Hume Moreland	700
Inner Eastern Melbourne	1,900
Inner Gippsland	7,900
Loddon	1,600
Mallee	1,800
North Eastern Melbourne	1,800
Outer Eastern Melbourne	1,200
Outer Gippsland	2,900
Ovens Murray	9,300
Southern Melbourne	1,400
Western District	2,900
Western Melbourne	1,700

Table 12: Participant days and ratio per resident population, by DHHS area

DHHS area	Population ('000)	Participation days (millions)[a]	Participation rate (exercised in previous year)	Days per active person
Total	**4,838**	**76.5**		
Barwon	234.3	4.1	83%	21.2
Bayside Peninsula	735.7	13.3	84%	21.4
Brimbank Melton	260.6	3.3	72%	17.2
Central Highlands	153.2	2.2	81%	18.1
Goulburn	127.8	1.9	79%	18.5
Hume Moreland	289.9	4.4	78%	19.5
Inner Eastern Melbourne	524.5	8.2	84%	18.5
Inner Gippsland	150.3	2.2	80%	18.3
Loddon	189.6	2.5	80%	16.3
Mallee	74.4	1.0	76%	17.6
North Eastern Melbourne	504.6	8.6	82%	20.9
Outer Eastern Melbourne	337.9	4.9	83%	17.3
Outer Gippsland	73.2	1.2	82%	20.1
Ovens Murray	101.7	1.7	82%	20.7
Southern Melbourne	428.5	6.2	75%	19.4
Western District	122.7	1.8	79%	18.9
Western Melbourne	529.2	9.2	82%	21.3

[a] Participation days are calculated as (participation hours ÷ 8). Participation hours are recorded only for the three main activities for each person. Where activities are significant on an annual basis but seasonal (such as sports), reported hours will be low in the off-season.

Education and training

The personal training, education and professional fitness sectors are a significant and growing element of active recreation. Data for the professional fitness sector is being developed, but it is difficult to estimate the size of this industry using available data. Industry analysis (BRA, 2013) suggests that across Australia consumer expenditure on active recreation is in the order of $1.31 billion. On a per capita basis, this would suggest expenditure of around $330 million in Victoria.

For Victoria, ABS household expenditure data indicates that health and fitness charges and lessons constitute some $600 million of expenditure, of which at least $250 million is potentially attributable to active recreation.

Welfare contribution

We estimate that eliminating physical inactivity in Victoria's 2016 15+ year population would deliver healthcare system and production benefits to Victoria worth between $1.2 billion and $3.35 billion over the population's lifetime.

Active recreation delivers health and wellbeing benefits. This conclusion is clearly supported by a large and robust international evidence base of outcome-based studies.[5]

Collectively, the studies show that physical activity (including active recreation) is directly associated with improved cardiovascular health, less obesity, lower blood pressure, and less stress-related illness and mental ill-health. For outdoor active recreation, the health benefits of nature-based activity reflect the type, duration, intensity and frequency of activity, as well as the person doing the outdoor activity.

[5] See VicHealth (2016) (2016)for a summary of the contemporary literature.

As part of our economic evaluation of active recreation in Victoria, we engaged Deakin Health Economics to evaluate the health status and the economic and financial burden associated with physical inactivity in the 2016 Victorian adult population. Here, physical inactivity is defined as a lack of physical activity, based on *Australia's physical activity and sedentary behaviour guidelines* (DoH, 2014). We use the terms 'insufficient physical activity' and 'physical inactivity' interchangeably in this report.

Assuming that there are effective interventions that can shift the current insufficiently active Victorian adult population to meet physical activity requirements, Deakin Health Economics estimated the potential cost savings to the Victorian healthcare system per person who moves from being insufficiently physically active to active, measuring those benefits over the population's lifetime. It also estimated the workforce labour productivity impact of those shifts over the population's lifetime.

Health and wellbeing

The evaluation of healthcare cost savings used a risk factor impact (RFI) model previously developed by Deakin Health Economics (Cadilhac et al., 2011) based on Australian Institute of Health and Welfare expenditure data. The model was adapted, improved and updated with current data inputs.

Appendix C discusses how Deakin Health Economics' estimates were derived from the RFI. For reasons we discuss below, the RFI model is more likely to underestimate the true cost of physical inactivity to the Victorian economy than to overestimate it, and as a result the true health system cost of physical activity in Victoria could be larger than the estimates given here.

Table 13 summarises key outputs from the Deakin Health Economics RFI model:

- There are around 2.5 million Victorians aged 15+ who are physically inactive (that is, they do not meet the standards in *Australia's physical activity and sedentary behaviour guidelines*.
- If those 2.5 million Victorians remain insufficiently active, over their lifetime this will result in a disease burden attributable to physical inactivity of around 65,000 disability-adjusted life years (DALYs).[6] Their physical inactivity will also lead to around 16,000 cases of cancer, cardiovascular disease, diabetes or fall-related injury. Insufficient physical activity would also result in around 4,000 deaths in the population that would be directly attributable to the population being physically inactive.
- In addition to its direct health impacts, insufficient physical activity in the Victorian 15+ population has direct impacts on labour and home productivity. Over the lifetime of the Victorian working-age population, around 132,000 working days would be lost in the Victorian economy due to disease related to physical inactivity in the 2016 adult population. While this statistic may appear low, that is because most of the health loss associated with insufficient physical activity occurs in people over the age of 65 years and therefore mainly out of the workforce. Because of ill-health, over the lifetime of all adults, an estimated 850,000 days would be lost that would have been used for household production activities, along with 1.6 million days of lost leisure due to illness related to physical inactivity.

[6] DALYs are a measure of overall disease burden, expressed as the number of years of healthy life lost due to ill-health, disability or early death.

- Eliminating physical inactivity entirely from the Victorian 2016 15+ year population would conservatively save the Victorian healthcare system around $250 million over the lifetime of the insufficiently active population. The healthcare savings would come from avoided health sector expenditure for the Victorian population that was attributable to all cases of disease and each case of disease related to physical inactivity, assuming that the health sector expenditure in any single year approximates the lifetime cost of a new case of physical inactivity related disease.
- In terms of the economy, every one per cent increase in the number of Victorians who are sufficiently active will result in the creation of around 1,300 full time equivalent jobs and generate an additional $117 million in gross value added economic benefit per year.

Table 13: The lifetime health burden of physical inactivity on Victoria's 15+ population in 2016 and the lifetime health benefit of becoming physically active

	Value
Victorian population 15+ years in 2016	4,600,000
Proportion of population that is physically inactive	52%
Victorian population that is physically inactive	2,480,000
Lifetime health impacts of physical inactivity	
Total DALYS	65,000
Total incident cases of disease	16,000
Total deaths	4,000
Work absenteeism (days)	132,000
Days out of home-based production role	850,000
Leisure (days)	1,600,000
Lifetime health impacts of becoming physically active	
Total health sector cost savings	$245 million

Productivity and production

Similarly to the way active recreation reduces healthcare costs in Victoria, it also contributes to higher productivity and production by lowering absenteeism and presenteeism at work and at home.

The Deakin Health Economics RFI model estimates the cost to the economy of workforce production losses directly for absenteeism only, using two approaches: the friction cost approach (FCA) and the human capital approach (HCA). We present both FCA and HCA estimates in this section, since there is still debate in the literature about the preferred approach.

The FCA provides conservative estimates and recognises that employed people are often replaced within a short 'friction' period (such as within 3 or 6 months) when they are ill or depart the workplace permanently. The FCA used in this evaluation values the production loss as the total of gross state product (GSP) per hour lost due to absenteeism.[7] In 2016, the average GSP per hour worked in Victoria was $311.40. For this evaluation, this average value was applied to all age groups.

The HCA estimates the value of a human life as being the sum of future GSP per worker lost due to leaving the workforce prematurely because of death or disability. As such, it generates larger estimates of production gains by the prevention of a premature death or case of disease.

[7] Gross state product is the total market value of goods and services produced within Victoria, after deducting the cost of goods and services used up in the process of production but before deducting depreciation. The ABS calculates GSP by summing factor incomes (that is, compensation of employees, gross operating surplus and gross mixed income), plus taxes, less subsidies on production and imports (ABS, 2015). GSP per hour worked is a key indicator of labour productivity.

The RFI model also estimates the production benefits of unpaid household production (such as cooking or caring for children) and leisure. It values all the household production hours per day at the weighted average hourly rate of domestic services and child care (formal and informal) replacement wages. In the RFI model, leisure time hours were valued using the opportunity cost method by using one-third of the average hourly Victorian wage for males and females separately.

Based on RFI model outputs, Table 14 shows that Victoria's 2.5 million physically inactive 15+ population will create a significant economic burden on workforce, household and leisure time productivity over its lifetime because of its insufficient physical activity:

- The total opportunity cost saving from production gains (working, household activities and leisure) that could potentially be achieved if physical inactivity were eliminated from the 2016 Victorian 15+ population would be in the order of $3.39 billion (using the HCA) or $800 million (using the FCA).
- The potential household gain from everyone in the 2016 15+ Victorian population being physically active is in the order of $125 million over the life of the population. In addition, an estimated potential net leisure gain of around $150 million at the current prevalence of physical inactivity in Victoria could be realised by eliminating DALYs, incidences of disease and deaths attributable to physical inactivity.

Table 14: The lifetime production burden of physical inactivity on Victoria's 15+ population in 2016 and the lifetime production benefit of becoming physically active

	$ million[a]
Production costs—HCA	3,118
Production costs—FCA	528
Leisure-based production	148
Home-based production	123

a Using a 7% discount rate.

While the above estimates are sizeable in their own right, they are likely to understate the avoided healthcare and production impacts of insufficient physical activity for one or more of the following reasons:

- The productivity estimates do not include the economic cost of presenteeism.
- The avoided healthcare and production estimates are based on five major non-communicable diseases out of the 22 diseases and conditions documented to be associated with physical inactivity, based on moderate to strong evidence.
- It is uncertain how disease prevalence, population attributable fractions, healthcare costs, employment and GSP will change over time for the 2016 population. This uncertainty would multiply if the analyses were to be extended to future generations. Further, there is a lack of agreement on an appropriate discount rate to generate the net present value of future costs, especially for future generations.
- The avoided healthcare costs are the operating expenditure of the Victorian healthcare system only; they do not include expenditures for the whole healthcare system or future avoided capital augmentation that would be required as the population and incidence of disease, DALYs and deaths attributable to physical inactivity increase.
- The evaluation is limited to Victorians aged 15 years and over.

Recreation benefit values

People obtain benefits from active recreation over and above how much they pay to do those activities. Economists call the difference between the maximum amount that consumers are willing to pay for active recreation activities and what they actually have to pay the 'consumer surplus'. Consumer surplus is a direct measure of welfare contribution.

For example, if the maximum amount a Victorian is willing to pay for active recreation is $90 per day (including all trip and equipment expenditure) and the amount they have to pay is only $50, then that person gets a consumer surplus of $40. Even though this $40 consumer surplus does not get exchanged through any marketplace transaction, it is a benefit that should be counted in economic analysis, and is also central to the individual's decision to do the active recreation in the first place.

We estimate that the value of active recreation (the consumer surplus) to Victorians is in the order of $3.8 billion each year. This estimate is based on the number of active recreation participation days in Victoria each year (Table 12) and estimates from Australian and international literature on the consumer surplus value of active recreation.

Appendix C discusses our estimation approach in more detail. Note that, because of the way the recreation benefit is calculated, it cannot be added together with the leisure-based production estimates generated with the RFI model.

Unquantified impacts

Social cohesion and education

We know that active recreation can help to develop positive relationships among community members and that this can increase mental and personal wellbeing, as well as feelings of community connection (VicHealth, 2016). Many, but not all, of the benefits of social cohesion are reflected in the welfare contribution values discussed in the previous section (for example, through improved health and wellbeing, lower absenteeism and presenteeism rates, and the recreation consumer surplus). To avoid the risk of double counting, we did not attempt to parcel out a separate welfare contribution for those impacts.

There are likely to be benefits from active recreation that extend beyond the health, wellbeing and labour productivity benefits we estimated in the previous section:

- Meta-analyses show that outdoor education programs can improve self-concept and teamwork among primary and secondary school students. Importantly, these positive impacts often appear to persist over time (Neill, 2008). For primary and secondary school students, the main benefits relate to the development of life effectiveness skills (QORF, 2012), which could translate over time into better workplace performance.
- Outdoor therapy and activities have been linked to reduced delinquency among at-risk adolescents (Bowen & Neilla, 2013, 2015).
- The ABS 2006 General Social Survey found that people aged 18 and over who participated in sport or physical recreation were more likely than others to be volunteers in some capacity (QORF, 2012).
- There is some evidence that outdoor activities contribute towards developing greater environmental awareness and stewardship. What such attitude changes mean over the longer term for the environment and sustainability have not yet been examined through longitudinal research (Dickson et al., 2008).

Return on investment

Evidence-based policy and investment decisions need to be informed by an understanding of the economic benefit of the investment—in short, 'What is the return on investment?' In this section, we convert estimates from the Deakin Health Economics RFI model into per person estimates.

'Per unit' measures can be used to evaluate the order of magnitude of the benefit of programs that increase active recreation (or sport) in the 2016 Victorian 15+ year population so that people become and then remain physically active.

Our evaluation (Table 15) shows the following:

- For every 10,000 people who become physically active and stay active, Victoria will avoid around 265 DALYs, 65 incidences of disease and around 15 deaths from five major non-communicable diseases directly attributable to physical inactivity.
- Based on available estimates and the RFI model, healthcare cost savings for each person who becomes physically active are in the order of $100 on average over their lifetime, measured in 2016 dollars. As we note above, this healthcare estimate more likely underestimates than overestimates the true healthcare cost to Victoria for a number of reasons.
- Using the HCA, the workplace production benefit per person who becomes physically active is around $1,255 over their lifetime, on average. Using the FCA, it is $200.
- Combining the avoided healthcare and HCA or FCA estimates suggests that permanently shifting one Victorian from the 2016 population aged 15+ from being physically inactive to being physically active will deliver present value benefits in the $300–1,350 range over the individual's lifetime, on average, using a 7% real discount rate. This estimate is conservative because it excludes recreation, leisure and home-based production activities to avoid double counting.

Table 15: Per capita healthcare and production benefits of achieving the national guidelines for physical activity in Victoria's 15+ physically inactive population in 2016

Victorian population 15 years + in 2016	4,600,000
Proportion of population that is physically inactive	52%
Victorian population that is physically inactive	2,480,000
Total DALYS in 2016	65,000
Total incident cases of disease in 2016	16,000
Total deaths in 2016	4,000
DALYs averted per 10,000 people becoming physically active in 2016	263
Incident cases of disease prevented per 10,000 people becoming physically active in 2016	64
Deaths prevented per 10,000 people becoming physically active in 2016	16
Total health sector cost savings	$245 million
Healthcare cost savings per person who becomes physically active	$100
Total workplace production benefit—HCA	$3,118 million
Total workplace production benefit—FCA	$528 million
Workplace production benefit per person who becomes physically active—HCA	$1,255
Workplace production benefit per person who becomes physically active—FCA	$200
Health cost saving per person—HCA	$1,355
Health cost saving per person—FCA	$300

Note: Using a 7% discount rate.

Next steps

This report shows that Victoria's active recreation sector is an important part of the Victorian economy, and that it probably makes far more of a contribution to Victorians' wellbeing and communities than many of us realise.

Many of the estimates in this report are approximations based on the best available data. Our main aim has been to present order of magnitude estimates of the economic and welfare contribution of Victoria's active recreation sector to our community, based on the best available evidence.

Further work is needed to narrow and strengthen the estimates in this report and to develop a consensus approach for evaluating the contribution of Victoria's active recreation sector in the future. This view is consistent with the recommendation we made in our recent work for Outdoors Victoria (MJA, 2016). In particular, we need to do four things:

- **Close data and knowledge gaps:** Several important knowledge gaps have been identified in this work. We need to understand how different levels of physical activity affect health and production outcomes. At the moment, we are limited to being able to attribute the health and production outcomes of shifting between physical inactivity and physical activity. This relatively coarse level of understanding limits the scope for clear evidence-based policy to encourage Victorians to make that shift.

  Given that there are around 2.5 million inactive Victorians aged 15+, that group may be enough for policy to focus on initially. However, over time, more nuanced and disaggregated policy may be called for, and an evidence base is needed to back such policy. A second key data gap is in evidence on the economic and welfare implications of active recreation in the under 15-year age category.

- **Develop a standard approach for estimating the economic and welfare contribution of Victoria's sport and active recreation sectors:** Sport and active recreation are natural and complementary activities. Our work found that the sport and active recreation sectors and subsectors that are evaluating their economic contribution in Victoria are often using different approaches. Those approaches are not always consistent and transparent. We think that the Victorian physical activity sector would benefit from using a uniform approach to estimate the economic and welfare contributions of active recreation subsectors. This approach should preferably be developed using the Victorian Department of Treasury and Finance's guidelines and support, which would ensure that the approach is 'gold standard'.

- **Develop industry-standard economic and welfare performance measures:** The Victorian sport and active recreation sectors would benefit from having a uniform set of economic and welfare contribution measures to use in evaluating industry performance over time. Again, these measures could be developed using Department of Treasury and Finance guidelines and support.

- **Further research and sector development:** The potentially significant size of the active recreation sector's economic and welfare contributions in Victoria means that the sector warrants further attention. This report starts to build an evidence-based case for additional research into how the sector can be developed to make an even greater contribution to Victoria's economy and the health, wellbeing and productivity of its population in the future.

Appendix A: Glossary of terms

This glossary adopts many of the definitions provided in Briceno & Schundler (2015), VicHealth (2016 and Commonwealth of Australia (2011).

Active recreation activities are those engaged in for the purpose of relaxation, health and wellbeing or enjoyment, in which the primary activity requires physical exertion and the primary focus is on human activity. It excludes competition sport and active travel.

Active travel is non-motorised transport between destinations, such as by walking, cycling, scooting or skateboarding.

Disability-adjusted life years (DALYs) are a measure of overall disease burden, expressed as the number of years of healthy life lost due to ill-health, disability or early death.

Direct contribution is the direct sales or margins of sales associated with initial expenditure. Some expenditures are assumed to translate into purchases made outside the state.

Domestic day-trip visitors are those people who travel for a round-trip distance of at least 50 kilometres and who do not spend a night away from home as part of their travel. Same-day travel as part of overnight travel is excluded.

Domestic overnight visitors are people aged 15 years or over who undertake an overnight trip of one night or more and at least 50 kilometres away from home.

Economic activity refers to different types of economic exchanges as they circulate through a region's economy. In this study, the direct, indirect and induced contributions represent total economic activity (such as sales, production and consumption of goods and services, employment and tax payments) associated with active recreation. Gross state product (GSP) is a common measure of Victorian economic activity.

Economic benefit is the wellbeing a consumer gains as a result of their consumption of a specific good or service, expressed in monetary terms. This is also known as consumer surplus. It is the difference between the maximum amount a person is willing to pay to get a good or service and what they actually have to pay.

Economic impact is the net change in Victorian economic activity that is generated by an industry sector (in this case, the active recreation sector).

Economic leakage is money that leaves a regional economy when an expenditure is made by a consumer. Leakages generally happen because some of the expenditures for goods and services used in the regional economy (for example, petrol) is made or acquired from outside the local economy. The person selling the good in the regional economy has to send money outside that economy to pay for it or to buy inputs.

Economic multiplier in this report is the ratio between initial expenditures and total economic contribution (also called the Keynesian multiplier). It shows how initial expenditures generate additional economic activity as the initial money is re-spent by other businesses and workers. For example, a hotel is paid $150 to house an active recreation participant for the night. The hotel owner keeps $15 as profit, employees are paid $85, and $50 is spent importing goods from outside Victoria. The employees spend $85 on food. Most of the food is imported from outside Victoria, so only $10 of the expenditure goes to wages and profit for the grocery store. The hotel owner sends her $15 to her daughter in Western Australia, which creates no further economic activity in Victoria (this is called economic leakage). Based on these transactions, there has been $110 ($15 profit + $85 wages + $10 to the grocery store) of economic activity in Victoria from the initial $150. If no further activity occurs, the economic contribution multiplier is 0.73 (110 divided by 150).

Employment is the number of full-time equivalent (FTE) jobs generated and/or supported in the creation of local gross economic output and gross value added.

Expenditure this is the value of the initial (direct) stimulus that is relevant to each industry. It is expenditure by governments, businesses and individuals involved in active recreation.

Gross economic output is a measure of the total production or expenditure in a local economy that is either directly or indirectly related to active recreation expenditure. It estimates how active recreation expenditure shifts through the Victorian economy to supply goods, services, jobs, incomes and taxation revenue.

Gross value added (GVA) is a subset of gross economic output, as imported goods and services used to service incremental expenditures are excluded. GVA includes local business profits and wages paid, and therefore represents economic returns on local capital and labour resources. It measures the true contribution of active recreation to the Victorian economy, because it backs out leakage out of the economy.

Indirect contributions are sales to the businesses where expenditures are made (for example, for intermediate inputs bought in the supply chain). For example, petrol stations purchasing petrol refined in Victoria produce a flow-on contribution to other parts of the Victorian economy.

Induced contributions are sales of goods and services purchased by employees of directly and indirectly affected businesses. A ski-field employee who buys milk from Gippsland using income they earned in the active recreation sector is creating an induced contribution for the Victorian economy.

Interstate visitor nights are nights spent by visitors in states or territories in which they do not normally reside.

Metabolic equivalent of task (MET) is a physiological measure expressing the energy cost (or calories) of physical activities. One MET is the energy expended by an individual while seated at rest. While the person is exercising, the MET is the energy expended compared to that spent at rest, so MET values indicate the intensity of the activity. An activity with a MET value of 5 means that the person is expending five times the energy (or number of calories) that they would when at rest.

Participant days are single visits to an active recreation location or one-time engagements by one individual in a recreational activity.

Physical activity is any bodily movement produced by skeletal muscles that results in MET expenditure. It occurs in four main domains: leisure/recreation; transport; occupational/school; and household. Physical activity includes ‘exercise’ (planned, structured and repetitive activity with a fitness goal), sport (organised, club and social), unstructured/incidental physical activity (such as gardening), active play and walking (for recreation and transport).

Physical inactivity is a lack of physical activity, based on *Australia’s physical activity and sedentary behaviour guidelines* (Appendix B)

The **Regional Development Victoria input–output model** is a purpose-built economic model that allows the user to estimate total economic activity generated by tourism and infrastructure expenditures in a Victorian regional economy.

Sport is human activity involving physical exertion and skill as the primary focus of the activity. It has elements of competition in which rules and patterns of behaviour governing the activity are set formally by organisations, and is generally recognised as a sport.

Visitors are active recreation participants who travel more than 50 kilometres from their homes to visit one of Victoria's active recreation activity locations.

Appendix B: National guidelines for physical activity and sedentary behaviour

Age group	Physical activity	Guidelines
Early childhood 0–5 years	3 hours of light- to vigorous-intensity activity every day	No screen-time for children under 2 years of age Less than 1 hour of screen-time per day for children aged between two and five No more than 1 hour of being sedentary or inactive at a time, except when sleeping, for all children aged birth to 5 years
Children and youth 5–17 years	At least 1 hour of physical activity every day Bone and muscle strengthening activities at least 3 days each week	Minimise sedentary time every day Less than 2 hours of screen-based entertainment per day Break up long periods of sitting as often as possible
Adults 18 years and over	Between 2½ and 5 hours of moderate intensity physical activity, or between 1¼ and 2½ hours of vigorous intensity physical activity, each week Activity on most, and preferably all, days Muscle strengthening activities at least 2 days each week	Minimise prolonged sitting Break up long periods of sitting as often as possible
Older adults 65 years and over	At least 30 minutes of moderate intensity physical activity on most, preferably all, days Activity each day, in as many ways as possible, doing a range of physical activities Incorporate activities that promote fitness, strength, balance and flexibility	

Source: DoH (2014).

Appendix C: Economic evaluation approach

We used a bottom-up approach to estimate the economic contribution of the Victorian active recreation sector in this report. In broad terms, the bottom-up approach sums the individual expenditure contributions of the subsectors that are included in the Victorian active recreation sector analysis. The key advantage of this approach is that it overcomes the difficulty that arises from the lack of industry-wide data.

However, consistent with previous work that has looked at the economic contribution of outdoor recreation in Australia (QORF, 2012), the key challenges with the approach are as follows:

- There are existing studies for only a small number of all active recreation types.
- Different methodologies need to be used to estimate economic contributions.
- Different time periods apply to the estimates.
- Different economic measures were reported.

Key data sources are summarised in Table 16. Our approaches to estimating participation, economic contribution and welfare contribution are outlined below.

Active recreation participation in Victoria

We estimated active recreation participation as the number of days Victorians spent doing activities in the previous year (and associated results) using one of two sources:

- participation surveys specific to active recreation, where they were available
- the Australian Sport Commission's Participation in Exercise, Recreation and Sport Survey (ERASS).[8]

Participation surveys

Where dedicated surveys are available for specific activities (such as skiing in the Victorian high country and walking, swimming, running and cycling activities in parks operated by Parks Victoria), we generally used those participation numbers. These reports also usually include estimates of how long people spend per day on active recreation.

In some cases, activity-specific surveys do not cover all of Victoria (for example, surveys of fishing in Gippsland). We used such survey data where it is available to estimate for other regions in Victoria, using the approach discussed further below.

[8] http://www.ausport.gov.au/information/casro/ERASS.

Participation in Exercise, Recreation and Sport Survey

The ERASS was a joint initiative of the Australian Sports Commission and state and territory departments of sport and recreation. It was conducted on an annual basis between 2001 and 2010.

The ERASS collected information on the frequency, duration, nature and type of activities participated in by people aged 15 years or over for exercise, recreation or sport during the 12 months prior to interview. Participation means active 'playing' participation, and does not include coaching, refereeing, being a spectator or activities related to work, household chores, gardening duties or active transport.

We agreed with DHHS to use the ERASS survey data in preference to available ABS Participation in Sport and Physical Recreation Survey data for 2013–15. The ERASS surveys distinguish between organised and unorganised physical activities. For the purposes of this analysis, we included those activities that are unorganised as a proxy for active recreation. We see this as a key but reasonable assumption.

The ERASS surveys were used to:

- classify physical activities as sport or active recreation
- estimate activity frequency and duration for sport and active recreation

derive relationships between the type of participation in physical activity for exercise, recreation and sport and social, economic, and demographic factors.Table 1 in the body of this report shows the activities included in our evaluation, and the proportion of each allocated to the sport and active recreation categories.

Many of the activities in Table 1 may be organised through clubs. For the purposes of this analysis, we assumed that club activities are not competition sport. Where activities straddle the line between sport and active recreation, we apportioned participation in those activities between active recreation and competitive sport. The apportionment is also shown in Table 1.

We estimated participation based on the average participation reported in the quarterly ERASS reports for the years from 2007 to 2010. This approach assumes that there have not been any significant changes in participation since that time and that active recreation participation rates and durations have not changed significantly since then. Taking a longer time period than one year also allows for the dilution of any one-off effects that would have a greater effect on a single year's or quarter's results.

The participation rate in this data is the number of people aged 15 or over who participated in each activity, multiplied by the number of occasions that they participated and by the duration.

Total expenditure on active recreation in Victoria last year

These figures represent the value of spending from identified sources in the past year. The key sources for this analysis were as follows.

Trip-based expenditure using Tourism Research Australia estimates of the number of people aged 15 or over who visited each region in Victoria

This survey captures expenditure by domestic day visitors, who are people who travel for a round-trip distance of at least 50 kilometres and who do not spend a night away from home as part of their travel. It also captures overnight domestic day visitors, who are visitors who travel at least 50 kilometres and stay overnight.

The survey also lists the activities engaged in by each person during their visit. Separately, TRA estimates average expenditure by day-trippers and overnight stayers in each region for domestic and international visitors.

Where we used TRA data to estimate trip-based active recreation expenditure, we combined activities to provide an estimate of tourism expenditure in each region and then allocated that total expenditure to different activities according to their relative frequency of participation, which was defined using the approach for estimating active recreation participation rates discussed above. Trip expenditures were allocated to activities in proportion to the relative number of activities undertaken in each region and relative to other activities undertaken during the trip. This assumes similar trip-related expenses for most activity categories.

Specific expenditure surveys

Where dedicated surveys are available for specific active recreation activities (such as skiing in the high country), we generally used the trip and equipment expenditure figures from those studies and grossed them up. Those reports also usually include expenditure estimates for day and overnight activities.

We estimated snow-based trip and equipment expenditure using the Alpine Resorts Co-ordinating Council's *Victorian alpine resorts: end of season report, winter 2014* (2015), which is based on the analysis of value added from snow activities in the Victorian Alps. We used the weighted input–output multiplier for tourist spending in the region to convert the value added estimates in the report back to an expenditure figure. This replaced the derived figure for tourist expenditure assigned to snow activities. As this figure is a derived figure, the other activities of the alpine total were adjusted so that the overall spend by tourists was not changed for the region.

For walking, cycling, running and swimming, we used visitor survey data obtained from Parks Victoria. This data tracks visitor activities for all metropolitan and national parks operated by Parks Victoria. We used data from a second Parks Victoria survey that tracks the type of visit (local, day trip from home, part of a holiday) by percentage for 28 Victorian parks managed by Parks Victoria to apportion trip types and activities for urban, peri-urban and regional parks.

Equipment investment and other consumer expenditure

The ABS provides estimates of household expenditure on specific equipment used in recreational activities in *Value of sport, Australia, 2013* (cat. no. 4156.0.55.002). Goods in the catalogue include bicycles, boats, aircraft, fishing equipment, camping equipment and other types of equipment. Detailed expenditure data per household is available at the Australian level for 2009–10. Detailed expenditure data per household in Victoria is available for 2003–04.

The ratio of Victorian to Australian expenditure per household in 2003–04 was used to adjust the Australian figure for 2009–10. This was then grossed up for the number of Victorian households in 2015–16 and inflation.

For active recreation clothing, Australian expenditure on hiking and recreation equipment was derived from IBISWorld's analysis of that market. That analysis identified 42% of total expenditure on equipment as being on clothing and footwear (and therefore not double counting for camping, fishing and so on). Overall, Victoria represented some 27% of sales of equipment. These two ratios were applied to generate an estimate of active recreation clothing and footwear expenditure for Victoria.

Other household expenditure was extracted from the Household Expenditure Survey. This included only those items not covered by the above groups and included gym and similar memberships, hire costs for casual sport (green fees, bowling hire), sporting attire and sports equipment. These were scaled in proportion to the number of hours of active recreation to total recreation activity and then scaled down to reflect purchases in proportion to the number of people who had not participated in any physical recreation.

Infrastructure investment

There is limited information on private investment in active recreational facilities and infrastructure. We used primary data where it is available.

Alpine investment in Victoria was reported for 2005 in *The economic significance of the Australian alpine resorts: summary report*, which was prepared for the Alpine Resorts Co-ordinating Council. This was inflated to 2014–15 prices.

Public sector expenditure comprised two elements: consumption and investment expenditure. The former comprised the ongoing costs for Parks Victoria (from annual reports), which were allocated on the basis of the number of visitors to national parks, state parks or waterways as a proportion of all visitors.

Health and production benefits

For this project, we worked with Deakin Health Economics to evaluate the health status and economic and financial burden associated with physical inactivity in the 2016 Victorian adult population. This work extended and updated earlier work that Deakin Health Economics and its colleagues completed in 2009 to evaluate the health and economic benefits of reducing a range of controllable disease risk factors in the Victorian adult population (Cadilhac et al., 2009).

The evaluation of healthcare cost savings used the risk factor impact (RFI) model previously developed by Deakin Health Economics (Cadilhac et al., 2011). The model was adapted, improved and updated with current data inputs.

The objective was to estimate the health status and economic and financial burden attributable to physical inactivity and the potential benefits that could be realised if physical inactivity were to be eliminated as a risk factor in the 2016 Victorian adult population. Physical inactivity is defined as a lack of physical activity, based on *Australia's physical activity and sedentary behaviour guidelines* (Appendix B).

The health status benefits were measured as changes in the future incidence of disease, deaths and DALYs that could be attributable to physical inactivity.

The economic benefits were measured as future changes in paid workforce participation rates, prevented absenteeism and early retirements from the workforce, and increased days of household and leisure activities that could be associated with improvements in health status.

The financial benefits were defined as the dollar value (net present value) of the estimated economic benefits listed above, together with the future expenditure savings to the health sector arising from the reduced incidence of diseases. These benefits represent opportunity cost savings rather than immediately realisable cash savings. The opportunity cost savings were estimated in 2016 Australian dollars and reflect the potential cost savings for the 2016 Victorian adult population over the rest of their lives; they do not include cost savings to other future population cohorts.

A separate report detailing the methods and results of the Deakin Health Economics analysis has been provided to DHHS.

Recreation benefits

Whereas the health benefit reflects the intensity and duration of the exercise component of an activity, the recreation benefit reflects the overall time spent on the activity. For the purposes of this analysis, a conservative estimate was used to reflect the recreation benefit.

A recreation value of $50 per day equivalent was used, reflecting the consistent outcome of a range of analyses.

Economic contribution calculations

We used Regional Development Victoria's regional economic impact model to estimate the regional economic contribution of active recreation in Victoria. The model provides measures of effects from spending on infrastructure, products and trips and spending related to active recreation travel. In general, there are direct effects and indirect effects. In looking at the gross or net impact of active recreation on the Victorian economy, we needed to look at both direct and indirect effects.

The estimates generated by the regional economic impact model are underpinned by an input–output model developed by SGS Economics from national input–output figures from the ABS. The ABS figures show the flow of goods and services between all the parts of the Australian economy. The figures developed for each local government area disaggregate those total figures across regions using known regional subtotals and forcing the relationship across all regions to match the Australian total.

The key data sources used in this analysis are listed in Table 16.

While this approach is considered reasonable, the limitations of using input–output models should be noted (SGS Economics, 2014):

- **The input-output approach assumes that relationships between industries are static**. Productivity improvements are not factored in, and historical relationships are assumed to hold, so businesses are not able to adjust to changes in prices to change the way they produce things.
- **The input–output approach uses total production estimates.** Consequently, the relationships are average. However, if we think about where increases in spending might occur, the spender would be expected to look for the best value option (or a marginal option). Using an average approach does not allow for using any underutilised capacity at the industry level or for the better use of existing machinery as production expands from its existing base.
- **All of the expenditure is assumed to be in new economic activities in each municipality.** Crowding out or industry substitution effects are assumed to be negligible. This means that there is sufficient slack in the local economy to service these stimuli without transferring significant resources from other uses.

The end result of these modelling assumptions is that I-O generally overstates the gross and net-economic impact of industry sectors.

An alternative is to use computable general equilibrium (CGE) models to evaluate economic impacts. A CGE incorporates both the underlying relationships within the economy from I-O and the interactions that occur over time. It will adjust relative costs and explicitly model constraints. CGE does not solve all problems associated with I-O but it does address many of the issues outlined above. For these reasons, State Governments and Treasury organisations generally prefer economic contribution analyses performed using CGE, particularly when evaluating 'large' investments and policy shocks.

Table 16: Key data sources—full list

Information	Data sources	Comments
Participation and trends in active recreation activity in Victoria (non-tourism and tourism)	ABS, *Participation in sport and physical recreation, Australia, 2009–14*, cat. no. 4177.0	This data provides total effort (duration, frequency) in active recreation activities used in this report. The data is limited to people 15 years old or over.
	Participation in Exercise, Recreation and Sport Survey (ERASS) 2007–10	Survey data on exercise, recreation and sport participation, session frequency and duration of exercise. Categorised across 168 activities. Survey data is quarterly.
	Parks Victoria annual visitor surveys	This dataset provides first and all mentioned activities for metropolitan and national parks operated by Parks Victoria. To avoid double counting, we used only the walking, running, cycling and swimming figures from the dataset.
Expenditure on active recreation products and employment in active recreation activities	ABS, *Value of sport, Australia, 2013*, cat. no. 4156.0.55.002	Includes expenditure per household per week (2009–10) on selected sport and physical recreation products: bicycles, boating and accessories ($2.30 per week); camping equipment ($0.70); fishing equipment ($0.55); golf equipment ($0.45). Employment 2011: diving instructor (open water), fishing guide, boat builder and repairer, bungy jump master, greenkeeper, hunting guide, etc. Aggregate data only, based on 14,000 respondents.
	IBISWorld Australian Market industry reports: bicycle retailing and repair, sports and recreation facilities, marine equipment retailing, hiking and outdoor equipment stores	This source was used to estimate active recreation equipment expenditure where not covered by the ABS *Value of sport, Australia* estimates.

Information	Data sources	Comments
Expenditure, welfare values and trends in active recreation activity in Victoria (non-tourism) (list not exhaustive)	Marsden Jacob Associates (2015), *Economic value of Victoria's outdoors*. Marsden Jacob Associates (MJA) (2015), *Economic impact and welfare values of Victorian regional and rural trails*. Marsden Jacob Associates (2012), *Economic evaluation of recreational boating in Victoria*. Marsden Jacob Associates (2014*), Economic contribution of recreation at Victorian parks*. RMCG (2014), *Estimating the economic impact of hunting in Victoria in 2013*. Alpine Resorts Strategic Marketing Plan 2014–2018 (summer and winter visitation statistics and expenditure) Outdoors Victoria (2008), *Australian outdoor adventure activity benefits catalogue*. (2008), *The cost of physical inactivity: what is the lack of participation in physical activity costing Australia?* J. Thompson Coon, K. Boddy, K. Stein, R. Whear, J. Barton, M. H. Depledge (2011), 'Does participating in physical activity in outdoor natural environments have a greater effect on physical and mental wellbeing than physical activity indoors? A systematic review', *Environmental Science & Technology*, 45(5):1761–1772.	These studies use a range of approaches to measure economic impacts and welfare values. Most studies include estimates of gear, accessories and travel-related expenses Several studies include welfare estimates (health and wellbeing), including the studies completed by Marsden Jacob Associates.

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Acronyms and abbreviations

ABS	Australian Bureau of Statistics
DALYs	disability-adjusted life years
DHHS	Department of Health and Human Services
ERASS	Participation in Exercise, Recreation and Sport Survey
FCA	friction cost approach
FTE	full-time equivalent
GSP	gross state product
GVA	gross value-added
HCA	human capital approach
MET	metabolic equivalent of task
MJA	Marsden Jacob Associates
PAF	population attributable fraction
RFI	risk factor impact
TRA	Tourism Research Australia
YLDs	years lost due to disability
YLLs	years of life lost

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