



Cost-benefit analysis of intensive early intervention for children with autism

Final report prepared for AEIOU

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Executive Summary

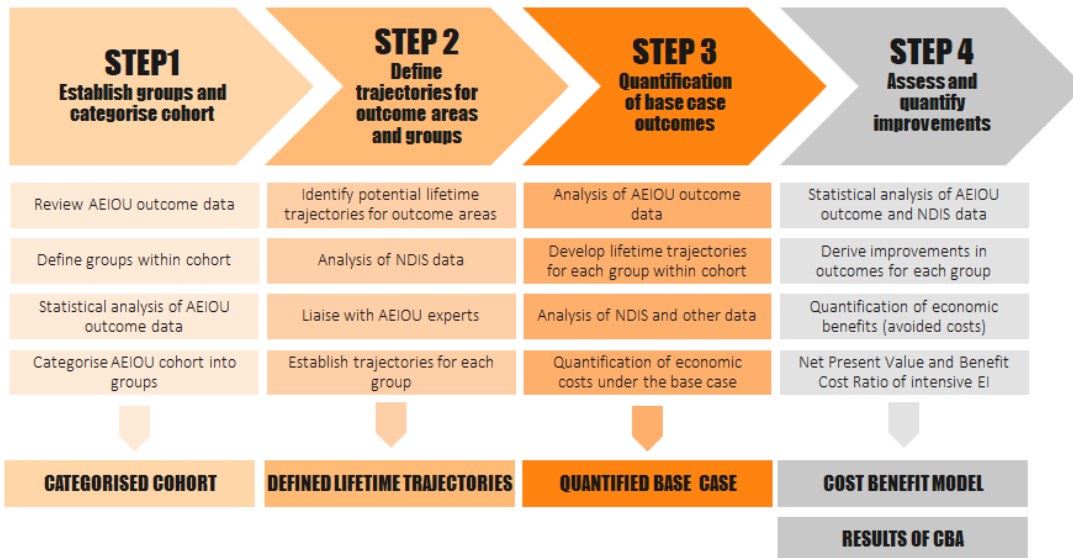
Autism spectrum disorder (ASD) is a persistent developmental disorder, characterised by symptoms evident from early childhood. Depending on the severity, autism can inhibit children long into adulthood in key life outcome areas such as educational attainment, employment, ability to live independently, and more.

Early intervention (EI) is widely recognised as being critical to improving short and long-term outcomes for individuals with autism. AEIOU delivers an intensive EI model in a naturalistic early childhood setting, specialising in helping children develop essential life skills to foster inclusion and prepare children for their next phase of learning.

Synergies Economic Consulting has previously assessed the net economic benefits analysis of the provision of EI to a cohort of children with autism. Since that study, AEIOU now has assessment data for children after one year and two years enrolment in AEIOU's intensive EI program. This report sets out the assessment and quantification of the economic benefits attributable to the provision of intensive EI for a cohort of children with autism, being avoided lifetime costs and economic benefits attributable to improved outcomes, based on a detailed analysis of AEIOU's assessment data.

The approach to undertaking the cost-benefit analysis is detailed in the figure below. In summary, AEIOU's assessment data, which is recorded at entry into the intensive EI program and after one year and two years of EI, has been analysed, along with detailed data on National Disability Insurance Scheme (NDIS) expenditure, to determine the magnitude of improvements in lifetime outcomes across a cohort of children with autism.

Overview of approach to the cost-benefit analysis



Categorising the cohort

The first task involved assessing and categorising the cohort of children with autism. Firstly, the cohort of 460 children was separated into two sub-cohorts, comprised of 261 children who received one year of intensive EI, and 199¹ children who received AEIOU’s full two-year intensive EI program.²

The second step was to establish categories within each sub-cohort to enable the assessment and quantification of lifetime outcomes under both the base case and ‘with intensive EI’ scenarios. While AEIOU’s assessment dataset included several outcome measures, the Mullen Scales of Early Learning (MSEL) scores were used to both categorise the cohort and to assess the improvements derived from intensive EI. The MSEL is a standardised measure of cognitive functioning designed to be used with children from birth through to 68 months. It was selected as the measure to underpin the cost-benefit analysis based on it being the most complete and statistically robust of the outcome datasets provided by AEIOU and the strong correlation that exists between IQ and communication skills and lifetime outcomes across the key outcome areas.

¹ While AEIOU has obtained data for a total cohort of 453 children, 56 per cent of these children either left the program before their T3 evaluation or were not assessed at T3. Hence, the cost-benefit analysis has been assessed based on T# outcomes.

² Children leaving the program after one year mostly did so after having displayed a functional ability to attend mainstream schooling.

Based on a review of AEIOU’s assessment data, the sub-cohorts were categorised into seven groups, denoted by levels 1-7. Level 1 through 3 approximately aligns with those participants classified as ‘profound’ by AEIOU. Levels 4 through 6 represent the those classified as severe, moderate, and mild, with level 7 being for participants who score above this threshold. The categorisation of the sub-cohorts based on T1 outcome data (i.e. at entry into intensive EI) is summarised in the table below.

Categorisation of the 1-year and 2-year sub-cohorts based on AEIOU outcome data at T1

Group	No. children in AEIOU 1-year cohort	No. children in AEIOU 2-year cohort	Percentage of cohort
Level 1	81	71	34.13%
Level 2	64	57	30.00%
Level 3	41	31	14.78%
Level 4	31	20	9.35%
Level 5	27	7	7.17%
Level 6	13	12	3.48%
Level 7	4	1	1.09%

Note: Synergies analysis of AEIOU T1 outcome data.

Developing lifetime trajectories

Lifetime trajectories were developed and quantified for the sub-cohorts under both the base case (i.e. without intensive EI) and the ‘with intensive EI’ scenario. The key steps involved in developing and quantifying the lifetime trajectories for the cohorts under these two scenarios was as follows:

- lifetime trajectories were developed for each level in the sub-cohorts, based on:
 - statistical analysis of NDIS data, including data provided to Synergies by the NDIA and publicly available data on NDIS packages for people with autism;
 - for the non-NDIS outcome areas (e.g. education, employment, informal care) estimates of the proportion of individuals in each level that would achieve certain outcomes, as provided by AEIOU;
- lifetime trajectories were defined for the cohorts under the base case using the T1 data (i.e. assuming children did not receive intensive EI). The development of base case lifetime trajectories based on T1 scores was supported by an analysis demonstrating no improvement in T1 scores with age under the base case;

- the AEIOU cohorts were recategorised using T3 outcome data, being MSEL scores after one and two years of intensive EI.³ The revised categorisations were then used to define lifetime trajectories under the ‘with intensive EI’ scenario; and
- the lifetime trajectories under the two scenarios were quantified and compared to identify the economic benefit attributable to intensive EI for the two sub-cohorts.

Economic benefit of intensive EI

Reduced NDIS costs

The NDIS expenditure required for the provision of care and services to the cohort under the base case and the ‘with intensive EI’ scenario has been assessed for three categories of support budget:

- **Core Supports:** to help with everyday activities and disability-related needs.
- **Capital Supports:** to help with higher-cost pieces of assistive technology, and funding for one-off purchases.
- **Capacity Building Supports:** to build skills and independence.

Of the above categories, Core support is the most significant in terms of the expenditure requirements, both for all NDIS participants and for participants with autism.

Reduced NDIS expenditure on Core support (2-year cohort)

Cost category	Average cost per person (PV terms)	Without intensive EI		With intensive EI		Cost saving from intensive EI (\$000) (PV terms)
		# Children	Cost (\$000) (PV terms)	# Children	Cost (\$000) (PV terms)	
1 st Quintile	\$9,875	18.9	\$187	25.2	\$249	-\$62
2 nd Quintile	\$81,619	26.2	\$2,138	28.5	\$2,326	-\$188
3 rd Quintile	\$280,333	21.3	\$5,971	22.8	\$6,392	-\$420
4 th Quintile	\$765,483	28.7	\$21,969	27.7	\$21,204	\$765
9 th Decile	\$1,643,805	38.1	\$62,629	35.1	\$57,698	\$4,931
10 th Decile	\$3,552,739	65.9	\$234,126	59.9	\$212,809	\$21,316
Total cohort		199	\$327,020	199	\$300,677	\$26,343

Source: Synergies modelling.

³ While the T2 outcome scores were available for a cohort of 453 children, the T3 outcome scores have been applied to assess the net economic benefit derived from the provision of intensive EI. While the T2 outcome data shows an improvement in the larger cohort of children, the net benefit on a per child basis is greatest when assessed based on T3 outcome data.

Reduced NDIS expenditure on Core support (1-year cohort)

Cost category	Average cost per person (PV terms)	Without intensive EI		With intensive EI		Cost saving from intensive EI (\$000) (PV terms)
		# Children	Cost (\$000) (PV terms)	# Children	Cost (\$000) (PV terms)	
1 st Quintile	\$9,875	34.6	\$342	52.4	\$517	-\$176
2 nd Quintile	\$81,619	38.4	\$3,134	43.2	\$3,526	-\$392
3 rd Quintile	\$280,333	29.9	\$8,382	32.7	\$9,167	-\$785
4 th Quintile	\$765,483	37.2	\$28,476	34.7	\$26,562	\$1,914
9 th Decile	\$1,643,805	45	\$73,971	38.3	\$62,958	\$11,013
10 th Decile	\$3,552,739	76	\$270,008	59.8	\$212,454	\$57,554
Total cohort		261	\$384,313	261	\$315,184	\$69,129

Source: Synergies modelling.

The tables above shows that intensive EI results in a cost saving for the Core support category of NDIS expenditure of \$26.34 million and \$69.13 million in PV terms for the two-year and one-year cohorts respectively. In per child terms, this equates to cost savings of \$132,376 and \$264,862 (PV terms) respectively. The higher benefit derived for the one-year cohort is attributable to the significant reduction in the number of children in the 10th decile at T2 compared to T1 for this sub-cohort.

The tables also shows that the benefit derived from intensive EI is primarily driven by shifting expenditure requirements from the 9th and 10th declines, which account for 52 per cent (two-year cohort) and 46 per cent (one-year cohort) per cent of total costs under the base case, to the lower for quintiles.

Compared to the Core support category, NDIS expenditure on the Capital and Capacity Building categories are relatively low. Hence, the economic benefit derived from intensive EI in terms of the cost savings for these categories is also significantly lower. The results of the analysis for these categories are detailed in the tables below.

Reduced NDIS expenditure on Capital and Capacity Building (2-year cohort)

Category	Base case costs (\$000) (PV)	'With intensive EI' costs (\$000) (PV)	Net benefit from intensive EI (\$000) (PV)	Net benefit per child (PV)
Capital	\$5,100	\$4,823	\$277	\$1,392
Capacity building	\$59,981	\$58,985	\$996	\$5,005

Source: Synergies modelling.

Reduced NDIS expenditure on Capital and Capacity Building (1-year cohort)

Category	Base case costs (\$000) (PV)	'With intensive EI' costs (\$000) (PV)	Net benefit from intensive EI (\$000) (PV)	Net benefit per child (PV)
Capital	\$6,307	\$5,665	\$642	\$2,462
Capacity building	\$77,381	\$75,017	\$2,364	\$9,058

Source: Synergies modelling.

Other key outcome areas

The tables below summarise the economic impacts quantified under the base case and 'with intensive EI' scenarios for the two sub-cohorts. The tables also show the cohort-wide and per child economic benefit attributable to the provision of intensive EI.

Economic benefits from intensive EI for other key outcome areas (2-year cohort)

Outcome	Base case outcomes		With intensive EI outcomes		Total economic benefit (\$000) (PV)	Per child economic benefit (\$000) (PV)
	# Children	(\$000) (PV)	# Children	(\$000) (PV)		
Education costs						
Full time special education	186.5	\$51,776	181.1	\$50,277	\$1,499	\$7.53
Mainstream school with support	9.7	\$1,975	12.65	\$2,575	-\$601	-\$3.02
Mainstream school w/o support	2.8	\$363	5.25	\$680	-\$317	-\$1.59
Employment earnings						
Full-time at minimum wage	2.8	\$816	5.25	\$1,529	\$714	\$3.59
Part-time at minimum wage	11.2	\$1,631	14.25	\$2,076	\$444	\$2.23
Informal care costs						
Significant care requirements	49.56	\$18,877	52.9	\$20,149	-\$1,272	-\$6.39
Moderate care requirements	32.34	\$6,929	32.45	\$6,953	-\$24	-\$0.12
Small care requirements	106.5	\$7,606	98.65	\$7,045	\$561	\$2.82
Healthcare costs						
Lifetime healthcare costs	199	\$25,112	199	\$24,743	\$369	\$1.86
Quality of life						
Burden of illness costs	199	\$375,213	169	\$361,888	\$13,326	\$78.85

Note: Quality of life benefits are quantified by applying disability weightings derived by the Australian Institute of Health and Welfare. These weights quantify societal preferences for different health states, ranging from 0, representing a state of good or ideal health, to 1, representing states equivalent to being dead. Disability weightings for different conditions are applied to each level within the cohort and applied to the Value of a Statistical Life Year to quantify the annual impact of each level on quality of life. Lifetime impacts are then quantified for each level, enabling the improvement in quality of life to be quantified based on the differences in lifetime trajectories for the cohort under the base case and 'with intensive EI' scenario.

Source: Synergies modelling.

Economic benefits from intensive EI for other key outcome areas (1-year cohort)

Outcome	Base case outcomes		With intensive EI outcomes		Total economic benefit (\$000) (PV)	Per child economic benefit (\$000) (PV)
	# Children	(\$000) (PV)	# Children	(\$000) (PV)		
Education costs						
Full time special education	242.6	\$67,351	227.1	\$63,047	\$4,303	\$16.49
Mainstream school with support	12.45	\$2,534	19.05	\$3,878	-\$1,344	-\$5.15
Mainstream school w/o support	5.95	\$771	14.85	\$1,923	-\$1,153	-\$4.42
Employment earnings						
Full-time at minimum wage	5.95	\$1,733	14.85	\$4,326	\$2,593	\$9.93
Part-time at minimum wage	16.95	\$2,469	24.85	\$3,620	\$1,151	\$4.41
Informal care costs						
Significant care requirements	75.04	\$28,582	80.52	\$30,670	-\$2,087	-\$8.00
Moderate care requirements	45.91	\$9,836	47.53	\$10,184	-\$347	-\$1.33
Small care requirements	125.65	\$8,974	105.75	\$7,552	\$1,421	\$5.45
Healthcare costs						
Lifetime healthcare costs	261	\$32,777	261	\$31,713	\$1,064	\$4.08
Quality of life						
Burden of illness costs	261	\$469,791	169	\$426,842	\$42,949	\$254.14

Note: refer to note on previous graph.

Source: Synergies modelling.

Cost-benefit analysis results

The tables below present the overall results of the cost-benefit analysis of the provision of intensive EI for the one-year and two-year sub-cohorts. The cost of intensive EI has been calculated incremental to the cost of providing either mainstream childcare or parental care to the cohorts under the base case.

Summary of results of cost-benefit analysis (2-year cohort) (Present Values)

Impact	Base case (\$000)	With intensive EI (\$000)	Economic benefit (\$000)	Benefit per child ^a
Direct cost savings to government				
NDIS – Core Support	\$327,015	\$300,620	\$26,395	\$132,639
NDIS – Capital	\$59,981	\$58,985	\$996	\$5,005
NDIS – Capacity Building	\$5,100	\$4,823	\$277	\$1,390
Education	\$54,113	\$53,532	\$581	\$2,921
Healthcare	\$25,112	\$24,743	\$369	\$1,856
Productivity and other benefits				
Employment	\$2,447	\$3,605	\$1,158	\$5,819
Informal care	\$33,412	\$34,147	-\$735	-\$3,694
Quality of life	\$375,213	\$361,888	\$13,326	\$66,964
Total economic benefits			\$42,367	\$212,901
Cost of intensive EI			-\$16,089	-\$80,850
Net economic benefit			\$26,278	\$132,051

^a Based on a cohort of 199.

Note: PV at a real social discount rate of 5 per cent.

Source: Synergies modelling.

Summary of results of cost-benefit analysis (1-year cohort) (Present Values)

Impact	Base case (\$000)	With intensive EI (\$000)	Economic benefit (\$000)	Benefit per child ^a
Direct cost savings to government				
NDIS – Core Support	\$384,274	\$315,142	\$69,133	\$264,876
NDIS – Capital	\$77,381	\$75,017	\$2,364	\$9,058
NDIS – Capacity Building	\$6,307	\$5,665	\$643	\$2,462
Education	\$70,655	\$68,848	\$1,807	\$6,923
Healthcare	\$32,777	\$31,713	\$1,064	\$4,075
Productivity and other benefits				
Employment	\$4,202	\$7,946	\$3,744	\$14,343
Informal care	\$47,393	\$48,406	-\$1,013	-\$3,882
Quality of life	\$469,791	\$426,842	\$42,949	\$164,557
Total economic benefits			\$120,690	\$462,413
Cost of intensive EI			-\$10,366	-\$39,715
Net economic benefit			\$110,324	\$422,698

^a Based on a cohort of 261.

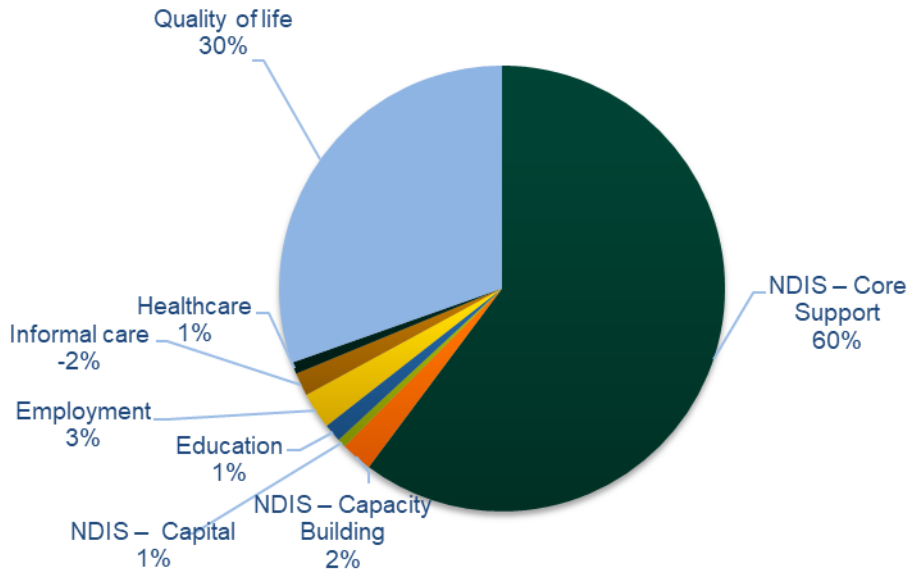
Note: PV at a real social discount rate of 5 per cent.

Source: Synergies modelling.

These results show a total net economic benefit of \$136.6 million (PV terms) (approximately \$297,000 in per child terms) across the entire cohort, with an overall Benefit Cost Ratio (BCR) of 6.16. The results also show that the net benefit is significantly higher for the one-year cohort (\$423,000 per child compared to \$132,000 per child), primarily attributable to the greater NDIS savings derived by members of

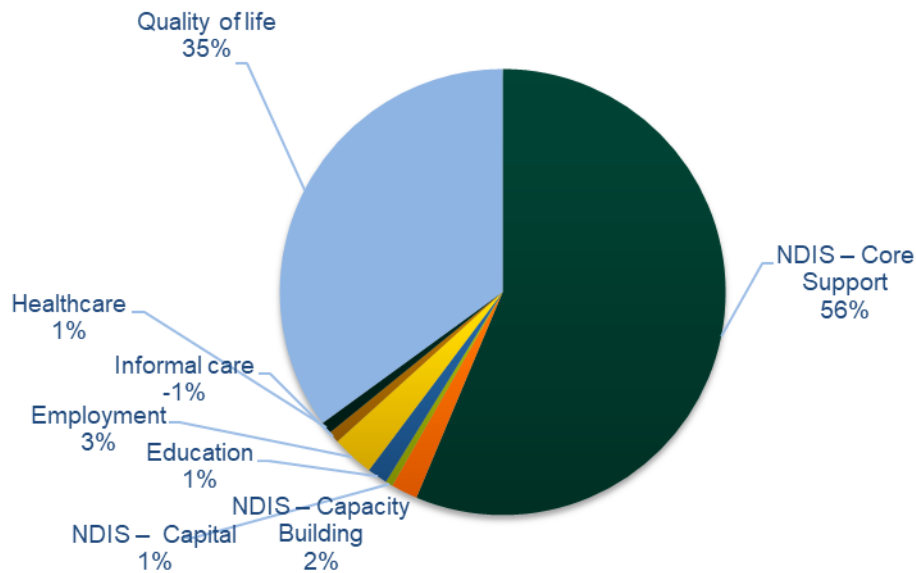
this sub-cohort. The distribution of the benefits across the various outcome areas is shown in the figure below.

Breakdown of economic benefits from intensive EI (2-year)



Data source: Synergies modelling.

Breakdown of economic benefits from intensive EI (1-year)



Data source: Synergies modelling.

As shown in the figures above, the cost savings achieved for the NDIS Core Support packages and improvements in quality of life are the dominant benefits derived from intensive EI, accounting for ~90 per cent of total economic benefits for both sub-cohorts. This is reflective of the significant economic benefits that are derived, both in terms of

direct cost savings for the NDIS and indirect benefits through increased quality of life, from improvements that enable people with autism to live more independently and without such significant care requirements.

While some individuals within the cohort achieve meaningful improvements in terms of employment and education outcomes, the benefits quantified for these outcomes are significantly lower than for the NDIS Core Support and quality of life categories. This is a function of the relatively high severity of autism symptoms exhibited by the cohort and the extent to which this constrains the employment and education outcomes that can be achieved by the AEIOU cohort, even with significant improvements from intensive EI.

Noting this, the net economic benefit and BCR results, both for the entire cohort and the two sub-cohorts separately, demonstrate the significant positive return that is generated from investing in delivering intensive EI to children with autism. This result means that for every \$1 invested in delivering intensive EI to the AEIOU cohort, a societal return of \$6.16 is derived. It is also noteworthy that of this total, \$4.58 is direct cost saving for the NDIS.⁴

Intensive EI achieved an 11.6 per cent reduction in the PV of the total NDIS expenditure for the entire cohort. For intensive EI to achieve a BCR of 1 based on reduced NDIS expenditure alone, this would only require a reduction in NDIS expenditure of around 3 per cent. This would require that only a small percentage of the observed improvement in the cohort (noting that this does not account for improvements in other key outcome areas).

⁴ That is, in addition to the economic benefits quantified for the other outcome areas, for every \$1 invested in providing intensive EI to the AEIOU cohort, NDIS expenditure is reduced by \$2.47.

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1 Introduction

Autism spectrum disorder (ASD) (also simply termed autism) is a persistent developmental disorder, characterised by symptoms evident from early childhood. Depending on the severity, autism can inhibit children long into adulthood in key life outcome areas such as educational attainment, employment, ability to live independently, and more. Early intervention (EI) is widely recognised as being critical to improving short and long-term outcomes for individuals with autism.

AEIOU delivers an intensive EI model in a naturalistic early childhood setting, specialising in helping children develop essential life skills to foster inclusion and prepare children for their next phase of learning. AEIOU's intensive EI program features EI therapies alongside specialised childcare, following the same Early Years Learning Framework as other mainstream childcare centres. Therapies and care are delivered by a transdisciplinary team of autism specialists, comprised of EI specialists, speech pathologists, occupational therapists, behaviour analysts, allied health assistants, and early childhood teachers.

Synergies Economic Consulting (Synergies) has previously assessed the net economic benefits analysis of the provision of EI to a cohort of children with autism. Since that study, AEIOU now has assessment data for children after one year and two years enrolment in AEIOU's intensive EI program. This data now allows for a more robust analysis to be undertaken, with projected lifetime outcomes being informed by data and assessed improvements from intensive EI.

This report sets out the assessment and quantification of the economic benefits attributable to the provision of intensive EI, being avoided lifetime costs and economic benefits attributable to improved outcomes, against the cost of providing intensive EI to the cohort. The analysis considers the key economic costs attributable to autism and the economic benefits (avoided costs) as a result of the provision of intensive EI, both to the individuals with autism and the wider community. The analysis assesses the net economic benefit for varying levels of autism severity.

The rest of this report is structured as follows:

- section 2 provides an overview of the prevalence of autism in Australia and benefits of intensive EI;
- section 3 sets out the approach to undertaking the analysis;
- section 4 details the quantification of reduced NDIS expenditure due to intensive EI;

- section 5 assesses the economic benefits derived from intensive EI for the other key outcome areas;
- section 6 assesses the economic cost of the provision of intensive EI; and
- section 7 presents the results of the cost benefit analysis.

The report includes one attachment, which contains additional detail in relation to the statistical analysis undertaken using AEIOU outcome and NDIA data to inform the development of lifetime trajectories for the cohort against the key outcome areas.

2 Autism and early intervention

2.1 Prevalence of ASD in Australia

ASD is characterised by symptoms evident from early childhood, such as difficulty in social interaction, restricted or repetitive patterns of behaviour and impaired communication skills. However, these may not be recognised until later, when social demands, such as those related to schooling, become greater. There is no definitive test for autism; instead, diagnosis is made on the basis of developmental assessments and behavioural observations.

A 2015 survey released by the Australian Bureau of Statistics (ABS) estimated that 164,000 people had autism in Australia, representing a prevalence rate of 0.7 per cent, or around 1 in 150 people.⁵ Of this total, 143,900 (88 per cent) were identified as also having a disability. Males were four times as likely as females to be reported as having autism.

Other estimates indicate the prevalence rate may be higher, with Autism Spectrum Australia revising its prevalence rate to 1 in 70 people in 2018.⁶ When compared with the estimate for the total number of people with autism in 2009 of 64,400, these figures indicate a considerable increase in the number of people being diagnosed with ASD.

2.2 Lifetime impacts of ASD

Autism is a lifelong disability and is often linked with physical, developmental, or mental health conditions such as intellectual disability, epilepsy, gastro-intestinal issues, ADHD, dyspraxia, anxiety, or depression.

People with ASD may face several barriers, of varying significance depending on the severity of their disability, throughout their lifetime. Key lifetime impacts are summarised in the table below.⁷

⁵ Australian Bureau of Statistics (ABS) Survey of Disability, Ageing and Carers (SDAC). In the SDAC, identification of autism is based on respondents who report autism or related disorders as a long-term condition—defined in SDAC as a condition which lasted, or was likely to last, for six months or more and was current at the time of the survey.

⁶ Autism Spectrum Australia (2018) 'Autism prevalence rate up by an estimated 40% to 1 in 70 people', 11 July 2018.

⁷ Australian Institute of Health and Welfare (2017) Autism in Australia.

Table 1 Overview of lifetime outcomes from ASD

Key outcome area	Lifetime impacts from ASD
Education	<ul style="list-style-type: none"> In 2015, the majority (85 per cent) of children and young people (aged 5 to 20) with autism and disability reported difficulty at school, with more than 1 in 4 attending a special school. The most common types of difficulty experienced were fitting in socially, learning difficulties and communication difficulties.
Employment	<ul style="list-style-type: none"> Around 50 per cent of people with autism and disability of working age (15–64 years old) reported difficulty changing jobs or getting a preferred job was the most common restriction in 2015. Around 30 per cent reported the need for ongoing supervision or assistance or were permanently unable to work due to their condition or disability.
Need for assistance with core activities	<ul style="list-style-type: none"> Individuals can experience a mix of behaviours which can have a mild to profound impact on their day-to-day life. The majority of people with autism (65 per cent) had a disability with a profound or severe limitation in core activities such as needing help or supervision with communication, mobility or self-care because of a person's disability or long-term health condition. In 2014-15, of NDA (National Disability Agreement) service users with autism: <ul style="list-style-type: none"> 73% always or sometimes needed help or supervision for self-care (such as washing oneself, dressing and eating) 91% always or sometimes needed help or supervision with interpersonal interactions and relationships 90% of those aged 5 and over always or sometimes needed help or supervision with education 80% of those aged 15 and over always or sometimes needed help or supervision in domestic life 91% of those aged 15 and over always or sometimes needed help or supervision in working life, which includes actions, behaviours and tasks to obtain and retain employment.

Source: Australian Institute of Health and Welfare (2017). Autism in Australia.

These lifetime outcomes translate to significant economic costs. Synergies conducted a comprehensive, bottom-up assessment of the economic cost of ASD in Australia in 2007. This analysis was most recently updated in 2013, with the annual economic cost of autism estimated at between \$8.1 billion and \$11.2 billion. Even excluding burden of disease (i.e., quality of life), total direct and indirect costs were estimated at between \$4.2 billion and \$7.3 billion.⁸

The adverse impacts of autism extend beyond the individual, with families and the wider community also bearing significant costs. In addition to the reduced productivity costs and significant healthcare expenditure attributable to individuals with autism, parents of children with autism have been found to experience higher rates of stress than parents of typically developing children, or those with other disabilities.⁹

⁸ Synergies Economic Consulting (2011) Economic Cost of Autism Spectrum Disorder in Australia, April 2011. All estimates are in December 2010 dollars.

⁹ Pisula, E. (2007). A Comparative Study of Stress Profiles in Mothers of Children with Autism and those of Children with Down's Syndrome. *Journal of Applied Research in Intellectual Disabilities*, 20(3), pp 274-278; and Schieve, L.A., Blumberg, S.J., Rice, C., Visser, S.N. & Boyle, C. (2007). The Relationship Between Autism and Parenting Stress. *Pediatrics*, 119 (Supp 1), pp S114-S121.

These costs, and the increasing prevalence of the diagnosis of ASD, has been a key driver of the increased focus on the potential for the provision of intensive EI to alleviate the significant social and economic costs attributable to autism, particularly over the last decade or so.¹⁰

2.3 Early intervention

Although no medical or drug therapy has been shown to improve the core symptoms of autism, there is significant data demonstrating the criticality of EI for improving outcomes for individuals with autism, specifically in relation to long-term outcomes.¹¹ This has led to the development of best practice guidelines for ASD interventions in Australia.¹²

Early interventions occur at or before preschool age, as early as two years of age. In this age period, a child's brain is still forming, meaning it is more 'plastic' or changeable than at older ages. Because of this plasticity, treatments have a better chance of being effective in the longer term. Early interventions not only give children the best start possible, but also the best chance of developing to their full potential. The earlier the child is provided with assistance the greater the chance for learning and progress, with studies indicating optimal outcomes are achieved when an integrated developmental and behavioural intervention is commenced as soon as ASD is diagnosed or seriously suspected.¹³

A systematic review of early intensive intervention for ASD found that EI resulted in some improvements in cognitive performance, language skills, and adaptive behaviour skills in some young children with ASD.¹⁴

2.3.1 Best practice early intervention

As autism is a heterogeneous syndrome, no one intervention is suitable for all children. As such, there are a wide variety of interventions that have been proposed as suitable for providing EI for children with autism. Best practice EI has been reviewed by several studies over the last decade.

¹⁰ Charman, T. & Howlin, P. (2003). Research into early intervention for children with autism and related disorders: Methodological and design issues. *Autism*, 7(2), pp 217-225;

¹¹ Prior, M. & Roberts, J. (2006). *Early Intervention for Children with Autism Spectrum Disorders: Guidelines for Best Practice*.

¹² Prior & Roberts (2006).

¹³ Zwaigenbaum et al (2015) *Early Intervention for Children with Autism Spectrum Disorder Under 3 Years of Age: Recommendations for Practice and Research*. *Pediatrics*, 2015 October

¹⁴ Warren et al. (2011) *A Systematic Review of Early Intensive Intervention for Autism Spectrum Disorders*.

Prior et al extensively reviewed EI, initially in 2006 and updated in 2011.¹⁵ Prior and Roberts reported that there is a lack of evidence supporting many of these interventions and evidence from high quality intervention trials is somewhat inconsistent.

However, they concluded high intensity interventions which address the child and family's needs using a behavioural, educational and/or developmental approach have been shown to be the best of currently available early interventions. Research has consistently shown good outcomes for intensive Applied Behaviour Analysis¹⁶ programs and there is growing evidence that intensive developmental and combined programs are also effective.

They concluded that there were some key elements which are necessary for effective EI:

- autism-specific curriculum content focusing on attention, compliance, imitation, language, and social skills;
- highly supportive teaching environments which deal with the need for predictability and routine, and with challenging behaviour, obsessions, and ritual behaviours;
- support for children in their transition from the preschool classroom; and
- support for family members including partnership with professionals involved in treatments.

These observations also align with the findings of Zwaigenbaum et al (2015) review of literature from 2000 to 2012 related to intervention programs provided to children with ASD aged younger than three years.¹⁷ In addition to the elements above, Zwaigenbaum et al also noted:

- intervention services should consider the sociocultural beliefs of the family and family dynamics and supports, as well as economic capability, in terms of both the delivery and assessment of factors that moderate outcomes; and
- intervention providers should consider medical disorders that may affect a child's clinical presentation (especially behaviour) and their response to an intervention and in turn should refer to appropriate health care providers.

¹⁵ Prior, M., Roberts, J., Rodger, S., Williams, K. (2011) A Review of the Research to Identify the Most Effective Models of Practice in Early Intervention for Children with Autism Spectrum Disorders

¹⁶ Behavioural Interventions: Focus is on application of learning theory and skill development; use of Applied Behaviour Analysis (ABA). Example: Pivotal Response Training (PRT)

¹⁷ Zwaigenbaum et al (2015) Early Intervention for Children with Autism Spectrum Disorder Under 3 Years of Age: Recommendations for Practice and Research.

Bejarano et al (2020) also noted the implementation of EI programmes should be substantiated by a sufficient amount of information about the characteristics of each participant.¹⁸ The table below outlines the types of EI strategies applied for children with autism.

Table 2 Overview of types of EI for children with autism

Type of early intervention	Description	Examples
Behavioural	<ul style="list-style-type: none"> • Focus on application of learning theory and skill development • Use of Applied Behaviour Analysis (ABA) approaches 	<ul style="list-style-type: none"> • Program Discrete Trial Training (DTT) • Early Intensive Behavioural Intervention (EIBI) incidental teaching • Pivotal Response Treatment (PRT) • Positive Behaviour Support (PBS).
Developmental	<ul style="list-style-type: none"> • Focus on building relationships and development of social emotional capacities 	<ul style="list-style-type: none"> • Relationship Development Intervention (RDI) • Developmental social-pragmatic (DSP) model
Therapy-based	<ul style="list-style-type: none"> • Focus on communication and social development or sensory motor development • Usually designed for use with other interventions 	<ul style="list-style-type: none"> • Picture Exchange Communication System (PECS) • Auditory Integration Training (AIT) • Functional Communication Training (FCT) • Key Word Sign
Family-based	<ul style="list-style-type: none"> • Focus on working with families to develop skills in working with their children 	<ul style="list-style-type: none"> • The Hanen Program • More Than Words®
Combined	<ul style="list-style-type: none"> • Incorporate behavioural and developmental strategies – often include sensory issues • Focus on working with and managing the characteristics of autism 	<ul style="list-style-type: none"> • Treatment and Education of Autistic and related Communication Handicapped Children (TEACCH) • Early Start Denver Model • SCERTS® Model
Medical	<ul style="list-style-type: none"> • Prescribed medications might reduce these behaviours enough so that behavioural or developmental therapies and supports work better. 	<ul style="list-style-type: none"> • Atypical antipsychotics • Typical antipsychotics • Stimulants
Other	<ul style="list-style-type: none"> • Other types of early intervention 	<ul style="list-style-type: none"> • Music Intervention Therapy

Source: Prior, M., Roberts, J., Rodger, S., Williams, K. (2011) A Review of the Research to Identify the Most Effective Models of Practice in Early Intervention for Children with Autism Spectrum Disorders; Raising Children (raisingchildren.net.au).

2.3.2 Evidence of benefits of early intervention

Many studies have demonstrated improvement in verbal and nonverbal communication, social engagement, and autism symptomology from pre- to post-intervention, providing preliminary evidence supporting the effectiveness of very early intervention.¹⁹

¹⁸ Bejarano-Martín, Á., Canal-Bedia, R., Magán-Maganto, M., Fernández-Álvarez, C., Lóa-Jónsdóttir, S., Saemundsen, E., ... & Posada, M. (2020). Efficacy of focused social and communication intervention practices for young children with autism spectrum disorder: A meta-analysis. *Early Childhood Research Quarterly*, 51, 430-445.

¹⁹ Bradshaw, J., Steiner, A.M., Gengoux, G. et al. (2015) Feasibility and Effectiveness of Very Early Intervention for Infants At-Risk for Autism Spectrum Disorder: A Systematic Review. *J Autism Dev Disord* 45, 778-794

Early intervention reduced autism-risk behaviours, increased parental non-directiveness, improved attention disengagement and improved parent-rated infant adaptive function.²⁰ Other studies found that the effect of intervention on social communications outcomes significant, particularly for younger children (2.5 to 5 years old) who showed more progress compared to older children (5 to 7 years old).²¹

The table below summarise key findings of studies assessing early learning and intervention programs.

Table 3 Outcomes of studies of autism-specific early learning programs

Domain	Measure ^a	Studies	Results (pre/post within groups comparison)
Educational skills	PEP-R	Reed et al	<ul style="list-style-type: none"> Significant improvement for “special nursery placement” on gross motor, cognitive and verbal subscales Significant improvement for “Autism-specific special nursery” on the overall PEP-R score
		Reed et al	
Cognitive skills	BAS-II	Reed et al	<ul style="list-style-type: none"> Significant improvement for “special nursery placement” on picture matching, naming and early number skills subscales
	MSEL	Zacor & Ben-Itzchak	<ul style="list-style-type: none"> Significant raw scores gains across all four domains for an “eclectic-developmental” autism-specific preschool program Gains were significant in standard scores on receptive language only
Adaptive behaviour	VABS-Screener	Charman et al	<ul style="list-style-type: none"> Significant changes over time on the VABS Screener on domain age-equivalent scores but no significant difference in the overall adaptive behaviour composite score
	VABS	Reed et al	<ul style="list-style-type: none"> Children attending an “Autism-specific special nursery” school significantly improved on composite score
		Magiati et al	<ul style="list-style-type: none"> Significant increases in mean age-equivalent scores on the VABS for “Autism-specific special nursery” group
Autism symptoms	ADOS	Zachor et al	<ul style="list-style-type: none"> Significant gains on the social interaction domain score for the “eclectic-developmental” intervention group
	SCQ	Charman et al	<ul style="list-style-type: none"> No significant changes over time for the measure of autism symptoms on the Social Communication Questionnaire
	ADOS	Solomon et al	<ul style="list-style-type: none"> Large treatment effects were evident for parent and child interactional behaviors.

²⁰ Green et al (2015) Parent-mediated Intervention versus no Intervention for infants at high risk of autism: a parallel, single blind, randomized trial

²¹ Fuller, E. A., & Kaiser, A. P. (2019). The effects of early intervention on social communication outcomes for children with autism spectrum disorder: A meta-analysis. *Journal of autism and developmental disorders*, 1-18.

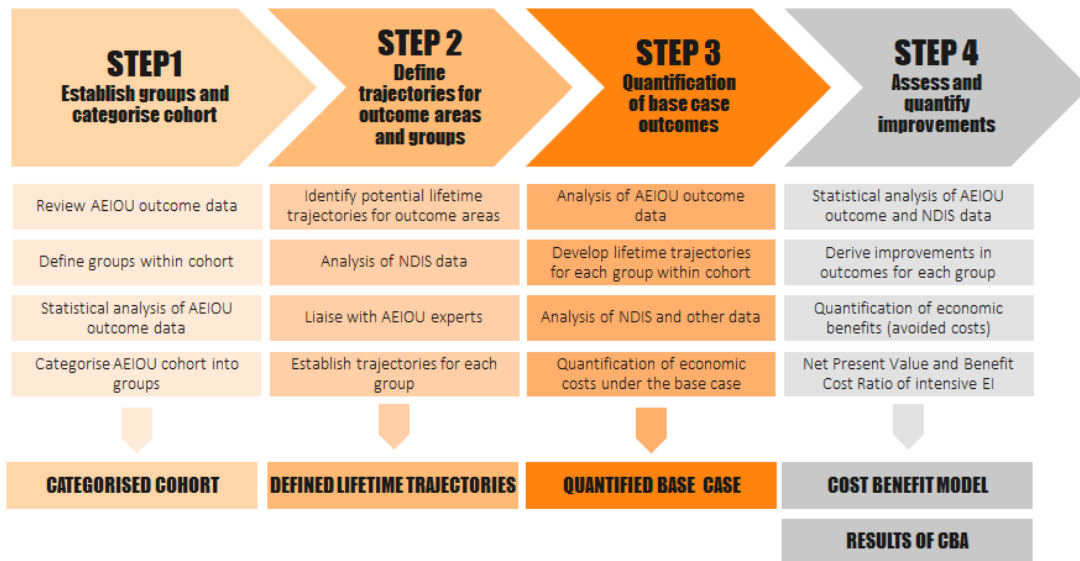
Domain	Measure ^a	Studies	Results (pre/post within groups comparison)
Adaptive communication	ADI-R, ADOS, PLS-4, Mullen Scales	Harden et al	<ul style="list-style-type: none"> • Functional development improved significantly. Depressive symptomatology decreased. • Improved in diagnostic categories on ADOS • Greater improvement in adaptive communication skills. • Greater skill acquisition for both parents and children, especially in functional and adaptive communication skills.
	ADOS	Schertz et al	<ul style="list-style-type: none"> • Positive effects from a parent-mediated approach to promote foundational preverbal social communication. • More frequent attention to parents' faces and responses to parents' joint attention overtures. Significant improvement on separate standardized communication measures.
	ADOS	Casenhiser, D. M., Shanker, S. G., & Stieben, J.	<ul style="list-style-type: none"> • Children in the treatment group made significantly greater gains in social interaction skills. • Children were significantly more attentive and involved in interactions with their parents and initiated more joint attentional frames.

^a PEP-R: Psychoeducational profile – revised; BAS-II: British Abilities Scale-II; MSEL: Mullen Scales of Early Learning; VABS: Vineland Adaptive Behaviour Scale; ADOS: Autism Diagnostic Observation Scale; SCQ: Social Communication Questionnaire; ADI-R: Autism Diagnostic Interview-Revised.

3 Approach

This section details the approach applied to undertake the cost-benefit analysis of the provision of intensive EI to a cohort of children with autism. The approach, as summarised in the figure below, is consistent with that adopted in the Synergies 2013 report, noting that the assessment of the cohort and the projections of improvements in key outcome areas has been based on outcome data collected by AEIOU.

Figure 1 Overview of approach to the cost-benefit analysis



Source: Synergies.

3.1 AEIOU cohort

For this study a comprehensive data set was provided which sets out a range of data for the cohort of children with autism. In total, 460 children were included in the sample. A child’s autism severity is assessed based on a range of factors and using various assessment tools. The data contains assessments using the Social Communication Questionnaire, Vinland Adaptive Behaviour Scales (VABS), Parenting Stress Index, Mullen Scales of Early Learning (MSEL), Autism Diagnostic Observation Schedule (once only), and Preschool Language Scale.

Using the participants Mullen Scales of Early Learning (MSEL) scores, AEIOU has classified the participants autism severity as profound, severe, moderate, or mild. The Mullen Scale assesses a child’s visual reception, fine motor skills, and receptive and expressive language. The severity of the child was then calculated based on their aggregate performance across these categories.

Table 4 Severity categorisation using Mullen Scale of Early Learning

Level	No. children in AEIOU cohort	MSEL Cognitive T score sum
Profound	345	≤ 80
Severe	51	81-120
Moderate	34	121-160
Mild	25	161-200
Above	5	> 200

Source: Data uses the categorisation from AEIOU All centres data base.

While the entire cohort includes 460 children, assessing the net economic benefits of intensive EI requires consideration of the following sub-cohorts:

- those children that receive two years of intensive EI (two-year cohort), which account for 199 children (43.3 per cent of the cohort); and
- those children that receive one year of intensive EI (one-year cohort), which account for the remaining 261 children (56.7 per cent).

AEIOU uses clinical assessment of developmental skills to determine the amount and duration of intensive EI required. Children who say one year enter AEIOU with a higher level of age-adjusted skills, respond to therapy quickly, and are ready to be transitioned to their next educational setting within a year. Children who stay two or more years enter AEIOU with a lower level of age-adjusted skills, require a higher level of support and therapy, and need two or more years of intensive EI to be ready to transition to their next setting.

3.2 Define groups and categorise the cohort

Quantification of the economic benefits attributable to intensive EI for a cohort of children firstly requires the sub-cohorts to be categorised into groups. This is necessary so that lifetime trajectories can be established for key outcome areas for each group under the base case and the ‘with intensive EI’ scenario, enabling the economic benefit to be quantified having regard to the improvement in lifetime trajectories.

Groups must be defined having regard to the extent to which movement between groups will be reflective of changes to lifetime trajectories across the key outcome areas, while also having regard to the data that is available to firstly categorise the cohort and then to project lifetime trajectories under the two scenarios. In the 2013 analysis, three groups were defined based on ranges for IQ, as detailed in the box below.

Box 1 Synergies' 2013 analysis

In Synergies' 2013 cost-benefit analysis, this process was simplified by categorising the cohort of children based on IQ, as follows:

- Group 1 – children with severe autism, likely to be non-verbal and suffer from significant behavioural issues and anxieties;
- Group 2 – children with mild to moderate autism, likely to experience difficulties with language and communication, particularly in social settings; and
- Group 3 – children with High Functioning Autism (HFA), while not suffering from intellectual disabilities, individuals in this group can experience difficulties in other areas that can adversely impact long-term outcomes in key areas.

Indicative lifetime trajectories were then established for each group based on the expert opinion of key members of the Autism Research and Innovation Committee (ARIC). These lifetime trajectories were established for both the 'without EI' and 'with EI' scenarios.

Based on discussions with AEIOU and analysis of the outcome data that has been collected by AEIOU in recent years, seven groups have been established, denoted by levels 1-7, based on cognitive ability. These groups have been created Level 1 through 3 approximately aligns with those participants classified as profound by AEIOU. Levels 4 through 6 represent the those classified as severe, moderate, and mild by AEIOU, with level 7 being for participants who score above this threshold.

Attachment A contains a detailed description of the approach applied to establish the groups and allocate the cohort across the groups. At a high level, the cohorts have been categorised based on their recorded entry (i.e. T1) scores using the Mullen Scales of Early Learning (MSEL) Cognitive T score sum measure.²² The rationale for using this measure is two-fold:

- 1) A comprehensive literature review revealed IQ and communication skills to be the measures most strongly correlated with lifetime outcomes across the key outcome areas (see Attachment A). The MSEL is a standardised measure of cognitive functioning designed to be used with children from birth through to 68 months; and
- 2) Statistical analysis revealed the MSEL Cognitive T score sum measure to be the most complete and statistically robust of the outcome datasets provided by AEIOU. More detail on this is given in Attachment A.

The distribution of the cohorts across these four groups is detailed in Table 5.

²² The overall score for the Mullen Scale of Early Learning, which is an individually administered, standardised measure of cognitive functioning designed to be used with children from birth through to 68 months.

Table 5 Categorisation of the AEIOU cohort using the Mullen Scale

Group	No. children in AEIOU 1-year cohort	No. children in AEIOU 2-year cohort	Percentage of entire cohort
Level 1	81	71	34.13%
Level 2	64	57	30.00%
Level 3	41	31	14.78%
Level 4	31	20	9.35%
Level 5	27	7	7.17%
Level 6	13	12	3.48%
Level 7	4	1	1.09%

Note: Synergies analysis of AEIOU outcome data.

As shown in the table above, 75 per cent of the cohort have been categorised in the bottom three levels. This demonstrates the significant majority of children with profound autism in AEIOU's cohort.

3.3 Define lifetime trajectories by level and scenario

The economic benefit attributable to the provision of intensive EI to the cohort of children with autism is quantified by comparing lifetime outcomes for the cohort under two scenarios:

- the base case, being the scenario under which the cohort is not provided with intensive EI; and
- the 'with intensive EI' scenario, under which the cohort is provided with intensive EI.

This necessitates lifetime trajectories to be established for both sub-cohorts, for each key outcome area, under the two scenarios.

In the 2013 analysis, data constraints meant that lifetime trajectories for both scenarios were defined based on indicative improvements provided by the AEIOU Autism Research and Innovation Committee (ARIC). That is, for each group defined within the cohort, the ARIC advised on proportions of children within each group that would achieve different lifetime outcomes for each key outcome area under the base case and the 'with intensive EI' scenario. While based on the experience of renowned clinical experts, these proportions were not underpinned by outcome data.

For this analysis, AEIOU's outcome data has been analysed, in combination with NDIS data, to develop lifetime trajectories for each level across the cohorts. Each level is essentially assigned a probabilistic lifetime trajectory for each key outcome area. For the base case, lifetime trajectories have been defined based on MSEL Cognitive T Score

sum scores at T1 (see section 3.2). That is, the score a child records at T1 (entry into AEIOU’s program) is relied upon to establish lifetime trajectories under the base case.

While reliance upon T1 scores to develop base case lifetime trajectories does represent a methodological constraint,²³ the approach is supported by an analysis of T1 scores and the age at which children commence intensive EI. As there is significant variance in the age at which children entered the program, and as such, the age at which the initial T1 measurements were taken, it is possible to assess how T1 scores vary with age under the base case.

Analysis of the T1 scores shows no evidence of improvement in scores with age, rather we see a slight downward trend. This suggests that on average, under the base case, scores will not improve without intensive EI.²⁴ Thus, it is not unreasonable to assume that, on average, the gains observed in scores between T1 and T2 (for the one-year cohort) and T1 and T3 (for the two-year cohort) can be attributed to intensive EI and to the extent the outcome scores provide an indication of long-term outcomes, reliance on T1 scores to develop lifetime trajectories under the base case is appropriate.²⁵ More detail is provided in Attachment A.

For the ‘with intensive EI’ scenario, lifetime trajectories for the cohorts have been defined based on the T2 scores for the one-year cohort and T3 scores for the two-year cohort. That is, the cohorts are recategorised across the levels within the cohort based on T2 and T3 scores and are assigned the relevant lifetime trajectories. Hence, to the extent intensive EI results in improvements from the T1 to T2 scores for the one-year cohort and from T1 to T3 scores for the two-year cohort, this will be reflected in improved lifetime trajectories for the cohort. The change in categorisation of the cohorts from T1 to T2 and from T1 to T3 is summarised in the table below.

Table 6 Categorisation of the cohort at T1 (base case) and T3 (with intensive EI)

Level	Assessed level at T1 (base case)				Assessed level at T2/T3 (after intensive EI)			
	1-year cohort	% of cohort	2-year cohort	% of cohort	1-year cohort	% of cohort	2-year cohort	% of cohort
Level 1	81	31.0%	71	35.7%	62	23.8%	64	32.2%
Level 2	64	24.5%	57	28.6%	55	21.1%	49	24.6%
Level 3	41	15.7%	31	15.6%	36	13.8%	37	18.6%
Level 4	31	11.9%	20	10.1%	29	11.1%	17	8.5%
Level 5	27	10.3%	7	3.5%	48	18.4%	14	7.0%

²³ In that it is not based on a longitudinal assessment of a cohort that does not receive intensive EI.

²⁴ Noting there will be variability at the individual level.

²⁵ Noting that robustness of the quantification of lifetime trajectories would be improved with longer term outcome data.

Level 6	13	5.0%	12	6.0%	19	7.3%	15	7.5%
Level 7	4	1.5%	1	0.5%	12	4.6%	3	1.5%

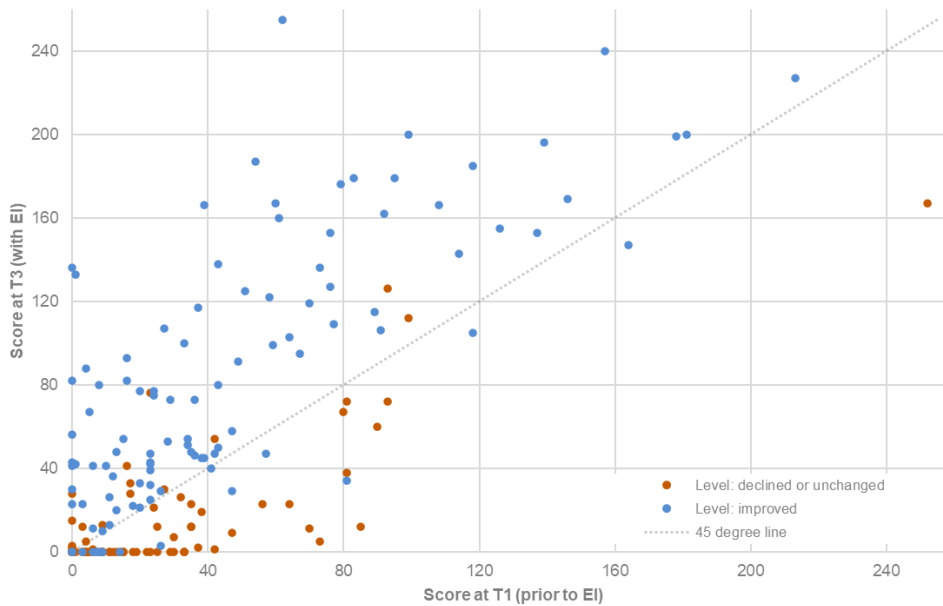
Source: Synergies, based on AEIOU outcome data.

The table above shows that:

- for the one-year cohort, the proportion of children in levels 1 to 3 falls from 71 per cent at T1 (i.e. base case) to 59 per cent at T2 (i.e. with intensive EI), with the proportion of children in levels 5 to 7 increasing from 17 per cent to 30 per cent; and
- for the two-year cohort, the proportion of children in levels 1 to 3 falls from over 80 per cent at T1 to 75 per cent at T3. In addition, the proportion of children in levels 5 to 7 increases from 10 per cent to over 16 per cent.

The figure below shows the T1 and T3 scores for each member of the AEIOU cohort. The chart shows how the assessed levels of the members of the cohort have either improved, regressed, or shown no change after intensive EI.

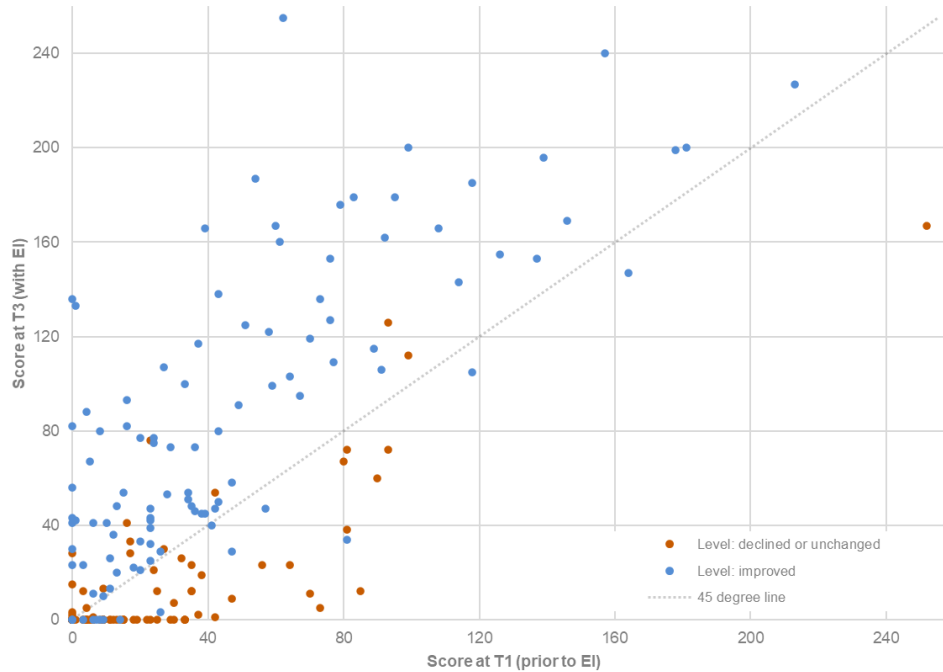
Figure 2 Synergies MSEL based assessment score for T1 and T3 (2-year)



Note: Attachment A contains further information regarding the approach to assessing and categorising the AEIOU cohort under the two scenarios.

Data source: Synergies modelling, based on AEIOU outcome data.

Figure 3 Synergies MSEL based assessment score for T1 and T2 (1-year)



Data source: Synergies modelling, based on AEIOU outcome data.

In the figures above, participants that lie above the 45-degree line have shown improvements between T1 and T3 (T2), those below the line had a lower score at T3 (T2). It is important to note that in assigning levels to children in the cohort at T3 (T2), where the MSEL score recorded for a child indicates a lower level than recorded at T1, the T1 level has been assigned to that child. For example, if a child recorded a MSEL score commensurate with Level 2 at T1 and a MSEL score commensurate with Level 1 at T3 (T2), the child remains classified as Level 2 at T3 (T2). The rationale for this approach is that the child’s regression in level is not indicative of an absolute regression in terms of cognitive ability and severity of autism symptoms and hence it would be inappropriate to attribute disbenefits to the provision of intensive EI as a result.²⁶ Under this approach, while the incremental cost of providing intensive EI to this child is included in the analysis, the child does not impact on the economic benefit quantified for the cohort.

²⁶ Standardised clinical assessments allow AEIOU to benchmark how well a child performs on a set of tasks as compared with a group of children the same age. Since this takes age and expected development into account, if a child were following a typical trajectory, their line would be horizontal. Alternatively, if a child was staying at the same level of development, their scores would decline over time.

Based on the above approach, the lifetime trajectories for the cohorts can be assessed under both scenarios, with the difference being driven by the outcome data for the cohort, rather than the subjective opinion of the ARIC.

In terms of developing the lifetime trajectories for each level within the cohorts, different approaches were adopted across the key outcome areas. For the non-NDIS assistance key outcome areas (e.g. education, employment), AEIOU advised on lifetime outcomes for each level within the cohort. As in 2013, proportions have been applied to represent the proportion of children in each level that will realise various outcomes. For example, for children in the 'Level 4' category (i.e. severe autism), AEIOU advised that 10 per cent were likely to achieve part-time employment at the minimum wage, with the remaining 90 per cent being unemployed.

It is important to note that, unlike in 2013, AEIOU has not advised on the improvements that will be achieved as a result of intensive EI, but rather simply the projected lifetime outcomes for each level. The improved lifetime outcomes attributable to intensive EI are driven by the analysis of AEIOU's outcome data, as detailed above.

For NDIS assistance, the lifetime trajectories are derived from the data on current NDIS participants.²⁷ Looking at how NDIS budgets vary with age for the current cohort of NDIS participants, potential lifetime trajectories can be inferred for the AEIOU cohort. This assumes that in distribution, at least without intensive EI, NDIS budgets will remain stable overtime. Given that between 2018 and 2020 the average NDIS budget for a participant with autism has grown by over 10 percent in nominal terms,²⁸ this has the potential to underestimate the potential benefits.²⁹

3.4 Quantification of lifetime outcomes

Estimating the economic benefit derived from intensive EI requires the quantification of lifetime trajectories for the AEIOU cohort under the two scenarios – base case and 'with intensive EI'. The difference in the quantified impacts under these two scenarios represents the economic benefit that can be attributed to the provision of intensive EI to the AEIOU cohorts.

²⁷ For this undertaking, two sources NDIA data were used. The first was provided by NDIA which included budgets by support category broken down by age and functional level, and provided for 2018, 2019, 2020. The second source was the NDIA data active participant plan data which has been made publicly available on their website, <https://data.ndis.gov.au/data-downloads>.

²⁸ Based on Synergies calculations.

²⁹ The data also suggest that growth is not occurring evenly across the distribution, with those classified with a functional category as 'low' by NDIS experiencing a higher growth in percentage terms than those classified as moderate.

As detailed above, through analysis of NDIS data and based on outcome proportions provided by AEIOU, it is possible to develop lifetime trajectories for each of the participant levels, 1 through 7, across all key outcome areas under both scenarios.

The approach to quantification of lifetime trajectories is then the same under the two scenarios:

- assess, based on T1 scores for the base case and T2 and T3 scores for the 'with intensive EI' scenario, the outcomes expected to be realised by the cohort for each key outcome area;
- for the NDIS categories, analyse the NDIS data to estimate the NDIS expenditure required over the lifetime of the cohort under the two scenarios; and
- for the other key outcome areas, using the proportions provided by AEIOU, allocate the cohort across the various trajectories for each outcome area and apply parameter estimates to quantify the economic impacts under both the base case and the 'with intensive EI' scenario.

The following base assumptions have been applied in quantifying lifetime trajectories for the cohorts under both scenarios:

- it is assumed that all children commence receiving intensive EI between the ages of two and three and are provided one or two years of intensive EI;
- lifetime costs are calculated from the age of five onwards;
- a real social discount rate of five per cent has been applied to calculate Present Value estimates for lifetime economic impacts; and
- an adjustment has been made to account for the expected lifetime of cohort participants, with a mortality rate of 2.06 times the normal population has been assumed,³⁰ as found by Hwang et al (2019).³¹

3.5 Assess net economic benefit of intensive EI

The final step involves assessing the net economic benefit of intensive EI across the cohorts. This involves the following steps:

³⁰ Given the relatively limited data available, the same mortality rate has been applied across the cohort (i.e. the same mortality rate has been assumed for every level within the cohort). Further, the same mortality rate has been applied under the base case and 'with intensive EI' scenarios (i.e. no allowance has been made for the reduction in mortality rate as a result of the improved outcomes derived from the provision of intensive EI to the cohort).

³¹ Hwang, Y. J., et al (2019). Mortality and cause of death of Australians on the autism spectrum. *Autism research*, 12(5), pp 806-815.

- comparing the economic impacts quantified under the two scenarios to identify the economic benefits attributable to the provision of intensive EI to the cohorts;
- assessing the incremental cost of providing intensive EI to the cohorts, based on an assessment of the cost of childcare and parental care that would be required under the base case against the cost of providing intensive EI; and
- comparing the estimates derived in the preceding steps to provide Net Present Value (NPV) and Benefit Cost Ratio (BCR) results for the net economic benefit attributable to the provision of intensive EI to the cohorts.

Net economic benefits can be assessed for each of the cohorts, for specific key outcome areas, and for individual children within the cohorts across different groups. Net economic benefits can also be reported in terms of the average net economic benefit derived by children within the cohorts. Sensitivity analysis has been performed on key assumptions and parameter values.

4 NDIS assistance

Individuals with autism receive ongoing funding from the healthcare system, which in total, is a considerable cost. The largest cost of healthcare expenditure for children with autism is covered by the National Disability Insurance Scheme (NDIS).

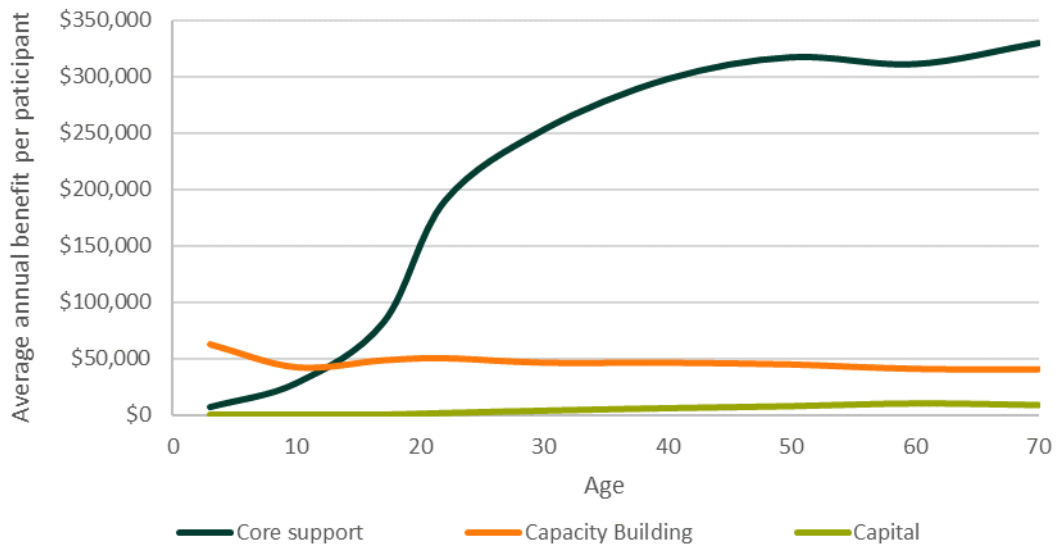
4.1 NDIS assistance categories

The NDIS provides funding within three broad categories of support budgets:

- **Core Supports:** to help with everyday activities and disability-related needs.
- **Capital Supports:** to help with higher-cost pieces of assistive technology, and funding for one-off purchases.
- **Capacity Building Supports:** to build skills and independence.

Figure 4 shows funding profile of NDIS participants by age for each of these three categories.

Figure 4 Average NDIS participant funding by age and category



Note: Average take over 2018, 2019 and 2020, measured at December in each year.

Data source: NDIS.

Funding for each of these categories show very different profiles over the life of participants. On average, capacity building is the highest category for participants up to 10 years of age, and slowly tapers down over the life of participants. In contrast, core support starts lower but increases over time to become by far the biggest funding category. Capital expenditure tends to be the lowest on average, however, includes major, one-off items of expenditure such as home improvements.

4.2 NDIS Data

The NDIA provided data on active participant counts and average plan budgets by functional category, age group, and support for participants with autism. Table 7 shows the NDIA’s categorisation of participants with autism.

Table 7 NDIA categorisation of autism disability

Functional category	Assessment tool	Assessment level
High	DSM-5	Requiring support
	Vineland 3	Adaptive behaviour score 56 and above
Moderate	DSM-5	Requiring substantial support
	Vineland 3	Adaptive behavioural score 41 to 55
Low	DSM-5	Requiring very substantial support
	Vineland 3	Adaptive behaviour score 40 and below

Note: The NDIA does not report on average plan budgets by assessment tool used.

Source: NDIA.

The data is provided for nine age brackets.³² In terms of the type of support provided, the data contained a breakdown of four sub-categories for core support; nine sub-categories for capacity building; and two sub-categories for capital support. The detailed breakdown of data provides a robust basis for assessing how funding needs vary across the cohort and how different categories of support change over a lifetime.

In addition to this, NDIS publishes data for the three support budgets by region. Average budget data is available for 81 regions across Australia.³³

4.3 Core support

Core support is the main ongoing support budget and provides the support for daily living, housing, and living support. This constitutes the largest part of the NDIS budget. The sub-categories under Core support are as follows:

- Daily activities
- Consumables
- Social, community and civic participation
- Transport.

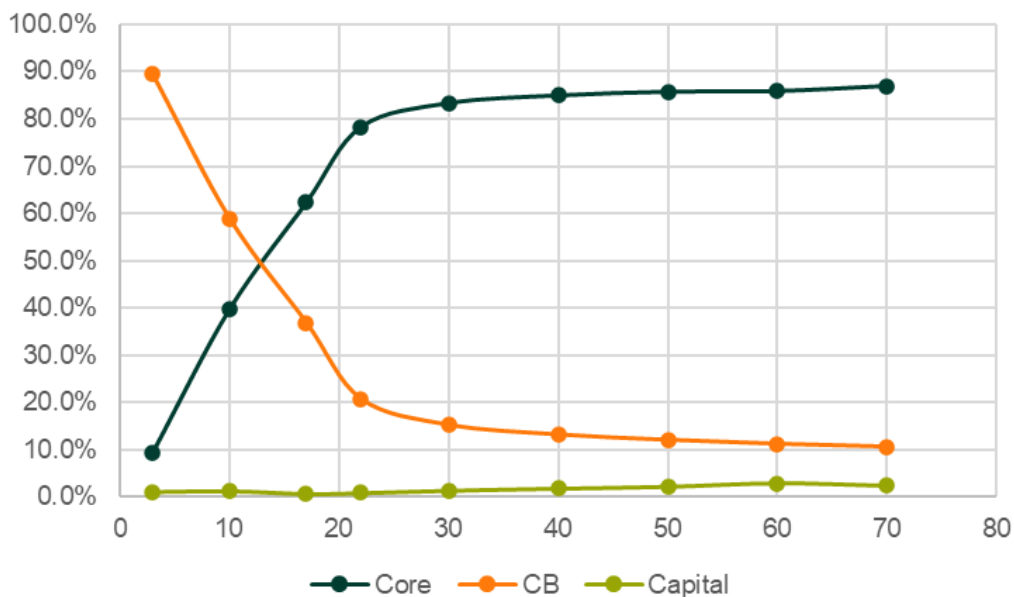
³² These age brackets are 0-6, 7-14, 15-18, 19-24, 25-34, 35-44, 45-54, 55-64, 65+.

³³ Noting that data for regions with less than 11 participants is censored to preserve anonymity.

In addition to being the largest component of the funding provided by the NDIS, including for participants with autism, the Core support category is also the most varied, as participants have significant flexibility in terms of how their budget is allocated across the four sub-categories. Given this, and taking into account that the NDIA data show that funding across the sub-categories is highly correlated, funding provided under the Core support category has been assessed as a single funding category.

For most NDIS participants with autism, Core support accounts for the majority of total funding received under the NDIS. The following figure shows each support budget as a percentage of total NDIS expenditure by age. As expected, for younger participants, Capacity Building accounts for the largest share of NDIS funding, however Core Support quickly becomes the dominant category once participants reach adulthood. The Capital support category remains relatively immaterial across all age groups.

Figure 5 Percentage of total NDIS for autism participants spending by age group



Data source: NDIA, average taken across 2018, 2019 and 2020.

The data provided by the NDIA also shows that Core Support are the costs that vary the most by level of the participant. This contrasts with Capacity Building support, which has high initial expenditure, followed by a relatively flat profile of expenditure throughout the life of the participant.

Having regard to the significance of the Core support category in terms of the level of NDIS funding required by participants with autism, a granular approach has been adopted to quantification of both current funding requirements for individuals with

autism and also the cost savings achieved as a result of the gains attributable to intensive EI. Regional data of NDIS Core support budgets have therefore been assessed to estimate the percentiles for NDIS Core support budgets for each of the nine age brackets.³⁴

Having estimated the percentiles for the Core support budget, six groups were created based on the quintiles, with an extra separation of the top 10 percent.³⁵

- 1st Quintile (0-20%): Will need little to no support
- 2nd Quintile (20-39%): By age 40 will require between \$4,500 and \$23,000 per year
- 3rd Quintile (40-59%): By age 40 will require between, \$23,000 and \$66,000 per year
- 4th Quintile (60-79%): By age 40 will require between, \$66,000 and \$166,000 per year
- 9th Decile (80-89%): By age 40 will require between, \$166,000 and \$283,000 per year
- 10th Decile (Top 10%): By age 40 will require \$283,000 plus per year.

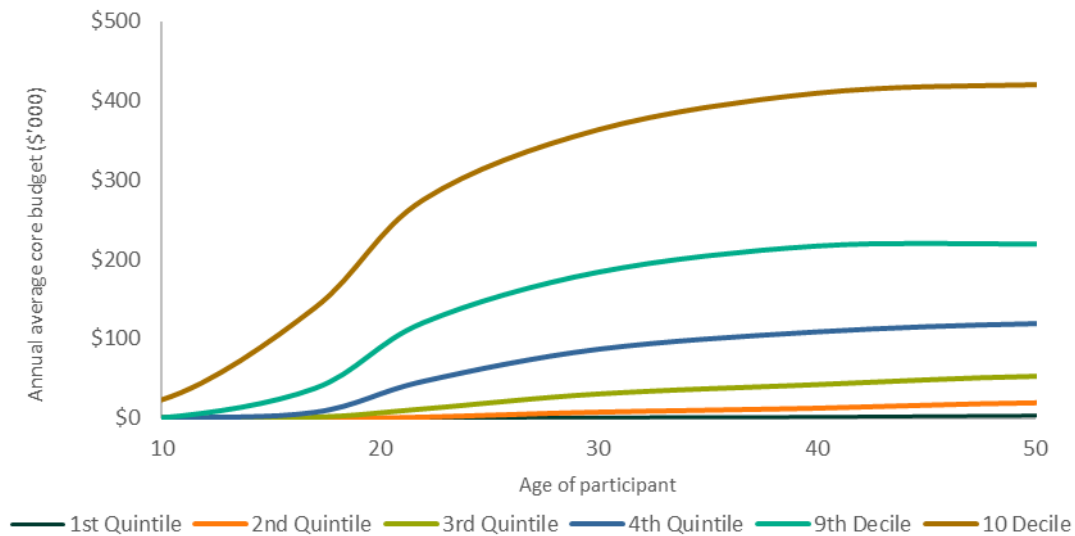
The following figure shows lifetime trajectories for Core support funding for NDIS participants with autism. It is important to note that percentiles change with the age of the participants. For example, the blue line (representing the 80th percentile) shows that at around 21 years of age the top 20 percent of participants are receiving around \$75,000 per year, while at the age of 40 the top 20 percent of participants are receiving over \$150,000 per year.³⁶

³⁴ Details of the approach used for estimate are provided in Attachment A.

³⁵ Having regard to the significance of these participants to the level of Core support funding required for individuals with autism under the NDIS and the magnitude of the benefits from intensive EI.

³⁶ Note: The percentiles are calculated based on all NDIS autism participants, not just participants who receive core support payments. This distinction is mainly relevant at younger age groups where participants may not yet be receiving core support payments.

Figure 6 NDIS percentiles for the Core support budget for autism participants



Data source: Estimated using NDIA SA4 data from June 2021. Percentile are calculated using age ranges, with the midpoint of these ranges plotted on the graph.

4.3.1 Base case

The table below details the calibrations that have been constructed using AEIOU participant data and the available NDIS data. That is, the table details the percentage outcomes for each expenditure level, in terms of NDIS Core support funding required, for each level across the cohort.

Table 8 Base case trajectories for NDIS Core support by level (proportion by level)

Outcome	Level						
	1	2	3	4	5	6	7
1 st Quintile (0 – 20 percent)	0	0	15	25	40	45	100
2 nd Quintile (21-40 percent)	5	10	20	25	30	30	0
3 rd Quintile (41-60 percent)	5	10	15	15	20	25	0
4 th Quintile (61-80 percent)	5	25	20	20	10	0	0
Penultimate 10 percent (81-90 percent)	10	40	20	10	0	0	0
Top 10 percent (91-100 percent)	75	15	10	5	0	0	0

Source: Calibrated from NDIA and AEIOU data, with input from AEIOU.

The above proportions were applied to the breakdown of the cohort of children based on T1 scores (see Table 5) to derive estimates for Core support under the base case. The tables below set out the estimates for core support for the cohorts, by level.

Table 9 Core support budget costs under the base case for the 2-year cohort

Level	1st Quintile (0%-20%)	2nd Quintile (21%-40%)	3rd Quintile (41%-60%)	4th Quintile (61%-60%)	9th Decile (81%-90%)	10th Decile (91%-100%)	Total cost (\$000) (PV terms)
<i>Cost per child (PV)</i>	\$9,875	\$81,619	\$280,333	\$765,483	\$1,643,805	\$3,552,739	-
Level 1	0.0	3.6	3.6	3.6	7.1	53.3	204,857
Level 2	0.0	5.7	5.7	14.3	22.8	8.6	80,826
Level 3	4.7	6.2	4.7	6.2	6.2	3.1	27,807
Level 4	5.0	5.0	3.0	4.0	2.0	1.0	11,201
Level 5	2.8	2.1	1.4	0.7	0.0	0.0	1,127
Level 6	5.4	3.6	3.0	0.0	0.0	0.0	1,188
Level 7	1.0	0.0	0.0	0.0	0.0	0.0	10
Total cohort	18.9	26.2	21.3	28.7	38.1	65.9	\$327,015

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 10 Core support budget costs under the base case for the 1-year cohort

Level	1st Quintile (0%-20%)	2nd Quintile (21%-40%)	3rd Quintile (41%-60%)	4th Quintile (61%-60%)	9th Decile (81%-90%)	10th Decile (91%-100%)	Total cost (\$000) (PV terms)
<i>Cost per child (PV)</i>	\$9,875	\$81,619	\$280,333	\$765,483	\$1,643,805	\$3,552,739	-
Level 1	0.0	4.1	4.1	4.1	8.1	60.8	233,710
Level 2	0.0	6.4	6.4	16.0	25.6	9.6	90,752
Level 3	6.2	8.2	6.2	8.2	8.2	4.1	36,776
Level 4	7.8	7.8	4.7	6.2	3.1	1.6	17,361
Level 5	10.8	8.1	5.4	2.7	0.0	0.0	4,348
Level 6	5.9	3.9	3.3	0.0	0.0	0.0	1,287
Level 7	4.0	0.0	0.0	0.0	0.0	0.0	39
Total cohort	34.6	38.4	29.9	37.2	45.0	76.0	\$384,274

Source: Synergies modelling, based on inputs provided by AEIOU.

4.3.2 With intensive EI

As described in section 3, the avoided NDIS Core support costs attributable to the improved outcomes achieved from intensive EI have been quantified based on the T2 and T3 outcome data for the one-year and two-year cohorts respectively. The tables below detail the core support costs quantified for the two cohorts under the ‘with intensive EI’ scenario.

Table 11 Core support budget costs under the EI treatment for the two-year cohort

Level	1st Quintile (0%-20%)	2nd Quintile (21%-40%)	3rd Quintile (41%-60%)	4th Quintile (61%-80%)	9th Decile (81%-90%)	10th Decile (91%-100%)	Total cost (\$000) (PV terms)
<i>Cost per child (PV)</i>	\$9,875	\$81,619	\$280,333	\$765,483	\$1,643,805	\$3,552,739	
Level 1	0.0	3.2	3.2	3.2	6.4	48.0	\$184,660
Level 2	0.0	4.9	4.9	12.3	19.6	7.4	\$69,482
Level 3	5.6	7.4	5.6	7.4	7.4	3.7	\$33,188
Level 4	4.3	4.3	2.6	3.4	1.7	0.9	\$9,521
Level 5	5.6	4.2	2.8	1.4	0.0	0.0	\$2,255
Level 6	6.8	4.5	3.8	0.0	0.0	0.0	\$1,485
Level 7	3.0	0.0	0.0	0.0	0.0	0.0	\$30
Total cohort	25.2	28.5	22.8	27.7	35.1	59.9	\$300,620

Note: Note that while Level 1 represents the most profound category in the cohort and Level 7 represents those individuals with the least severe autism symptoms, in categorising the NDIS expenditure requirements, the first quintile relates to those NDIS participants that receive the lowest level of funding, while the 10th Decile relates to those participants with the highest funding requirements.

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 12 Core support budget costs under the EI treatment for the one-year cohort

Level	1st Quintile (0%-20%)	2nd Quintile (21%-40%)	3rd Quintile (41%-60%)	4th Quintile (61%-80%)	9th Decile (81%-90%)	10th Decile (91%-100%)	Total cost (\$000) (PV terms)
<i>Cost per child (PV)</i>	\$9,875	\$81,619	\$280,333	\$765,483	\$1,643,805	\$3,552,739	
Level 1	0.0	3.1	3.1	3.1	6.2	46.5	\$178,889
Level 2	0.0	5.5	5.5	13.8	22.0	8.3	\$77,990
Level 3	5.4	7.2	5.4	7.2	7.2	3.6	\$32,292
Level 4	7.3	7.3	4.4	5.8	2.9	1.5	\$16,241
Level 5	19.2	14.4	9.6	4.8	0.0	0.0	\$7,730
Level 6	8.6	5.7	4.8	0.0	0.0	0.0	\$1,881
Level 7	12.0	0.0	0.0	0.0	0.0	0.0	\$118
Total cohort	52.4	43.2	32.7	34.7	38.3	59.8	\$315,142

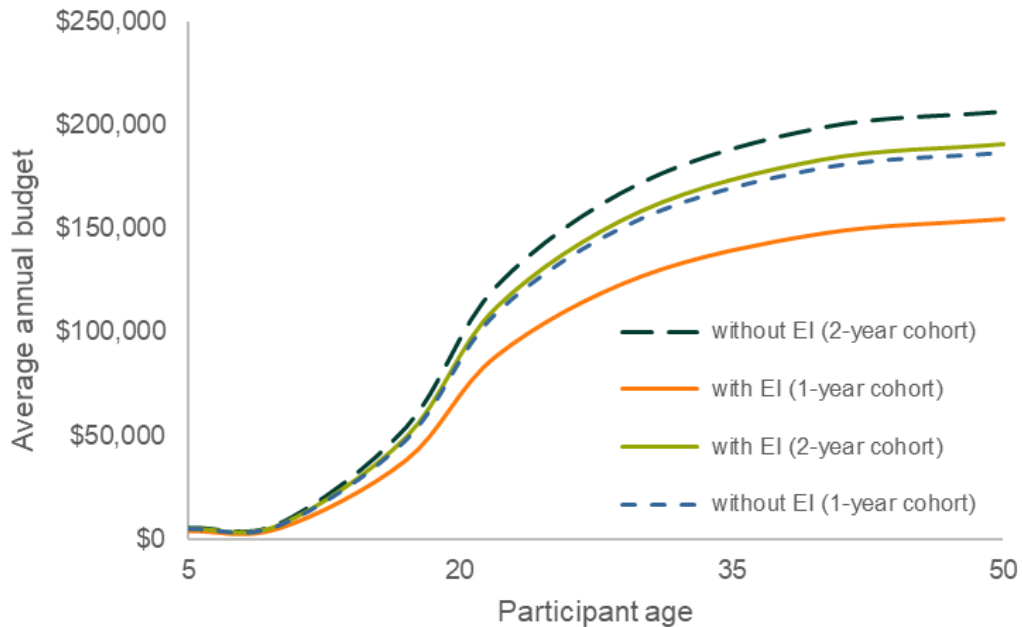
Note: Note that while Level 1 represents the most profound category in the cohort and Level 7 represents those individuals with the least severe autism symptoms, in categorising the NDIS expenditure requirements, the first quintile relates to those NDIS participants that receive the lowest level of funding, while the 10th Decile relates to those participants with the highest funding requirements.

Source: Synergies modelling, based on inputs provided by AEIOU.

The total benefit attributable to intensive EI from avoided Core support costs across the two cohorts are estimated at \$26.4 million for the two-year cohort and \$69.1 million for the one-year cohort (PV terms). Noting the significant variability in impacts of intensive EI across the cohorts, on a per child basis, this equates to an average benefit of \$132,600 for the two-year cohort and \$264,900 for the one-year cohort (PV terms).

The figure below shows the results of the modelling in terms of the average annual core support budget for both cohorts over time under the base case and the 'with intensive EI' scenario.

Figure 7 Average annual Core support budget for AEIOU cohorts over time



Data source: Synergies modelling.

4.4 Capital Support

As a basis for capital support, we use data for the three function levels, high, moderate, and low provided by the NDIS and estimate how many participants of each cognitive level will fall into each of the categories. We then use the lifetime trajectories for each function level to estimate the lifetime trajectories of AEIOU participants.

NDIS capital support funding relates to the cost of assistive technology, equipment, and home modifications. The two support categories within this budget are given below.

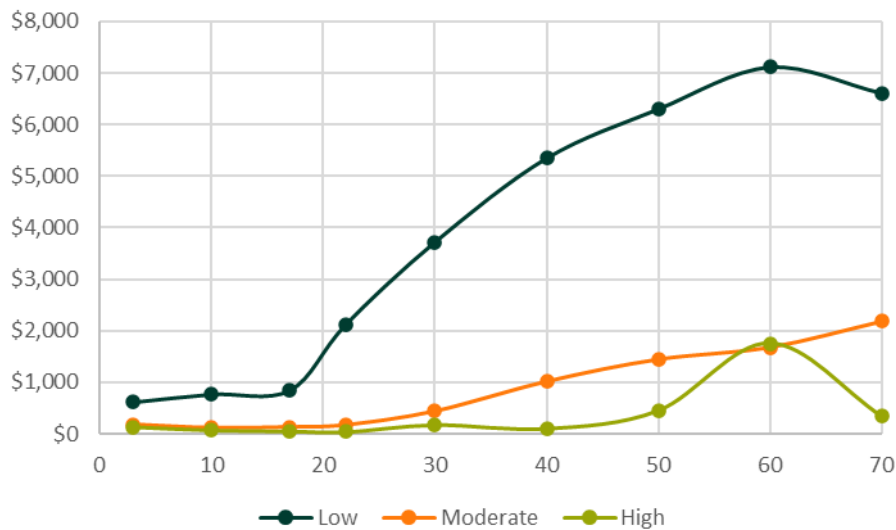
Table 13 Capital supports: Description of key support categories

Support Category	Descriptions
Assistive Technology	This includes equipment items for mobility, personal care, communication, and recreational inclusion such as wheelchairs or vehicle modifications.
Home Modifications	Home modifications such as installation of a handrail in a bathroom, or Specialist Disability Accommodation for participants who require special housing because of their disability.

Source: NDIA, <https://www.ndis.gov.au/participants/using-your-plan/managing-your-plan/support-budgets-your-plan>.

For capital support costs, the lifetime trajectory for low, moderate, and high participants are given in the figure below.

Figure 8 Lifetime trajectories for capital support budgets



Data source: NDIA.

The above figure shows that capital support remains relatively low for the moderate and high category but exceeds \$4,000 per annum for the low category after the age of 30 years.

4.4.1 Base case

The table below details the calibrations that have been constructed using AEIOU participant data and the available NDIS data. That is, the table details the percentage outcomes for each expenditure level, in terms of NDIS Capital support funding required, for each level across the cohort.

Table 14 Base case trajectories for Capital support by level (proportion by level)

Outcome	Level						
	1	2	3	4	5	6	7
Low	75	58	29	22	23	0	0
Moderate	23	38	54	63	64	69	0
High	2	4	17	16	14	31	100

Source: Calibrated from NDIA and AEIOU data, with input from AEIOU.

The above proportions were applied to the breakdown of the cohort of children based on T1 scores (see Table 5) to derive estimates for capital support under the base case. The table below sets out the estimates for capital support costs for the cohort, by level.

Table 15 Capital support budget costs under the base case for the two-year cohort

Level	Low		Moderate		High		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	53.3	\$2,324	16.3	\$127	1.4	\$4	\$2,455.32
Level 2	33.1	\$1,443	21.7	\$169	2.3	\$7	\$1,618.41
Level 3	9.0	\$392	16.7	\$130	5.3	\$16	\$538.83
Level 4	4.4	\$192	12.6	\$98	3.2	\$10	\$299.95
Level 5	1.6	\$70	4.5	\$35	1.0	\$3	\$108.16
Level 6	0.0	\$0	8.3	\$65	3.7	\$11	\$75.87
Level 7	0.0	\$0	0.0	\$0	1.0	\$3	\$3.05
Total cohort	101.31	\$4,421	80.09	\$624	17.87	\$55	\$5,100

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 16 Capital support budget costs under the base case for the one-year cohort

Level	Low		Moderate		High		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	60.8	\$2,651	18.6	\$145	1.6	\$5	\$2,801.13
Level 2	37.1	\$1,620	24.3	\$189	2.6	\$8	\$1,817.17
Level 3	11.9	\$519	22.1	\$173	7.0	\$21	\$712.65
Level 4	6.8	\$298	19.5	\$152	5.0	\$15	\$464.93
Level 5	6.2	\$271	17.3	\$135	3.8	\$12	\$417.18
Level 6	0.0	\$0	9.0	\$70	4.0	\$12	\$82.20
Level 7	0.0	\$0	0.0	\$0	4.0	\$12	\$12.21
Total cohort	122.79	\$5,358	110.87	\$864	27.92	\$85	\$6,307

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

The above table shows that Level 1 and 2 participants are the key driver of Capital support costs, accounting for 64 per cent of the cohort total.

4.4.2 With intensive EI

As described in section 3, the avoided NDIS capital support costs to the improved outcomes achieved from intensive EI have been quantified based on the T2 and T3 outcome data for the cohorts. The tables below detail the capital support costs quantified for the cohorts under the 'with intensive EI' scenario.

Table 17 Capital support budget costs under the with EI treatment for the two-year cohort

Level	Low		Moderate		High		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	48.0	\$2,095	14.7	\$115	1.3	\$4	\$2,213.24
Level 2	28.4	\$1,240	18.6	\$145	2.0	\$6	\$1,391.27
Level 3	10.7	\$468	20.0	\$156	6.3	\$19	\$643.12
Level 4	3.7	\$163	10.7	\$83	2.7	\$8	\$254.96
Level 5	3.2	\$141	9.0	\$70	2.0	\$6	\$216.31
Level 6	0.0	\$0	10.4	\$81	4.7	\$14	\$94.84
Level 7	0.0	\$0	0.0	\$0	3.0	\$9	\$9.16
Total cohort	94.11	\$4,107	83.34	\$649	21.86	\$67	\$4,823

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 18 Capital support budget costs under the with EI treatment for the one-year cohort

Level	Low		Moderate		High		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	46.5	\$2,029	14.3	\$111	1.2	\$4	\$2,144.08
Level 2	31.9	\$1,392	20.9	\$163	2.2	\$7	\$1,561.63
Level 3	10.4	\$456	19.4	\$151	6.1	\$19	\$625.74
Level 4	6.4	\$278	18.3	\$142	4.6	\$14	\$434.93
Level 5	11.0	\$482	30.7	\$239	6.7	\$21	\$741.65
Level 6	0.0	\$0	13.1	\$102	5.9	\$18	\$120.13
Level 7	0.0	\$0	0.0	\$0	12.0	\$37	\$36.63
Total cohort	106.26	\$4,637	116.7	\$909	38.81	\$118	\$5,665

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

The total benefit attributable to intensive EI from avoided capital support cost is estimated at \$0.92 million for the entire cohort (PV terms). On a per child basis, this equates to an average benefit of \$1,390 per child for the two-year cohort and \$2,462 per child for the one-year cohort. The breakdown of the costs under the base case and ‘with intensive EI’ scenario demonstrates that for the two-year cohort, this benefit is primarily attributable to a reduction in expenditure for children in level 2, with members in this group shifting to higher levels within the cohort, for which capital support costs are, on average, lower.

For the one-year cohort, reductions in Capital Support costs attributable to intensive EI are more widely distributed throughout the cohort.

4.5 Capacity Building

As, with NDIS Capital support, the basis for evaluating Capacity Building support is use data for the three function levels, high, moderate, and low provided by the NDIA.

Using this, we estimate how many participants of each cognitive level will fall into each of the categories. This is then used to project lifetime trajectories for each cognitive level of AEIOU participants.

There are nine categories within the Capacity Building support budget, each designed to help build participants skills and independence. These support categories are detailed in the table below.

Table 19 Support categories for NDIS participants with autism

Synergies grouping	NDIA Support category	Description
Package support costs	Support Coordination	A fixed amount for a Support Coordinator to help the participant use their plan.
	CB Choice and Control	Plan management to help the participant manage their plan, funding and paying for services.
Social assistance costs	CB Social Community and Civic Participation	Development and training to increase skills so the participant can participate in community, social and recreational activities.
	CB Relationships	This support will help the participant develop positive behaviours and interact with others.
	CB Daily Activity	Assessment, training, or therapy to help increase skills, independence, and community participation. These services can be delivered in groups or individually.
Employment and Education assistance costs	CB Employment	This may include employment-related support, training and assessments that helps the participant find and keep a job, such as the school leaver employment supports.
	CB Lifelong Learning	Examples include training, advice and help for the participant to move from school to further education, such as university or TAFE.
Health and living assistance costs	CB Health and Wellbeing	Including exercise or diet advice to manage the impact of disability. The NDIS does not fund gym memberships.
	CB Home Living	Support to help the participant find and maintain an appropriate place to live.

Source: NDIA, <https://www.ndis.gov.au/participants/using-your-plan/managing-your-plan/support-budgets-your-plan>.

Synergies has grouped these into four groups, Package support; Social assistance, Employment and education assistance; and Health and living assistance costs. The table below shows the base case trajectories in terms of PV of costs for the low, moderate, and high categories (as provided by NDIA) for these cost categories.

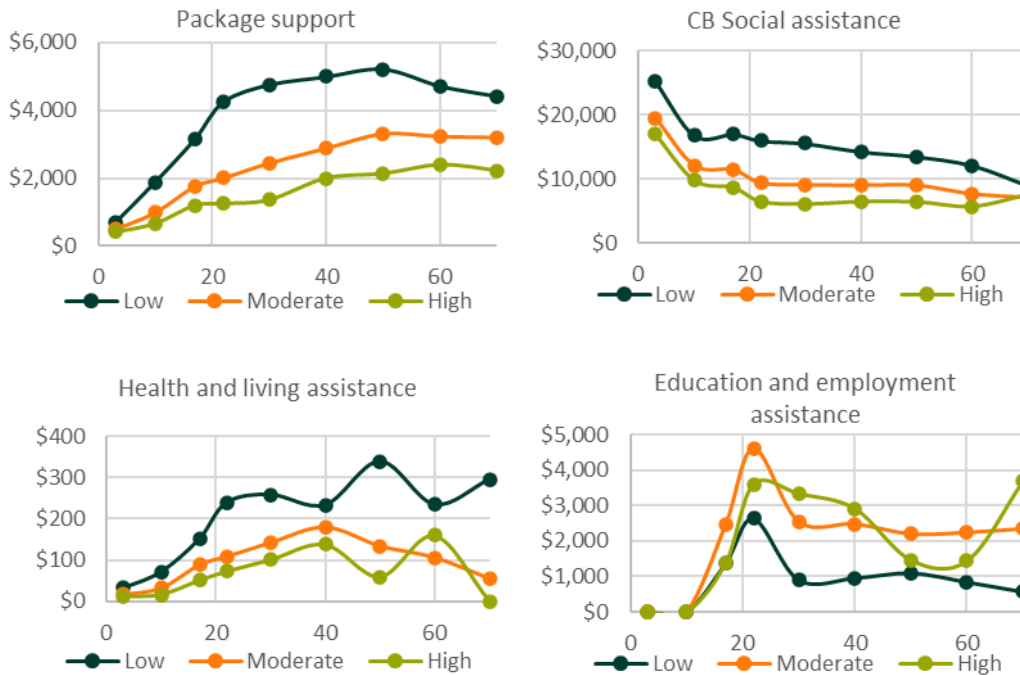
Table 20 PV cost estimates for Capacity Building by cost category

Support package	Present value of costs		
	Low	Moderate	High
Package support costs	\$60,428	\$33,087	\$21,517
Social assistance costs	\$280,647	\$186,089	\$141,433
Employment and Education assistance costs	\$14,797	\$31,143	\$28,891
Health and living assistance costs	\$3,045	\$1,550	\$1,027
Total	\$358,917	\$251,869	\$192,868

Source: NDIA with synergies modelling.

The lifetime trajectories in terms of expenditure requirements for each cost category for the low, medium, and high groups are displayed in the figure below.

Figure 9 Lifetime trajectories for capacity building categories



Data source: NDIA.

A key point to note in relation to the above charts is that, different to other NDIS expenditure categories, employment assistance expenditure is higher for the high and moderate categories than for the low category. This is explained by the limited scope for participants in the 'low' category to obtain employment. The two major cost categories for Capacity Building are Social assistance and Health and living assistance. Participants in the 'low' category have significantly higher costs relative to the other groups in relation to these two categories, with costs increasing in early adulthood before tapering.

4.5.1 Base case

The method applied to determine the distribution of each level within the cohort across the low, medium, and high NDIA categories for Capacity Building is consistent with that applied for Capital support (see section 4.4.1). The proportions for each level are detailed in the table below.

Table 21 Base case trajectories for Capacity Building by level (proportion of level)

Outcome	Level						
	1	2	3	4	5	6	7
Low	75	58	29	22	23	0	0
Moderate	23	38	54	63	64	69	0
High	2	4	17	16	14	31	100

Source: Estimates provided by AEIOU.

The above proportions were applied to the breakdown of the cohort of children based on T1 scores (see Table 5) to derive estimates for Capacity Building expenditure under the base case. The tables below Table 22 set out the cost estimates under the base case for the two sub-cohorts.

Table 22 Capacity building costs under the base case for the two-year cohort

Level	Low		Moderate		High		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	53.3	\$19,112	16.3	\$4,113	1.4	\$274	\$23,499.22
Level 2	33.1	\$11,866	21.7	\$5,455	2.3	\$440	\$17,761.02
Level 3	9.0	\$3,227	16.7	\$4,216	5.3	\$1,016	\$8,459.37
Level 4	4.4	\$1,579	12.6	\$3,174	3.2	\$617	\$5,369.97
Level 5	1.6	\$578	4.5	\$1,128	1.0	\$189	\$1,895.24
Level 6	0.0	\$0	8.3	\$2,085	3.7	\$717	\$2,802.95
Level 7	0.0	\$0	0.0	\$0	1.0	\$193	\$192.87
Total cohort	101.31	\$36,362	80.09	\$20,172	17.87	\$3,447	\$59,981

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 23 Capacity building costs under the base case for the one-year cohort

Level	Low		Moderate		High		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	60.8	\$21,804	18.6	\$4,692	1.6	\$312	\$26,808.97
Level 2	37.1	\$13,323	24.3	\$6,125	2.6	\$494	\$19,942.20
Level 3	11.9	\$4,268	22.1	\$5,576	7.0	\$1,344	\$11,188.20
Level 4	6.8	\$2,448	19.5	\$4,919	5.0	\$957	\$8,323.45
Level 5	6.2	\$2,229	17.3	\$4,352	3.8	\$729	\$7,310.22
Level 6	0.0	\$0	9.0	\$2,259	4.0	\$777	\$3,036.53
Level 7	0.0	\$0	0.0	\$0	4.0	\$771	\$771.47
Total cohort	122.79	\$44,071	110.87	\$27,925	27.92	\$5,385	\$77,381

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

The above tables show that, under the base case, children in level 1 and 2 are the most significant contributors to Capacity Building costs, for both sub-cohorts.

4.5.2 With intensive EI

As described in section 3, the reduction in NDIS expenditure in the Capacity Building category for the cohorts as a result of intensive EI has been quantified based on the T2 and T3 outcome data for the cohorts. The tables below detail the Capacity Building costs quantified for the cohorts under the 'with intensive EI' scenario.

Table 24 Capacity Building costs under the 'with intensive EI' scenario for the two-year cohort

Level	Low		Moderate		High		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	48.0	\$17,228	14.7	\$3,708	1.3	\$247	\$21,182.40
Level 2	28.4	\$10,200	18.6	\$4,690	2.0	\$378	\$15,268.25
Level 3	10.7	\$3,851	20.0	\$5,032	6.3	\$1,213	\$10,096.67
Level 4	3.7	\$1,342	10.7	\$2,698	2.7	\$525	\$4,564.47
Level 5	3.2	\$1,156	9.0	\$2,257	2.0	\$378	\$3,790.48
Level 6	0.0	\$0	10.4	\$2,607	4.7	\$897	\$3,503.68
Level 7	0.0	\$0	0.0	\$0	3.0	\$579	\$578.60
Total cohort	94.11	\$33,778	83.34	\$20,991	21.86	\$4,216	\$58,985

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 25 Capacity Building costs under the 'with intensive EI' scenario for the one-year cohort

Level	Low		Moderate		High		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	46.5	\$16,690	14.3	\$3,592	1.2	\$239	\$20,520.45
Level 2	31.9	\$11,449	20.9	\$5,264	2.2	\$424	\$17,137.83
Level 3	10.4	\$3,747	19.4	\$4,896	6.1	\$1,180	\$9,823.78
Level 4	6.4	\$2,290	18.3	\$4,602	4.6	\$895	\$7,786.45
Level 5	11.0	\$3,962	30.7	\$7,737	6.7	\$1,296	\$12,995.94
Level 6	0.0	\$0	13.1	\$3,302	5.9	\$1,136	\$4,438.00
Level 7	0.0	\$0	0.0	\$0	12.0	\$2,314	\$2,314.41
Total cohort	106.26	\$38,139	116.7	\$29,393	38.81	\$7,485	\$75,017

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

The tables above demonstrate a cohort-wide benefit of \$3.36 million. This equates to a per child benefit of \$5,005 for the two-year cohort and \$9,058 for the one-year cohort. As with the other NDIS support categories, this is primarily driven by a reduction in the costs for Level 2, as improved outcomes attributable to intensive EI result in members in this category improving into Levels 3 and above, where expenditure requirements on a per person basis are lower.

The tables below demonstrate how the benefits of intensive EI vary across the sub-categories of support under the Capacity Building category. The tables show that the

majority (over 85 per cent) of the reduction in Capacity Building costs is concentrated in the Social Assistance costs sub-category, with the improvements in outcomes across the cohorts actually resulting in an increase in Employment and Education Assistance costs.

Table 26 Per child benefits of EI for Capacity Building by grouping for the two-year cohort

Level	Present value of costs		Net benefits of Early Intervention
	Without EI	With EI	
Package support costs	\$46,012	\$44,798	\$1,215
Social assistance costs	\$230,470	\$226,191	\$4,279
Employment and Education assistance costs	\$22,661	\$23,214	-\$553
Health and living assistance costs	\$2,267	\$2,202	\$64
Totals	\$301,410	\$296,405	\$5,005

Source: Synergies modelling based on NDIA and AEIOU data.

Table 27 Per child benefits of EI for Capacity Building by grouping for the one-year cohort

Level	Present value of costs		Net benefits of Early Intervention
	Without EI	With EI	
Package support costs	\$44,786	\$42,595	\$2,190
Social assistance costs	\$226,211	\$218,495	\$7,716
Employment and Education assistance costs	\$23,281	\$24,245	(\$964)
Health and living assistance costs	\$2,201	\$2,086	\$115
Totals	\$296,479	\$287,421	\$9,058

Source: Synergies modelling based on NDIA and AEIOU data.

4.6 Summary of results for NDIS expenditure

Table 28 provides a summary of the NDIS expenditure requirements over the lifetime of the entire cohort under the base case and with intensive EI scenarios.

Table 28 Summary of NDIS expenditure under base case and with intensive EI scenarios for the one-year cohort (PV terms)

NDIS support category	Base case costs		With intensive EI costs		Net benefit of intensive EI	
	Total cohort cost (\$m)	Cost per child (\$m)	Total cohort cost (\$m)	Cost per child (\$m)	Total cohort benefit (\$m)	Benefit per child
Core support	\$384.27	\$1.47	\$315.14	\$1.21	\$69.13	\$264,876
Capital	\$6.31	\$0.02	\$5.66	\$0.02	\$0.64	\$2,462
Capacity Building	\$77.38	\$0.30	\$75.02	\$0.29	\$2.36	\$9,058
Totals	\$467.96	\$1.79	\$395.82	\$1.52	\$72.14	\$276,397

Note: Totals may not add due to rounding.

Source: Synergies modelling.

Table 29 Summary of NDIS expenditure under base case and with intensive EI scenarios for the two-year cohort (PV terms)

NDIS support category	Base case costs		With intensive EI costs		Net benefit of intensive EI	
	Total cohort cost (\$m)	Cost per child (\$m)	Total cohort cost (\$m)	Cost per child (\$m)	Total cohort benefit (\$m)	Benefit per child
Core support	\$327.02	\$1.64	\$300.62	\$1.51	\$26.40	\$132,639
Capital	\$5.10	\$0.03	\$4.82	\$0.02	\$0.28	\$1,390
Capacity Building	\$59.98	\$0.30	\$58.98	\$0.30	\$1.00	\$5,005
Totals	\$392.10	\$1.97	\$364.43	\$1.83	\$27.67	\$139,035

Note: Totals may not add due to rounding.

Source: Synergies modelling.

The breakdown presented in the tables above shows the dominance of reduced expenditure under the Core support NDIS category in terms of the net benefits of intensive EI. This is due to this category accounting for over 95 per cent of the reduction in lifetime NDIS expenditure for both sub-cohorts.

As previously discussed, the differences in the economic benefit derived across the cohorts is primarily attributable to the difference in age-adjusted skill levels between the two sub-cohorts, with children in the one-year cohort responding more rapidly to Economic impacts for other key outcome areas

This section assesses and quantifies outcomes under the base case and the ‘with intensive EI’ case for those key outcome areas other than the provision of support under the NDIS.

4.7 Education

Children with autism, particularly those with moderate and severe autism, typically require access to some form of special schooling (e.g. additional assistance in a mainstream setting or full-time special schooling). Children with moderate to severe autism have difficulty learning in typical environments due to challenges in cognitive, language, and socio-behavioural factors. The requirement for learning assistance and special schooling represents an economic cost incurred by government through the provision of additional education funding.

To the extent that intensive EI reduces the special education requirements of children within the cohort, the avoidance of these costs represents an economic benefit. The table below details the parameter estimates applied to quantify the cost of special education delivered to children with autism.

Table 30 Parameter inputs for education costs

Outcome	Annual cost (\$2021/22)	Lifetime cost (Present Value)
The child will need to attend full-time special education.	\$31,824	\$277,620
The child will be able to attend mainstream schooling with support.	\$23,335	\$203,563
The child will be able to attend mainstream schooling without support.	\$14,846	\$129,506

Note: Present Value estimates calculated based on a real social discount rate of 5 per cent. Education costs to commence at 5 years of age and cease at 18 years of age.

Source: Queensland Budget 2020-21 - Service Delivery Statements Volume 2,3 and 5.

4.7.1 Base case

As described in section 3, education costs for the cohort under the base case have been quantified based on percentage outcomes for each level, as provided by AEIOU.³⁷ The percentages attributed to each outcome for each level across the cohort are detailed in the table below Table 31.

Table 31 Base case trajectories for education support and special education by level

Outcome	Level						
	1	2	3	4	5	6	7
Full-time special education	100	100	100	100	90	10	0
Mainstream schooling with support	0	0	0	0	10	75	0
Mainstream schooling without support	0	0	0	0	0	15	100

Source: Estimates provided by AEIOU.

As shown in the table above, it is assumed that all children that fall into categories 1 to 4 (children with profound and severe autism) will require full-time special education. As the severity of autism symptoms decline, children are more likely to be able to attend mainstream schooling with support, to the point where a proportion of children with mild autism and all children in level 7 are able to attend mainstream schooling without support.

The above proportions were applied to the breakdown of the cohort of children based on T1 scores (see Table 5) to derive estimates for education costs under the base case. The tables below set out the estimates for education costs for the cohorts, by level.

³⁷ The percentage outcomes are based on the knowledge of clinicians and apply under the scenario in which the cohort is not provided with intensive EI.

Table 32 Education costs under the base case for two-year cohort

Level	Full-time special ed.		Mainstream with support		Mainstream schooling		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	71	\$19,711	0	\$0	0	\$0	\$19,711
Level 2	57	\$15,824	0	\$0	0	\$0	\$15,824
Level 3	31	\$8,606	0	\$0	0	\$0	\$8,606
Level 4	20	\$5,552	0	\$0	0	\$0	\$5,552
Level 5	6.3	\$1,749	0.7	\$142	0	\$0	\$1,891
Level 6	1.2	\$333	9	\$1,832	1.8	\$233	\$2,398
Level 7	0	\$0	0	\$0	1	\$130	\$130
Total cohort	186.5	\$51,776	9.7	\$1,975	2.8	\$363	\$54,113

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 33 Education costs under the base case for one-year cohort

Level	Full-time special ed.		Mainstream with support		Mainstream schooling		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	81	\$22,487	0	\$0	0	\$0	\$22,487
Level 2	64	\$17,768	0	\$0	0	\$0	\$17,768
Level 3	41	\$11,382	0	\$0	0	\$0	\$11,382
Level 4	31	\$8,606	0	\$0	0	\$0	\$8,606
Level 5	24.3	\$6,746	2.7	\$550	0	\$0	\$7,296
Level 6	1.3	\$361	9.75	\$1,985	1.95	\$253	\$2,598
Level 7	0	\$0	0	\$0	4	\$518	\$518
Total cohort	242.6	\$67,351	12.45	\$2,534	5.95	\$771	\$70,655

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

4.7.2 With intensive EI

As described in section 3, the avoided education costs due to the improved outcomes achieved from intensive EI have been quantified based on the T2 and T3 outcome data for the sub-cohorts. The tables below detail the education costs quantified for the cohorts under the 'with intensive EI' scenario.

Table 34 Education costs under the ‘with intensive EI’ scenario for two-year cohort

Level	Full-time special ed.		Mainstream with support		Mainstream schooling		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	64	\$17,768	0	\$0.00	0	\$0.00	\$17,767.65
Level 2	49	\$13,603	0	\$0.00	0	\$0.00	\$13,603.36
Level 3	37	\$10,272	0	\$0.00	0	\$0.00	\$10,271.92
Level 4	17	\$4,720	0	\$0.00	0	\$0.00	\$4,719.53
Level 5	12.6	\$3,498	1.4	\$284.99	0	\$0.00	\$3,782.99
Level 6	1.5	\$416	11.25	\$2,290.08	2.25	\$291.39	\$2,997.90
Level 7	0	\$0	0	\$0.00	3	\$388.52	\$388.52
Total cohort	181.1	\$50,277	12.65	\$2,575	5.25	\$680	\$53,532

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 35 Education costs under the ‘with intensive EI’ scenario for one-year cohort

Level	Full-time special ed.		Mainstream with support		Mainstream schooling		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	62	\$17,212	0	\$0.00	0	\$0.00	\$17,212.41
Level 2	55	\$15,269	0	\$0.00	0	\$0.00	\$15,269.07
Level 3	36	\$9,994	0	\$0.00	0	\$0.00	\$9,994.30
Level 4	29	\$8,051	0	\$0.00	0	\$0.00	\$8,050.97
Level 5	43.2	\$11,993	4.8	\$977.10	0	\$0.00	\$12,970.27
Level 6	1.9	\$527	14.25	\$2,900.77	2.85	\$369.09	\$3,797.34
Level 7	0	\$0	0	\$0.00	12	\$1,554.07	\$1,554.07
Total cohort	227.1	\$63,047	19.05	\$3,878	14.85	\$1,923	\$68,848

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

The total benefit attributable to intensive EI from avoided special education costs is estimated at \$1.43 million for the entire cohort (PV terms). On a per child basis, this equates to an average benefit of \$2,921 for the two-year cohort and \$6,923 for the one-year cohort (PV terms).

4.8 Employment

Employment outcomes for individuals with autism are typically poor, with most failing to develop the skills necessary to obtain part or full-time employment, particularly those with profound and severe autism.

The poor employment outcomes for individuals with autism represents an economic cost incurred by government through unemployment benefits paid and employment support services, and by individuals through lost wages. For this analysis, employment outcomes have been quantified based on the appropriate wage rate, which represents a proxy for the productivity derived from employment.

Given the difficulties associated with individuals with autism obtaining employment, a conservative approach has been adopted, with employment outcomes quantified based on the minimum wage. The table below details the parameter estimates applied to quantify employment outcomes.

Table 36 Present value of lifetime earning under each employment outcome

Outcome	Annual earnings (\$2021/22)	Lifetime earnings (PV)
Full-time employment at the minimum wage	\$38,450	\$291,326
Part-time employment at the minimum wage	\$19,225	\$145,663
Remain unemployed	\$0	\$0

Note: Costs are assumed to be incurred between 18 years of age until 48 years of age (consistent with 30-year evaluation period). Present Value estimate is based on a real social discount rate of 5 per cent.

4.8.1 Base case

Productivity benefits attributable to employment outcomes under the base case have been quantified based on the percentage outcomes for each level, as provided by AEIOU.³⁸ The percentages attributed to each outcome for each level across the cohort are detailed in the table below Table 37.

Table 37 Base case trajectories for employment outcomes by level

Outcome	Level						
	1	2	3	4	5	6	7
Full-time employment at the minimum wage	0	0	0	0	0	15	100
Part-time employment at the minimum wage	0	0	0	10	20	65	0
Remain unemployed	100	100	100	90	80	20	0

Source: Estimates provided by AEIOU.

The base case trajectories for employment outcomes under the base case are not dissimilar to those observed for education outcomes, with individuals with autism up to level 4 unlikely to participate in the workforce. Outcomes improve significantly for levels 6 and 7, which are those individuals with mild or high-functioning autism.

The above proportions were applied to the breakdown of the cohort of children based on T1 scores (see Table 5) to derive estimates for productivity derived from employment under the base case. The tables below set out the estimates for the cohort, by level. As the proportions provided by AEIOU do not indicate that any individuals in levels 1 to 3 (i.e. individuals with profound autism) will participate in the workforce, no productivity estimates have been attributed to children in these levels.

³⁸ The percentage outcomes are based on the knowledge of clinicians and apply under the scenario in which the cohort is not provided with intensive EI.

Table 38 Productivity from employment under the base case for two-year cohort

Level	Full-time employment		Part-time employment		Remain unemployed		PV total lifetime earnings (\$000)
	# children	Earnings (\$000)	# children	Earnings (\$000)	# children	Earnings (\$000)	
Level 1	0	\$0	0	\$0	71	\$0	\$0.00
Level 2	0	\$0	0	\$0	57	\$0	\$0.00
Level 3	0	\$0	0	\$0	31	\$0	\$0.00
Level 4	0	\$0	2	\$291	18	\$0	\$291.33
Level 5	0	\$0	1.4	\$204	5.6	\$0	\$203.93
Level 6	1.8	\$524	7.8	\$1,136	2.4	\$0	\$1,660.56
Level 7	1	\$291	0	\$0	0	\$0	\$291.33
Total cohort	2.8	\$815.71	11.2	\$1,631.43	185	\$0.00	\$2,447.14

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 39 Productivity from employment under the base case for one-year cohort

Level	Full-time employment		Part-time employment		Remain unemployed		PV total lifetime earnings (\$000)
	# children	Earnings (\$000)	# children	Earnings (\$000)	# children	Earnings (\$000)	
Level 1	0	\$0	0	\$0	81	\$0	\$0.00
Level 2	0	\$0	0	\$0	64	\$0	\$0.00
Level 3	0	\$0	0	\$0	41	\$0	\$0.00
Level 4	0	\$0	3.1	\$452	27.9	\$0	\$451.56
Level 5	0	\$0	5.4	\$787	21.6	\$0	\$786.58
Level 6	1.95	\$568	8.45	\$1,231	2.6	\$0	\$1,798.94
Level 7	4	\$1,165	0	\$0	0	\$0	\$1,165.31
Total cohort	5.95	\$1,733.39	16.95	\$2,468.99	238.1	\$0.00	\$4,202.38

Source: Synergies modelling, based on inputs provided by AEIOU.

4.8.2 With intensive EI

The increased productivity derived from improved employment outcomes for children in the cohort have been quantified based on the T2 and T3 outcome data for the sub-cohorts. The tables below detail the productivity derived from employment outcomes quantified for the cohort under the 'with intensive EI' scenario.

Table 40 Productivity from employment under EI for the two-year cohort

Level	Full-time employment		Part-time employment		Remain unemployed		PV total lifetime earnings (\$000)
	# children	Earnings (\$000)	# children	Earnings (\$000)	# children	Earnings (\$000)	
Level 1	0	\$0	0	\$0	64	\$0	\$0.00
Level 2	0	\$0	0	\$0	49	\$0	\$0.00
Level 3	0	\$0	0	\$0	37	\$0	\$0.00
Level 4	0	\$0	1.7	\$248	15.3	\$0	\$247.63
Level 5	0	\$0	2.8	\$408	11.2	\$0	\$407.86

Level 6	2.25	\$655	9.75	\$1,420	3	\$0	\$2,075.70
Level 7	3	\$874	0	\$0	0	\$0	\$873.98
Total cohort	5.25	\$1,529.46	14.25	\$2,075.70	179.5	\$0.00	\$3,605.16

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 41 Productivity from employment under EI for the one-year cohort

Level	Full-time employment		Part-time employment		Remain unemployed		PV total lifetime earnings (\$000)
	# children	Earnings (\$000)	# children	Earnings (\$000)	# children	Earnings (\$000)	
Level 1	0	\$0	0	\$0	62	\$0	\$0.00
Level 2	0	\$0	0	\$0	55	\$0	\$0.00
Level 3	0	\$0	0	\$0	42	\$0	\$0.00
Level 4	0	\$0	2.9	\$422	26.1	\$0	\$422.42
Level 5	0	\$0	9.6	\$1,398	38.4	\$0	\$1,398.37
Level 6	2.85	\$830	12.35	\$1,799	3.8	\$0	\$2,629.22
Level 7	12	\$3,496	0	\$0	0	\$0	\$3,495.92
Total cohort	14.85	\$4,326.20	24.85	\$3,619.73	221.3	\$0.00	\$7,945.93

Source: Synergies modelling, based on inputs provided by AEIOU.

The total benefit attributable to intensive EI from improved labour productivity is estimated at \$4.9 million for the entire cohort (PV terms). On a per child basis, this equates to an increase in average lifetime earnings of \$5,819 for the two-year cohort and \$18,812 for the one-year cohort (PV terms).

4.9 Informal care

Many factors of autism, such as cognitive, language, and behavioural factors, can have an impact on an individual’s ability to safely live independently. For example, many individuals with profound or severe autism require full-time assistance to ensure a safe and stable living environment. This means multiple carers providing full-time care to the individual in dedicated housing. In less severe cases, where individuals might live independently, part-time living assistance might be required. Even for both individuals with autism receiving and not receiving formal care, there are often significant informal care requirements that are met by family members.

The provision of living assistance support represents a significant cost to government. These costs are largely met through the Core support category under the NDIS and as such the benefits attributable to intensive EI through improved living independence have already been quantified in section 4.

This impact relates to the cost associated with additional informal care provided by family members and other carers to individual with autism. The cost of informal care has been quantified based on foregone productivity (i.e. the opportunity cost of time for informal carers). A unit value of \$21 per hour has been applied to account for this

cost. This was derived using the productivity loss function and ABS data (average weekly total earnings and unemployment rate).³⁹ The table below details the cost estimates associated with the various outcomes in relation to informal care.

Table 42 Lifetime economic costs of informal care

Outcome	Annual economic cost (\$2021/22)	Lifetime economic cost (PV)
Significant amount of informal care required (40 hours per week)	\$43,005	\$380,897
Moderate amount of informal care required (22.5 hours per week)	\$24,190	\$214,254
Small amount of informal care required (7.5 hours per week)	\$8,063	\$71,418
No informal care required	\$0	\$0

Note: Costs are assumed to be incurred between 18 years of age until 70 years of age.

Source: ABS as at November 2020 - All employees average weekly total earnings (\$1,280.30).

4.9.1 Base case

The economic cost of informal care under the base case has been quantified based on the percentage outcomes for each level, as provided by AEIOU.⁴⁰ The percentages attributed to each outcome for each level across the cohort are detailed in the table below Table 43.

Table 43 AEIOU's estimates of care requirements by level

Outcome	Level						
	1	2	3	4	5	6	7
Significant amount of care	100	100	100	90	70	3	0
Moderate amount of care	0	0	0	10	20	2	0
Small amount of care	0	0	0	0	10	15	0
Minimal care required	0	0	0	0	0	80	100

Source: Estimates provided by AEIOU.

Before mapping the T1 scores for the AEIOU cohort across the lifetime trajectories based on these proportions, an adjustment was applied to account for the significant amount of care that will be provided to some members of the cohort, particularly those in levels 1 to 3, through the NDIS Core support packages.⁴¹ The table below contains the proportions following this revision.

³⁹ The unemployment rate prior to the impact of Covid-19 has been used, noting the long-term basis on which impacts and costs are being assessed.

⁴⁰ The percentage outcomes are based on the knowledge of clinicians and apply under the scenario in which the cohort is not provided with intensive EI.

⁴¹ To do this it is assumed that core support in the top (5th) quintile amounts to significant formal care. For participants receive this level of core support it has been assumed that they will also require just a small amount of informal care. For those in the 4th quintile, it is assumed that this amounts to a reasonable amount of formal care, requiring only moderate informal care from the family.

Table 44 Base case trajectories for ongoing informal care requirements by level

Outcome	Level						
	1	2	3	4	5	6	7
Significant amount of care	10	20	50	55	60	3	0
Moderate amount of care	5	25	20	30	30	2	0
Small amount of care	85	55	30	15	10	15	0
Minimal care required	0	0	0	0	0	80	100

Source: Estimates provided by AEIOU.

As shown in the table above, adjusting for the significant amount of care provided under the NDIS Core support packages, the proportion of individuals requiring significant care requirements is significantly lower compared to the trajectories provided by AEIOU, particularly for levels 1 through 4. However, even with this adjustment, there are significant informal care requirements across the cohort.

The proportions in Table 44 were applied to the breakdown of the cohort of children based on T1 scores (see Table 5) to derive estimates for the economic cost of informal care requirements under the base case. The tables below set out the estimates for the cohorts, by level.

Table 45 Informal care costs under the base case for the two-year cohort

Level	Significant informal care		Moderate informal care		Small informal care		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	7.1	\$2,704	3.55	\$761	60.35	\$4,310	\$7,775
Level 2	11.4	\$4,342	14.25	\$3,053	31.35	\$2,239	\$9,634
Level 3	15.5	\$5,904	6.2	\$1,328	9.3	\$664	\$7,896
Level 4	11	\$4,190	6	\$1,286	3	\$214	\$5,690
Level 5	4.2	\$1,600	2.1	\$450	0.7	\$50	\$2,100
Level 6	0.36	\$137	0.24	\$51	1.8	\$129	\$317
Level 7	0	\$0	0	\$0	0	\$0	\$0
Total cohort	49.56	\$18,877.23	32.34	\$6,928.99	106.5	\$7,606.03	\$33,412.25

Note: Children designated into "The child will not receive/require any informal care from family members." In relation to ongoing informal care requirements have been excluded from the above model.

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 46 Informal care costs under the base case for the one-year cohort

Level	Significant informal care		Moderate informal care		Small informal care		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	8.1	\$3,085	4.05	\$868	68.85	\$4,917	\$8,870
Level 2	12.8	\$4,875	16	\$3,428	35.2	\$2,514	\$10,817
Level 3	20.5	\$7,808	8.2	\$1,757	12.3	\$878	\$10,444
Level 4	17.05	\$6,494	9.3	\$1,993	4.65	\$332	\$8,819
Level 5	16.2	\$6,171	8.1	\$1,735	2.7	\$193	\$8,099
Level 6	0.39	\$149	0.26	\$56	1.95	\$139	\$344
Level 7	0	\$0	0	\$0	0	\$0	\$0
Total cohort	75.04	\$28,582.48	45.91	\$9,836.42	125.65	\$8,973.69	\$47,392.58

Note: Children designated into “The child will not receive/require any informal care from family members.” In relation to ongoing informal care requirements have been excluded from the above model.

Source: Synergies modelling, based on inputs provided by AEIOU.

4.9.2 With intensive EI

The reduction in informal care costs for children in the cohort has been quantified based on the T2 and T3 outcome data for the cohort. The tables below detail the informal care requirements and costs quantified for the cohort under the ‘with intensive EI’ scenario.

Table 47 Informal care costs under the ‘with intensive EI’ scenario for the two-year cohort

Level	Significant informal care		Moderate informal care		Small informal care		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	6.4	\$2,438	3.2	\$686	54.4	\$3,885	\$7,008
Level 2	9.8	\$3,733	12.25	\$2,625	26.95	\$1,925	\$8,282
Level 3	18.5	\$7,047	7.4	\$1,585	11.1	\$793	\$9,425
Level 4	9.35	\$3,561	5.1	\$1,093	2.55	\$182	\$4,836
Level 5	8.4	\$3,200	4.2	\$900	1.4	\$100	\$4,199
Level 6	0.45	\$171	0.3	\$64	2.25	\$161	\$396
Level 7	0	\$0	0	\$0	0	\$0	\$0
Total cohort	42.90	\$20,149.43	32.45	\$6,952.55	98.65	\$7,045.40	\$34,147.38

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 48 Informal care costs under the ‘with intensive EI’ scenario for the one-year cohort

Level	Significant informal care		Moderate informal care		Small informal care		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	6.2	\$2,362	3.1	\$664	52.7	\$3,764	\$6,789
Level 2	11	\$4,190	13.75	\$2,946	30.25	\$2,160	\$9,296
Level 3	18	\$6,856	7.2	\$1,543	10.8	\$771	\$9,170
Level 4	15.95	\$6,075	8.7	\$1,864	4.35	\$311	\$8,250
Level 5	28.8	\$10,970	14.4	\$3,085	4.8	\$343	\$14,398
Level 6	0.57	\$217	0.38	\$81	2.85	\$204	\$502
Level 7	0	\$0	0	\$0	0	\$0	\$0
Total cohort	80.52	\$30,669.79	47.53	\$10,183.51	105.75	\$7,552.47	\$48,405.77

Source: Synergies modelling, based on inputs provided by AEIOU.

Intensive EI results in a disbenefit in relation to informal care costs (i.e. net increase in informal care costs) of \$1.15 million for the entire cohort (PV terms). On a per child basis, this equates to an average disbenefit of \$3,700 for the two-year cohort and \$5,100 for the one-year cohort (PV terms). While informal care costs fall for Level 1 and 2 as a result of intensive EI, this is more than offset by the material increases in informal care costs incurred in relation to children categorised as Level 3, 4, and 5 at T2 and T3. This (albeit minor) increase in informal care requirements and costs under the ‘with intensive EI’ scenario is attributable to a reduction in NDIS support for those children recording material improvements as a result of intensive EI.⁴²

4.10 Healthcare costs

Individuals with autism incur, on average, higher healthcare costs relative to the population without autism. By improving overall outcomes and reducing the severity of autism symptoms, intensive EI reduces the incremental healthcare costs attributable to the cohort of children.

The table below details the parameter estimates used to quantify healthcare costs under the base case and ‘with intensive EI’ scenario.

Table 49 Lifetime healthcare costs for each trajectory

Outcome	Annual cost	Total cost (PV terms)
Average annual cost per person with ASD \$14,758 (upper bound)	\$14,758	\$130,715
Average annual cost per person with ASD \$11,069 (mid-bound)	\$11,069	\$98,036
Average annual cost per person with ASD \$7,379 (lower bound)	\$7,379	\$65,358

Note: Costs are assumed to be incurred between 18 years of age until 70 years of age.

Source: Incremental costs based on Synergies’ 2006 Cost of Autism report (inflated to \$2021/22).

⁴² That is, improvements in levels within the cohort results in an overall reduction in NDIS funding and support, leading to a small increase in informal care requirements and costs.

4.10.1 Base case

Healthcare costs under the base case has been quantified based on the percentage outcomes for each level, as provided by AEIOU.⁴³ The percentages attributed to each outcome for each level across the cohort are detailed in Table 43.

Table 50 Base case trajectories for healthcare costs by level

Outcome	Level						
	1	2	3	4	5	6	7
Average annual cost of \$14,758 (upper bound)	100	100	100	95	80	0	0
Average annual cost of \$11,069 (mid-bound)	0	0	0	5	15	10	0
Average annual cost of \$7,379 (lower bound)	0	0	0	0	5	90	100

Source: Estimates provided by AEIOU.

The above proportions were applied to the breakdown of the cohort of children based on T1 scores (see Table 5) to derive estimates for education costs under the base case. The table below sets out the estimates for education costs for the cohort, by level.

Table 51 Healthcare costs under the base case for two-year cohort

Level	Upper		Middle		Lower		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	71	\$9,281	0	\$0	0	\$0	\$9,281
Level 2	57	\$7,451	0	\$0	0	\$0	\$7,451
Level 3	31	\$4,052	0	\$0	0	\$0	\$4,052
Level 4	19	\$2,484	1	\$98	0	\$0	\$2,582
Level 5	5.6	\$732	1.05	\$103	0.35	\$23	\$858
Level 6	0	\$0	1.2	\$118	10.8	\$706	\$824
Level 7	0	\$0	0	\$0	1	\$65	\$65
Total cohort	183.6	\$23,999	3.25	\$319	12.15	\$794	\$25,112

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

⁴³ The percentage outcomes are based on the knowledge of clinicians and apply under the scenario in which the cohort is not provided with intensive EI.

Table 52 Healthcare costs under the base case for one-year cohort

Level	Upper		Middle		Lower		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	81	\$10,588	0	\$0	0	\$0	\$10,588
Level 2	64	\$8,366	0	\$0	0	\$0	\$8,366
Level 3	41	\$5,359	0	\$0	0	\$0	\$5,359
Level 4	29.45	\$3,850	1.55	\$152	0	\$0	\$4,002
Level 5	21.6	\$2,823	4.05	\$397	1.35	\$88	\$3,309
Level 6	0	\$0	1.3	\$127	11.7	\$765	\$892
Level 7	0	\$0	0	\$0	4	\$261	\$261
Total cohort	237.05	\$30,986	6.9	\$676	17.05	\$1,114	\$32,777

Note: Totals may not add due to rounding.

Source: Synergies modelling, based on inputs provided by AEIOU.

4.10.2 With intensive EI

The reduction in healthcare costs for children in the cohort has been quantified based on the T2 and T3 outcome data for the cohort (see Table 6). The tables below detail the healthcare costs quantified for the cohorts under the ‘with intensive EI’ scenario.

Table 53 Healthcare costs under the ‘with intensive EI’ scenario for the two-year cohort

Level	Upper		Middle		Lower		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	64	\$8,366	0	\$0	0	\$0	\$8,366
Level 2	49	\$6,405	0	\$0	0	\$0	\$6,405
Level 3	37	\$4,836	0	\$0	0	\$0	\$4,836
Level 4	16.15	\$2,111	0.85	\$83	0	\$0	\$2,194
Level 5	11.2	\$1,464	2.1	\$206	0.7	\$46	\$1,716
Level 6	0	\$0	1.5	\$147	13.5	\$882	\$1,029
Level 7	0	\$0	0	\$0	3	\$196	\$196
Total cohort	177.35	\$23,182	4.45	\$436	17.2	\$1,124	\$24,743

Source: Synergies modelling, based on inputs provided by AEIOU.

Table 54 Healthcare costs under the ‘with intensive EI’ scenario for the one-year cohort

Level	Upper		Middle		Lower		Total cost (\$000) (PV terms)
	# children	Cost (\$000)	# children	Cost (\$000)	# children	Cost (\$000)	
Level 1	62	\$8,104	0	\$0	0	\$0	\$8,104
Level 2	55	\$7,189	0	\$0	0	\$0	\$7,189
Level 3	36	\$4,706	0	\$0	0	\$0	\$4,706
Level 4	27.55	\$3,601	1.45	\$142	0	\$0	\$3,743
Level 5	38.4	\$5,019	7.2	\$706	2.4	\$157	\$5,882
Level 6	0	\$0	1.9	\$186	17.1	\$1,118	\$1,304
Level 7	0	\$0	0	\$0	12	\$784	\$784
Total cohort	218.95	\$28,620	10.55	\$1,034	31.5	\$2,059	\$31,713

Source: Synergies modelling, based on inputs provided by AEIOU.

The total benefit attributable to intensive EI from reduced healthcare costs is estimated at \$1.2 million for the entire cohort (PV terms). On a per child basis, this equates to an average benefit of \$1,850 for the two-year cohort and \$5,350 for the one-year cohort (PV terms).

4.11 Quality of life

Autism has the potential to adversely impact on quality of life, due to the physical, cognitive, and behavioural challenges that can arise, based on an individual’s severity. The Australian Institute of Health and Welfare (AIHW) estimates both fatal and non-fatal burden of disease for the Australian population using the disability-adjusted life years, years lived with disability and years of life lost measures (see box below).⁴⁴

Box 2 Developing weightings for quantifying quality of life impacts from illness and disease

Quantification of the impact of diseases and illnesses on quality of life requires numerical values or ‘weights’ to be attributed to time lives in non-fatal health states. This formalises and quantifies social preferences for different states of health and is a critical step in assessing and quantifying population health outcomes over time.

These ‘weights’ are typically referred to as disability weights, Quality Adjusted Life Year (QALY) weights, health state valuations, health state preferences or health state utilities. Most such weights are measures in a number on a scale of 0 to 1, where 0 is assigned to a state comparable to death and 1 is assigned to a state of ideal health (or vice versa).

Non-fatal health states, such as autism, are difficult to define. Non-fatal outcomes from diseases and illnesses are different from each other and the impact on individuals is highly variable, subject to contextual factors, including personal characteristics and the physical and social environment.

Ideally, any weighting exercise for use in cost-benefit analysis should measure preferences for clearly defined health states. Several methods have been developed for measuring preferences for health states.

Data source: <https://www.aihw.gov.au/getmedia/1972682c-bdea-4d90-ae64-7397e25b5fe7/bdia-c01.pdf.aspx>

⁴⁴ Australian Institute of Health and Welfare (2019) Australian Burden of Disease Study: methods and supplementary material 2015. Release date 13 June 2019.

For this analysis, the disability weightings derived by the AIHW have been applied to assess quality of life outcomes (alternatively referred to as ‘burden of illness’) for different levels of autism severity. These disability weights quantify societal preferences for different health states, ranging from 0, representing a state of good or ideal health, to 1, representing states equivalent to being dead. The objective of these weights is to quantify societal preferences for health states in relation to the societal ‘ideal’ of good health.⁴⁵

For autism, the AIHW applies a disability weighting of 0.262. Given the spectrum nature of autism and autism symptoms, quality of life impacts will differ significantly across the cohort. For example, children in levels 1 to 3, with profound autism, have significant cognitive impairments, in addition to impairments in several other areas of functioning, while children in level 7 do not suffer from cognitive impairment. To develop disability weightings to apply to all seven levels across the cohort, the weightings applied to conditions other than autism have been reviewed to provide a range.

The disability weighting for Asperger’s syndrome is 0.104. Given the similarities between Asperger’s syndrome and High Functioning Autism, this weighting has been applied to those children in Level 7. The weighting applied for individuals with severe motor and cognitive impairments is 0.542. As these impairments are common in individuals with profound and severe autism, this weighting has been applied to Levels 1, 2, and 3.

The weighting applied for autism by the AIHW – 0.262 – has been applied to Level 5, as this level is most reflective of those individuals with moderate autism. The weightings for Level 4 and Level 6 are based on the respective midpoints between the weightings for Levels 3 and 5 and Levels 5 and 7 respectively.

The table below sets out the disability weightings applied to each level and the annual and total economic cost (in PV terms) associated with these quality of life impacts. The disability weights are applied to the value of a statistical life year (VLY), of \$217,000 in \$2021/22, to determine the annual impact on quality of life, as detailed in the table below.⁴⁶

⁴⁵ See: <https://www.aihw.gov.au/getmedia/1972682c-bdea-4d90-ae64-7397e25b5fe7/bdia-c01.pdf.aspx>

⁴⁶ Office of Best Practice Regulation (2020). Best Practice Regulation Guidance Note – Value of Statistical Life.

Table 55 Parameter estimates for quantifying quality of life impacts for the cohort

Level	Disability weighting	Annual impact on quality of life	Total impact on quality of life (PV terms)
Level 1	0.542	\$117,614	\$2,067,733
Level 2	0.542	\$117,614	\$2,067,733
Level 3	0.542	\$117,614	\$2,067,733
Level 4	0.402	\$87,234	\$1,533,632
Level 5	0.262	\$56,854	\$999,531
Level 6	0.183	\$39,711	\$698,146
Level 7	0.104	\$22,568	\$396,761

Note: Costs are assumed to be incurred over the full lifetime.

Source: Synergies, using AIHW disability weightings and Value of a Statistical Life; Department of Prime Minister and Cabinet (2020) Best Practice Regulation Guidance Note, Australian Institute of Health and Welfare (2015) Australian Burden of Disease Study: methods and supplementary material.

4.11.1 Base case

The quality of life impacts under the base case have been quantified by applying the number of children in each level, based on T1 outcome data, to the estimates for total quality of life impacts (PV terms) as detailed in the table above. The base case cost estimates are shown in the table below.

Table 56 Quantifying quality of life impacts under the base case for the two-year cohort

Outcome	# children	Total impact on quality of life per child (PV terms \$000)	Total lifetime impact (\$000)
Level 1	71	\$2,068	\$146,809
Level 2	57	\$2,068	\$117,861
Level 3	31	\$2,068	\$64,100
Level 4	20	\$1,534	\$30,673
Level 5	7	\$1,000	\$6,997
Level 6	12	\$698	\$8,378
Level 7	1	\$397	\$397
Total cohort	199	\$1,885	\$375,213

Note: Costs are assumed to be incurred over the full lifetime.

Source: Synergies, using AIHW disability weightings and Value of a Statistical Life; Department of Prime Minister and Cabinet (2020) Best Practice Regulation Guidance Note, Australian Institute of Health and Welfare (2015) Australian Burden of Disease Study: methods and supplementary material.

Table 57 Quantifying quality of life impacts under the base case for the one-year cohort

Outcome	# children	Total impact on quality of life per child (PV terms \$000)	Total lifetime impact (\$000)
Level 1	81	\$2,068	\$167,486
Level 2	64	\$2,068	\$132,335
Level 3	41	\$2,068	\$84,777
Level 4	31	\$1,534	\$47,543
Level 5	27	\$1,000	\$26,987
Level 6	13	\$698	\$9,076
Level 7	4	\$397	\$1,587
Total cohort	261	\$1,800	\$469,791

Note: Costs are assumed to be incurred over the full lifetime.

Source: Synergies, using AIHW disability weightings and Value of a Statistical Life; Department of Prime Minister and Cabinet (2020) Best Practice Regulation Guidance Note, Australian Institute of Health and Welfare (2015) Australian Burden of Disease Study: methods and supplementary material.

4.11.2 With intensive EI

The improvement in quality of life attributable to intensive EI has been quantified based on the T2 and T3 outcome data for the cohort. The quality of life outcomes based on this outcome data are then compared to those quantified in the table above to derive the economic benefit from the improvement in quality of life. These are set out for the two sub-cohorts in the tables below.

Table 58 Quantifying quality of life impacts under the ‘with intensive EI’ scenario for the two-year cohort

Outcome	# children	Total impact on quality of life per child (PV terms \$000)	Total lifetime impact (\$000)
Level 1	64	\$2,068	\$132,335
Level 2	49	\$2,068	\$101,319
Level 3	37	\$2,068	\$76,506
Level 4	17	\$1,534	\$26,072
Level 5	14	\$1,000	\$13,993
Level 6	15	\$698	\$10,472
Level 7	3	\$397	\$1,190
Total cohort	199	\$1,819	\$361,888

Note: Costs are assumed to be incurred over the full lifetime. PV estimates are calculated based on a real social discount rate of 5 per cent.

Source: Synergies, using AIHW disability weightings and Value of a Statistical Life; Department of Prime Minister and Cabinet (2020) Best Practice Regulation Guidance Note, Australian Institute of Health and Welfare (2015) Australian Burden of Disease Study: methods and supplementary material.

Table 59 Quantifying quality of life impacts under the ‘with intensive EI’ scenario for the one-year cohort

Outcome	# children	Total impact on quality of life per child (PV terms \$000)	Total lifetime impact (\$000)
Level 1	62	\$2,068	\$128,199
Level 2	55	\$2,068	\$113,725
Level 3	36	\$2,068	\$74,438
Level 4	29	\$1,534	\$44,475
Level 5	48	\$1,000	\$47,978
Level 6	19	\$698	\$13,265
Level 7	12	\$397	\$4,761
Total cohort	261	\$1,635	\$426,842

Note: Costs are assumed to be incurred over the full lifetime. PV estimates are calculated based on a real social discount rate of 5 per cent.

Source: Synergies, using AIHW disability weightings and Value of a Statistical Life; Department of Prime Minister and Cabinet (2020) Best Practice Regulation Guidance Note, Australian Institute of Health and Welfare (2015) Australian Burden of Disease Study: methods and supplementary material.

The total economic benefit attributable to improved quality of life as a result of improved outcomes from intensive EI is estimated at \$73.94 million (PV terms) for the entire cohort. On a per child basis, this equates to an average benefit of \$51,000 for the two-year cohort and \$165,000 for the one-year cohort (PV terms).⁴⁷ Again, as with several of the other key outcome areas, this result is primarily driven by a significant reduction (over 33 per cent) in the economic cost associated with loss of quality of life for individuals in Level 2.

⁴⁷ While it may be the case that a component of the quality of life benefits derived from improvements attributable to intensive EI may relate to improvements in key outcome areas quantified elsewhere in this analysis (e.g. improved education and employment outcomes), the approach to quantifying improvements in the other key outcome areas mean the quantification of quality of life benefits does not constitute double counting of benefits.

5 Cost of intensive Early Intervention

To estimate the net economic benefit attributable to the provision of intensive EI to a cohort of children with autism, it is necessary to compare the economic benefit estimate derived in section 0 to the economic cost of providing intensive EI to the cohort.

AEIOU estimates the cost of providing intensive EI at \$80,000 per annum per child (\$2021/22). This equates to a total cost of \$156,144 per child (Present Value terms) for two years of intensive EI and \$78,072 per child (Present Value terms) for one year. This equates to a total cost of providing intensive EI to the entire cohort of children of \$51.5 million (\$31.1 million for the two-year cohort and \$20.4 million for the one-year cohort).⁴⁸

However, it is important to consider the extent to which the cost of intensive EI is incremental relative to the base case. Under the base case, the children in the cohort would have significant care requirements. Where able to be accommodated, some children would likely attend mainstream childcare. Alternatively, children with severe or profound autism are likely to require specialised childcare or full-time parental care.

To robustly estimate the net economic benefit derived from intensive EI, it is necessary to account for the base case childcare costs that are not incurred due to the child attending intensive EI (being the cost of childcare and/or the foregone labour productivity associated with full-time parental care).

As with the key outcome areas assessed in section 0, the magnitude of these costs under the base case have been informed by proportions provided by AEIOU in relation to the childcare outcomes for each level within the AEIOU cohort. The proportions provided by AEIOU are detailed in the table below.

Table 60 Base case trajectories for childcare requirements by level

Outcome	Level						
	1	2	3	4	5	6	7
Attend mainstream childcare	0	0	0	25	50	90	100
Parent to forego employment to provide care	100	100	100	75	50	10	0

Source: Estimates provided by AEIOU.

The table below details the parameter estimates used to quantify the cost of providing childcare to children in the cohort under the base case.

⁴⁸ Based on 199 children in the two-year cohort and 261 children in the one-year cohort, applying a 5 per cent discount rate.

Table 61 Parameter estimates for cost of providing childcare under the base case

Unit	Cost (\$)	Data source(s)
Average hourly cost of childcare	\$133	Care for Kids (before subsidies, the average cost of childcare in Australia)
Hourly cost of lost productivity	\$21	Derived using productivity loss function and ABS data (average weekly total earnings and unemployment rate pre-COVID)

The proportions estimated for the two base case outcomes for each level within the cohort were then applied to the categorisation of the sub-cohorts at T1 to estimate the cost of childcare requirements under the base case. For example, for the 34 children categorised as Level 4 at T1, the cost of childcare under the base case has been quantified based on 25 per cent of these children (8.5) attending mainstream childcare, with parents of the remaining 75 per cent (25.5) having to forego employment to provide care prior to the children commencing special education.

The parameter estimates detailed in Table 61 are then applied to the base case outcomes for the cohort to estimate childcare costs under the base case.

Table 62 Economic cost of childcare and parental care under the base case

Level	Mainstream childcare				Parental care (foregone labour productivity)				Total cost (\$000) (PV terms)
	1-yr (# children)	Cost (\$000)	2-yr (# children)	Cost (\$000)	1-yr (# children)	Cost (\$000)	2-yr (# children)	Cost (\$000)	
Level 1	0	\$0	0	\$0	81	\$3,167	71	\$5,420	\$8,512
Level 2	0	\$0	0	\$0	64	\$2,503	57	\$4,352	\$6,795
Level 3	0	\$0	0	\$0	41	\$1,603	31	\$2,367	\$3,932
Level 4	8	\$262	5	\$586	23	\$909	15	\$1,145	\$2,619
Level 5	14	\$457	3	\$677	14	\$528	3	\$267	\$1,460
Level 6	12	\$396	11	\$1,100	1	\$51	1	\$92	\$1,241
Level 7	4	\$135	1	\$198	0	\$0	0	\$0	198
Totals	37	\$1,250	20	\$1,341	224	\$8,761	179	\$13,643	\$24,756

Source: Synergies modelling, using data provided by AEIOU.

The total cost of childcare and parental care for the AEIOU cohort under the base case is estimated at \$15.0 million for the two-year cohort and \$10.0 million for the one-year cohort (PV terms). This results in an estimate for the incremental cost of intensive EI of \$15.3 million for the two-year cohort (\$76,900 per child) and \$9.9 million for the one-year cohort (\$37,900 per child).⁴⁹

⁴⁹ Noting that all PV estimates are at a real discount rate of 5 per cent.

6 Results of cost-benefit analysis

The preceding sections detail the quantification of the economic benefits and costs from the provision of intensive EI to a cohort of AEIOU children. This section reports the results of the cost-benefit analysis in terms of the net economic benefit attributable to intensive EI.

6.1 Central results

The tables below present a summary of the results of the cost-benefit analysis for the provision of intensive EI to the AEIOU cohort. Results have been categorised in terms of direct cost savings to government and productivity and other benefits.

Table 63 Summary of cost-benefit analysis results for the two-year cohort (Present Values)

Impact	Base case (\$000)	With intensive EI (\$000)	Economic benefit (\$000)	Benefit per child ^a
Direct cost savings to government				
NDIS – Core Support	\$327,015	\$300,620	\$26,395	\$132,639
NDIS – Capacity Building	\$59,981	\$58,985	\$996	\$5,005
NDIS – Capital Support	\$5,100	\$4,821	\$277	\$1,390
Education	\$54,113	\$53,532	\$581	\$2,921
Healthcare	\$25,112	\$24,743	\$369	\$1,856
Productivity and other benefits				
Employment	\$2,447	\$3,605	\$1,158	\$5,819
Informal care	\$33,412	\$34,147	-\$735	-\$3,694
Quality of life	\$375,213	\$361,888	\$13,326	\$66,964
Total economic benefits			\$42,367	\$212,901
Cost of intensive EI			(\$16,089)	(\$80,850)
Net economic benefit			\$26,278	\$132,051

^a Based on a cohort of 199.

Note: PV at a real social discount rate of 5 per cent.

Source: Synergies modelling.

Table 64 Summary of cost-benefit analysis results for the one-year cohort (Present Values)

Impact	Base case (\$000)	With intensive EI (\$000)	Economic benefit (\$000)	Benefit per child ^a
Direct cost savings to government				
NDIS – Core Support	\$384,274	\$315,142	\$69,133	\$264,876
NDIS – Capacity Building	\$77,381	\$75,017	\$2,364	\$9,058
NDIS – Capital Support	\$6,307	\$5,665	\$643	\$2,462
Education	\$70,655	\$68,848	\$1,807	\$6,923
Healthcare	\$32,777	\$31,713	\$1,064	\$4,075
Productivity and other benefits				
Employment	\$4,202	\$7,946	\$3,744	\$14,343

Impact	Base case (\$000)	With intensive EI (\$000)	Economic benefit (\$000)	Benefit per child ^a
Informal care	\$47,393	\$48,406	-\$1,013	-\$3,882
Quality of life	\$469,791	\$426,842	\$42,949	\$164,557
Total economic benefits			\$120,690	\$462,413
Cost of intensive EI			(\$10,366)	(\$39,715)
Net economic benefit			\$110,324	\$422,698

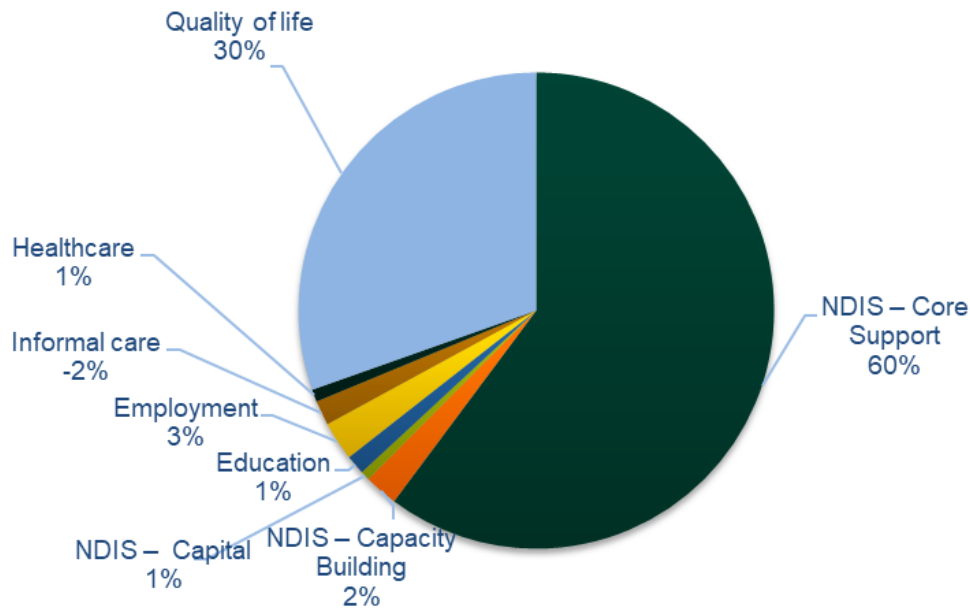
^a Based on a cohort of 261.

Note: PV at a real social discount rate of 5 per cent.

Source: Synergies modelling.

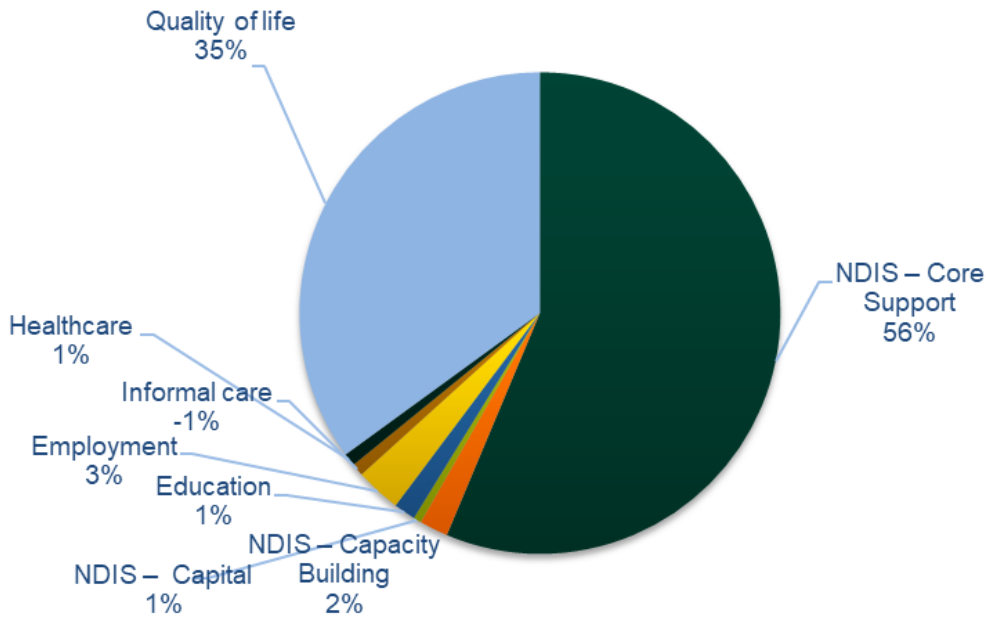
As shown in the tables above, the results demonstrate a significant net economic benefit from the provision of intensive EI, with the total net economic benefit across the cohort estimated at \$136.6 million, with a cohort-wide BCR of 6.16. This equates to a cohort-wide net economic benefit per child of \$297,000 (PV terms). Of the total economic benefits, the majority represents a direct cost saving to government, as shown in the figures below.

Figure 10 Breakdown of economic benefits from intensive EI for the two-year cohort



Data source: Synergies modelling.

Figure 11 Breakdown of economic benefits from intensive EI for the one-year cohort



Data source: Synergies modelling.

The figures above show that the cost savings achieved for the NDIS Core Support packages and improvements in quality of life are the dominant benefits derived from intensive EI, accounting for ~90 per cent of total economic benefits for both sub-cohorts. This is reflective of the significant economic benefits that are derived, both in terms of direct cost savings for the NDIS and indirect benefits through increased quality of life, from improvements that enable people with autism to live more independently and without such significant care requirements.

While some individuals within the cohort achieve meaningful improvements in terms of employment and education outcomes, the benefits quantified for these outcomes are significantly lower than for the NDIS Core Support and quality of life categories. This is a function of the relatively high severity of autism symptoms exhibited by the cohort and the extent to which this constrains employment and education outcomes that can be achieved, even with significant improvements from intensive EI.

Noting this, the net economic benefit and BCR results, both for the entire cohort and the two sub-cohorts separately, demonstrate the significant positive return that is generated from investing in delivering intensive EI to children with autism. This result means that for every \$1 invested in delivering intensive EI to the AEIOU cohort, a societal return of \$6.16 is derived. It is also noteworthy that of this total, \$4.58 is direct cost saving for the NDIS.⁵⁰

⁵⁰ That is, in addition to the economic benefits quantified for the other outcome areas, for every \$1 invested in providing intensive EI to the AEIOU cohort, NDIS expenditure is reduced by \$2.47.

Intensive EI achieved an 11.6 per cent reduction in the PV of the total NDIS expenditure for the entire cohort. For intensive EI to achieve a BCR of 1 based on reduced NDIS expenditure alone, this would only require a reduction in NDIS expenditure of around 3 per cent. This would require that only a small percentage of the observed improvement in the cohort (noting that this does not account for improvements in other key outcome areas).

6.2 Sensitivity analysis

The table below details the parameter estimates on which sensitivity analysis has been undertaken and the rationale for the parameters selected.

Table 65 Parameters and rationale for sensitivity analysis

Parameter	Sensitivities	Rationale
Discount rate	7%	Central discount rate adopted by Commonwealth Government and Queensland Government
Growth in NDIS expenditure	3% (real)	Central analysis assumed no growth in NDIS expenditure over the lifetime of the cohort, however analysis of recent data indicates significant real growth in expenditure for individuals with autism
AIHW Disability weightings	Reduced by 50%	Quality of life impacts have a higher degree of subjectivity relative to the other key outcome areas as they are non-monetary benefits and require subjective weightings to be applied to attributable monetary values to improvements attributable to intensive EI.

6.2.1 Discount rate

The table below shows the results of the cost-benefit analysis at a real discount rate of 7 per cent.

Table 66 Cost-benefit analysis results for the two-year cohort (7 per cent discount rate)

Impact	Base case (\$000)	With intensive EI (\$000)	Economic benefit (\$000)	Benefit per child ^a
Direct cost savings to government				
NDIS – Core Support	\$183,400	\$168,438	\$14,962	\$75,186
NDIS – Capital	\$42,595	\$41,883	\$712	\$3,580
NDIS – Capacity Building	\$5,100	\$2,683	\$2,417	\$12,145
Education	\$46,804	\$46,301	\$503	\$2,527
Healthcare	\$14,454	\$14,242	\$213	\$1,068
Productivity and other benefits				
Employment	\$1,498	\$2,207	\$709	\$3,563
Informal care	\$19,232	\$19,655	-\$423	-\$2,126
Quality of life	\$269,840	\$260,256	\$9,583	\$48,158
Total economic benefits			\$28,676	\$144,100
Cost of intensive EI			(\$16,073)	(\$80,771)

Impact	Base case (\$000)	With intensive EI (\$000)	Economic benefit (\$000)	Benefit per child ^a
Net economic benefit			\$12,603	\$63,329

^a Based on a cohort of 199.

Note: PV at a real social discount rate of 7 per cent.

Source: Synergies modelling.

Table 67 Cost-benefit analysis results for one-year cohort (7 percent discount rate)

Impact	Base case (\$000)	With intensive EI (\$000)	Economic benefit (\$000)	Benefit per child ^a
Direct cost savings to government				
NDIS – Core Support	\$215,203	\$175,984	\$39,218	\$150,262
NDIS – Capital	\$54,945	\$53,254	\$1,690	\$6,476
NDIS – Capacity Building	\$3,508	\$3,144	\$364	\$1,394
Education	\$61,112	\$59,549	\$1,563	\$5,988
Healthcare	\$18,866	\$18,254	\$612	\$2,346
Productivity and other benefits				
Employment	\$2,573	\$4,865	\$2,292	\$8,782
Informal care	\$27,279	\$27,862	-\$583	-\$2,234
Quality of life	\$337,857	\$306,969	\$30,886	\$118,343
Total economic benefits			\$76,044	\$291,357
Cost of intensive EI			(\$10,174)	(\$38,982)
Net economic benefit			\$65,870	\$252,375

^a Based on a cohort of 261.

Note: PV at a real social discount rate of 7 per cent.

Source: Synergies modelling.

Quantifying lifetime benefits from intensive EI for the cohort at 7 per cent has a significant impact on the PV of economic benefits and hence the net economic benefit derived by the cohort. The cohort-wide net economic benefit totals \$78.47 million, which represents a 43 per cent reduction relative to the central results. This is attributable to the economic cost of intensive EI being incurred in the short term, and hence the discount rate having minimal impact, while economic benefits from improved outcomes attributable to intensive EI arise over several decades. In particular, the benefits attributable to a reduction in NDIS expenditure requirements accrue over the very long term, and are hence significantly impacted by the discount rate adopted.

In assessing the results of the cost-benefit analysis at a real discount rate of 7 per cent, it is important to note the following:

- 1) A real discount rate of 7 per cent is not appropriate for evaluating a social policy such as the provision of intensive EI to a cohort of children with autism. While it is adopted as the central discount rate in business case development and cost-benefit analysis guidelines administered by the Commonwealth Government

and governments throughout most jurisdictions, there is a strong body of evidence demonstrating that a real discount rate of 7 per cent is materially higher than the appropriate discount rate for social policy analysis.

- 2) Even at a discount rate of 7 per cent, the provision of intensive EI to an AEIOU cohort still returns a NPV of \$78.47 million, with a BCR of 3.9, indicating a highly positive societal return from the investment.

6.2.2 Growth in NDIS expenditure

Between 2018 and 2021, NDIS expenditure has exhibited average annual growth of 5.1 per cent, translating to real growth of 3 per cent per annum over the period.⁵¹ There has also been significant growth, over 30 per cent annually, in the number of NDIS participants diagnosed with autism over this period. This growth has been relatively uniform across age groups.⁵² While the growth in NDIS costs was most pronounced earlier in this period and has started to slow, there was 23 per cent growth in NDIS participants in the two-year period from the start of 2020 to the end of 2021.

On this basis, and having regard to the broader trend of increasing cost pressures in the healthcare sector, there is considered a strong likelihood that NDIS costs will continue to increase in real terms in the future. Hence, a scenario has been modelled whereby NDIS expenditure on participants with autism increases at a real growth rate of 3 per cent. The results of this analysis are shown in the tables below.

Table 68 NDIS expenditure estimates for the two-year cohort (3 percent real growth rate)

NDIS support category	Base case costs		With intensive EI costs		Net benefit of intensive EI	
	Total cohort cost (\$m)	Cost per child (\$m)	Total cohort cost (\$m)	Cost per child (\$m)	Total cohort benefit (\$m)	Benefit per child
Core support	\$957.48	\$4.81	\$881.52	\$4.43	\$75.96	\$381,739
Capital	\$15.93	\$0.08	\$15.11	\$0.08	\$0.82	\$9,647
Capacity Building	\$121.67	\$0.61	\$119.75	\$0.60	\$1.92	\$4,149
Totals	\$1,095.09	\$5.50	\$1,016.37	\$5.11	\$78.72	\$395,535

a Based on a cohort of 199.

Note: PV at a real social discount rate of 5 per cent.

Source: Synergies modelling.

⁵¹ Average annual inflation of 2.1 per cent over the period, based on ABS CPI data for December 2018 to December 2021.

⁵² Growth in the number of participants in this period was 36.8 percent per year. By age group, the lowest growth was for the age group of 0-6 years with 27.9 per cent, while the over 65+ age group grew at an annualised rate of 58 per cent, albeit off a small base.

Table 69 NDIS expenditure estimates for the one-year cohort (3 percent real growth rate)

NDIS support category	Base case costs		With intensive EI costs		Net benefit of intensive EI	
	Total cohort cost (\$m)	Cost per child (\$m)	Total cohort cost (\$m)	Cost per child (\$m)	Total cohort benefit (\$m)	Benefit per child
Core support	\$1,127.66	\$4.32	\$928.85	\$3.56	\$198.81	\$761.73
Capital	\$19.76	\$0.08	\$17.84	\$0.07	\$1.92	\$7.37
Capacity Building	\$157.10	\$0.60	\$152.55	\$0.58	\$4.55	\$17.45
Totals	\$1,304.53	\$5.00	\$1,099.24	\$4.21	\$205.29	\$786.54

^a Based on a cohort of 261.

Note: PV at a real social discount rate of 5 per cent.

Source: Synergies modelling.

As shown in the tables above, applying a real growth rate of 3 per cent to future NDIS expenditure for the cohort has a significant impact on the economic benefits attributable to intensive EI. Under this scenario, the cohort-wide benefit from reduced NDIS expenditure increases from \$99.8 million to \$284.0 million, 185 per cent growth in PV terms.

6.2.3 AIHW disability weightings

Given the subjectivity associated with valuing economic benefits attributable to improved quality of life, sensitivity analysis has been undertaken on the AIHW disability weightings that underpin the quantification of this benefit. The disability weightings for each level within the cohort have been reduced by 50 per cent. This results in a reduction in the cohort-wide economic benefit attributable to improved quality of life to \$28.1 million, with the total economic benefit estimate reduced to \$134.9 million.

A. Approach to categorising and assessing lifetime trajectories

A.1 Overview

The purpose of this attachment is to set out the key steps taken to:

- Establish the base case for each group within AEIOU's cohort across each of the key outcome areas, having regard to the outcome data collected by AEIOU and available scientific evidence; and
- Establish the 'with intensive EI' scenario for each group within AEIOU's cohort across each of the key outcome areas, having regard to the outcome data collected by AEIOU and the knowledge of relevant experts.

The key differences in this analysis compared to the 2013 analysis is that we now have data for children both upon entry to the program and after one year and two years in the program (for the one-year and two-year cohorts respectively).⁵³ We also now have detailed NDIA data on the funding provided to participants with autism of varying severity.

A.2 Defining the cohort

In the AEIOU data, children were assessed (among other methods) using the Mullen Scale. Based on MSEL Cognitive T score sum, children were placed into four categories by AEIOU: profound, severe, moderate, and mild. To better measure the children on the low end of the threshold, Synergies has adapted the Mullen tables. Using the approximate linear form, the tables are extrapolated below 20 using the average slope of the conversion tables, and a new lower bound is placed at zero. Although this is an imperfect measure, it does allow a more detailed assessment of children who are falling on the lower end of the scale, where the majority of AEIOU's cohort fall. Using this allows Synergies' adjusted cognitive T-score sums to range between 0 and 360. Using this measure, participants have been divided up into seven cognitive levels.

The following table shows the distribution of the children across the categories based on their T1 assessment.

⁵³ Limited data has also been provided for test outcomes after two years in the program (T2).

Table A.1 Severity categorisation (Updated)

Level	No. children in AEIOU 1-year cohort	Percentage of cohort	No. children in AEIOU 2-year cohort	Percentage of cohort	MSEL Cognitive T score sum
Level 1	81	31.03%	71	35.68%	0 and below
Level 2	64	24.52%	57	28.64%	1 - 40
Level 3	41	15.71%	31	15.58%	41- 80
Level 4	31	11.88%	20	10.05%	81-120
Level 5	27	10.34%	7	3.52%	121-160
Level 6	13	4.98%	12	6.03%	161-200
Level 7	4	1.53%	1	0.50%	Above 200

Source: Synergies analysis based on data provided by AEIOU.

The benefit of this additional granularity is that it allows better assessment of improvement at T2 (for the one-year cohort) and T3 (for the two-year cohort) from the provision of intensive EI. The tables below show the categorisation of participants at T1 and T2 for the one-year cohort and T1 and T3 for the two-year cohort based upon the new categorisations.

Table A.2 Change in severity from T1 to T2 (number of children) (Mullen scales)

		T2 assessment						
		Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
T1 assessment	Level 1	45	17	2	0	0	0	0
	Level 2	15	30	18	6	2	0	0
	Level 3	2	8	13	12	11	2	0
	Level 4	0	0	2	8	16	4	0
	Level 5	0	0	1	2	15	6	2
	Level 6	0	0	0	1	4	6	6
	Level 7	0	0	0	0	0	1	4

Note: This table only includes participants who completed a Mullen assessment at both T1 and T2.

Source: AEIOU All centres data.

Table A.3 Change in severity from T1 to T3 (number of children) (Mullen scales)

		T3 assessment						
		Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
T1 assessment	Level 1	24	7	3	1	1	0	0
	Level 2	40	31	24	6	1	1	0
	Level 3	0	8	7	6	7	3	1
	Level 4	0	3	3	4	2	6	0
	Level 5	0	0	0	0	2	2	1
	Level 6	0	0	0	0	1	2	0
	Level 7	0	0	0	0	0	1	1

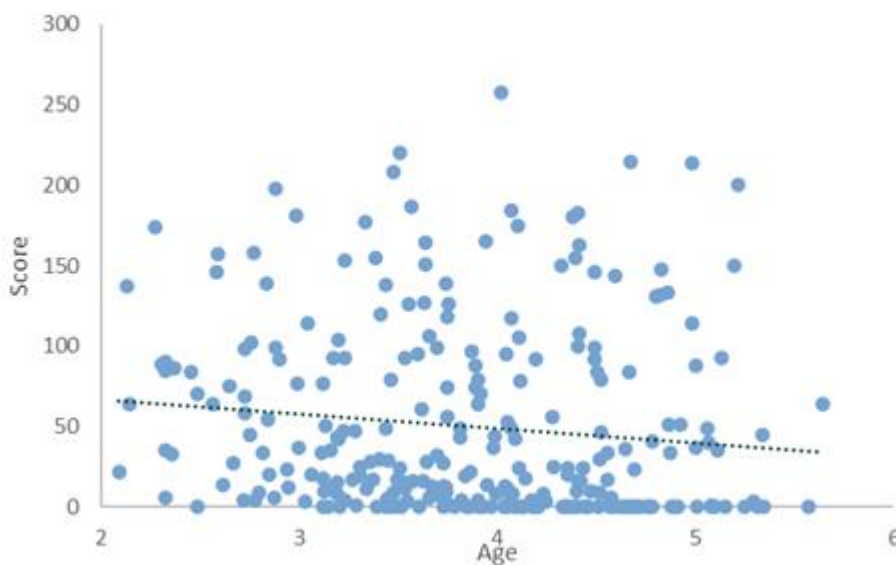
Note: This table only includes participants who completed a Mullen assessment at both T1 and T3.

Source: AEIOU All centres data.

The data in the above tables demonstrate the potential to identify improvements between T1 and T2/T3 within the profound category. As shown above, of those children in the one-year cohort categorised as level 1 at T1, 9 have improved to level 2. This granularity enables the more robust quantification of the economic benefits attributable to intensive EI.

The table below contains the T1 (i.e. entry) MSEL T scores for a large sample of entrants to AEIOU’s program.

Figure A.1 Participants’ T1 adjusted MSEL t-score sum versus age



Data source: AEIOU cohort data, Synergies calculations

Although there is no contrapositive for the participants scores at T2 without intensive EI, looking at participants’ T1 scores versus ages shows, at a cohort level, how one would expect the scores to evolve in the absence of intensive EI (i.e. under the base case). The T1 scores for the cohort plotted against the age at which the assessment was conducted are shown in the figure above. The figure suggests that at a cohort level, scores remain stable over time, with the trend line fitted to the data showing just a slight decline with age. Thus, a reasonable assumption is that without intensive EI, participant scores would have, at a cohort level, remained stable.

A.3 Defining the base case: NDIS

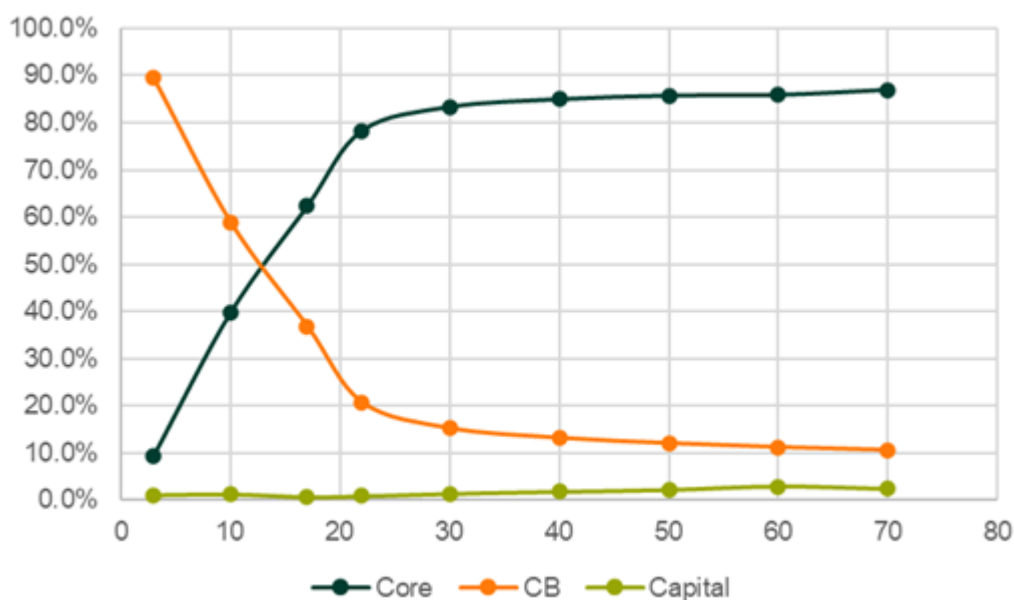
Defining an appropriate base case for each group within the cohort of children is fundamental to the robustness of the cost-benefit analysis. This is particularly important in terms of outcomes for funding requirements under the NDIS, given the materiality of this funding to the outcome of the analysis.

The NDIS provides funding within three broad categories of support budgets:

- **Core Supports:** to help with everyday activities and disability-related needs.
- **Capital Supports:** to help with higher-cost pieces of assistive technology, and funding for one-off purchases.
- **Capacity Building Supports:** to build skills and independence.

The following graph shows each support budget as a percentage of total NDIS expenditure by age. As one would expect, for younger age groups most of the expenditure is on capacity building. However, core support becomes the dominant budget expenditure once participants reach around 20 years of age. The capital category remains relatively immaterial across all age groups.

Figure A.2 Percentage of total NDIS for autism participants spending by age group



Data source: NDIA, average taken across 2018, 2019 and 2020.

The data provided by the NDIA also shows that Core Support are the costs that vary the most by the level of the participant. This contrasts capacity building support, which has high initial expenditure, but expenditure is quite flat showing a low variance across participants.

Given this, different methods have been applied to estimate participants' expenditure for each of these support categories. For Capacity Building and capital support budgets, we propose to use the categories of low, moderate, and high as a basis to estimate expenditure. As the figure above shows, from the mid-teens onwards core support makes up the majority of participants' support budgets. Given this, it is

important to get as accurate a measurement as possible for each level. Instead of using the coarse measure of high, moderate, and low, the percentiles of core support budgets are estimated using the observed regional variation in core support budgets.⁵⁴

A.3.1 Core Support

Core Support is the main ongoing support budget and provides the support for daily living, housing, and living support. This constitutes the largest part of the NDIS budget. Within Core support, the support categories are:

- Daily activities
- Consumables
- Social, community and civic participation
- Transport.

For participants, this is also the most flexible budget as participants are able to use the funding from this budget across any of the four support categories within core support. For this reason, and because the NDIS data show that funding across the core support categories is highly correlated, we will treat this as one broad category.

Using participant numbers and average plan budgets by service district for 2021 the percentiles for the core support budget for NDIS autism participants was estimated. This estimation was done by assume participants fell randomly across the service districts. This means that the mean of each service district provides a random sample of the underlying distribution.⁵⁵

Having established the lifetime trajectory for each of the percentiles, we then have to estimate how participants of each level fall across the percentiles. Details on the calibration process is given in the last section.

A.3.2 Capital Support Budgets

This category of NDIA funding relates to the cost of assistive technology, equipment, and home modifications. The two support categories within this budget are given below.

⁵⁴ This method of using percentiles works well for core support budgets as they provided a relatively smooth flow of income to participants to satisfy their daily need. Applying this method to capital supports becomes more difficult, as the support provided is much bulkier, and although it is still possible to estimate the annual support percentiles, it becomes more difficult to relate this to the level of participants.

⁵⁵ Here we consider the possibility that there may be some region fixed effects for the budgets but did not find any empirical evidence of this.

Table A.4 Capital supports: Description of key support categories

Support Category	Descriptions
Assistive Technology	This includes equipment items for mobility, personal care, communication, and recreational inclusion such as wheelchairs or vehicle modifications.
Home Modifications	Home modifications such as installation of a handrail in a bathroom, or Specialist Disability Accommodation for participants who require special housing because of their disability.

Source: NDIA, <https://www.ndis.gov.au/participants/using-your-plan/managing-your-plan/support-budgets-your-plan>.

To establish our base case, we need to breakdown by our MSEL categories how much funding each participant will need. Given the one-off nature of capital support items making them less persistent over time, and the lower average levels of funding involved for capital support, we will use a coarser aggregation of outcomes.

That is, rather than using quintiles, as we did for core support, we will use the three categories provided to us by NDIA – low, moderate, and high, and estimate the percentage of participants who fall into each category.

A.3.3 Capacity Building Supports

Capacity Building Supports are provided to help build participants skills and independence. The different support categories are detailed in the table below.

Table A.5 Support categories for NDIS participants with autism

Synergies grouping	NDIA Support category	Description
Package support costs	Support Coordination	A fixed amount for a Support Coordinator to help the participant use their plan.
	CB Choice and Control	Plan management to help the participant manage their plan, funding and paying for services.
Social assistance costs	CB Social Community and Civic Participation	Development and training to increase skills so the participant can participate in community, social and recreational activities.
	CB Relationships	This support will help the participant develop positive behaviours and interact with others.
	CB Daily Activity	Assessment, training, or therapy to help increase skills, independence, and community participation. These services can be delivered in groups or individually.
Employment and Education assistance costs	CB Employment	This may include employment-related support, training and assessments that helps the participant find and keep a job, such as the school leaver employment supports.
	CB Lifelong Learning	Examples include training, advice and help for the participant to move from school to further education, such as university or TAFE.
Health and living assistance costs	CB Health and Wellbeing	Including exercise or diet advice to manage the impact of disability. The NDIS does not fund gym memberships.
	CB Home Living	Support to help the participant find and maintain an appropriate place to live.

Here again we will use the NDIA high, moderate, and low categorisation to establish our base case and how much funding each participant will need (without intensive EI).

A.4 Calibrations

For capacity building and capital support budgets the NDIA have provided data on active participant counts and average plan budgets by level of function (high, moderate, and low), age group, support for participants with autism has been used. The table below outlines how the NDIA categorises participants with autism.

Table A.6 NDIA categorisation of autism disability

Level of function	Assessment tool	Assessment level
High	DSM-5	Requiring support
	Vineland 3	Adaptive behaviour score 56 and above
Moderate	DSM-5	Requiring substantial support
	Vineland 3	Adaptive behavioural score 41 to 55
Low	DSM-5	Requiring very substantial support
	Vineland 3	Adaptive behaviour score 40 and below

Note: The NDIA does not report on average plan budgets by assessment tool used.

Source: NDIA.

The DSM-5 is the primary means of assessment, with the Vineland 3 as a secondary measure. As part of AEIOU's assessment of participants, the Vineland 3 Adaptive Behaviour Score (VABS) for participants were assessed. There were two drawbacks with using the Vineland scores as our main method of assessment. One was that for participants with Autism academic studies have found a steep decline in score over the teenage years.⁵⁶ This means that T1 and T2/T3 scores could not be compared directly as the underlying trend with age would have to be taken into account. Further, in the sample, the VABS measure for AEIOU participants showed significant mean reversion suggesting that there is not insignificant measurement error.

For these reasons, the VABS scores were not used directly in Synergies analysis, however they were used as part of the calibrations across the three categories, low, moderate, and high. The participants' T1 VABS score (adjusted for time trends) and T1 level assessment is used to estimate how many participants from each level fall into each category. This is given in the table below.

Table A.7 Base case outcome percentages for NDIS Capacity Building and Capital Support budgets

Category	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Low (highest cost)	75%	58%	29%	22%	23%	0%	0%
Moderate	23%	38%	54%	63%	64%	69%	0%
High (lowest cost)	2%	4%	17%	16%	14%	31%	100%

⁵⁶ A small decline was also found based on T1 based of the AEIOU cohort.

The calibration for Core support percentiles is more complicated, as there is no direct link between the percentiles and any of the AEIOU measure. Here, the methodology was to estimate the levels across the percentiles so as to match the high, moderate, and low profiles.⁵⁷ Thus, calibration was done by assuming internal consistency across the two methods.

The calibrations for the NDIS core support budgets is provided below.

Table A.8 Core support: Synergies' calibration of percentages for NDIS

Category	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
1 st Quintile	0%	0%	15%	25%	40%	45%	100%
2 nd Quintile	5%	10%	20%	25%	30%	30%	0%
3 rd Quintile	5%	10%	15%	15%	20%	25%	0%
4 th Quintile	5%	25%	20%	20%	10%	0%	0%
9 th Decile	10%	40%	20%	10%	0%	0%	0%
10 th Decile	75%	15%	10%	5%	0%	0%	0%

⁵⁷ That is, the calibration was done so that the using the levels and the base case outcomes percentages table for Capacity Building and Capital support budgets provides low, moderate, and high core support budget profiles that approximately match those provided by NDIA.