Exploring two new indices for the Australian Early Development Census (AEDC) program: The Multiple Challenge and Multiple Strength Indicators

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Executive Summary

Within the Australian Early Development Census (AEDC) program, children's development is measured using the Australian version of the Early Development Instrument (AvEDI) developed in Canada. In both Australia and Canada, EDI results are presented for each of the five developmental domains, and for two summary indicators (1) vulnerable on 1 or more domains, and (2) vulnerable on 2 or more domains. In Canada, one additional indicator – the Multiple Challenge Index – is used to identify children facing significant developmental challenges.

The primary aim of this research was to explore the feasibility and utility of using the Multiple Challenge Index in Australia. In addition, there has been significant interest in the concept of identifying children or communities with 'strengths' in child development, and whether certain items from the AvEDI could be used for this purpose. As such, the secondary aim of this project was to explore the feasibility of creating a Multiple Strength Indicator to supplement the current suite of deficit based indicators. The Australian version is known as the Multiple Challenge Indicator.

Overview of the Multiple Challenge Index

The report begins with an overview of the Multiple Challenge Index including its inception, derivation and use in Canada. We demonstrate the problems in directly adapting the index for use in Australia due to the differences between the EDI and the AvEDI. We also point to possible differences in developmental expectations at school entry for Australian and Canadian children. After a comprehensive look at all of the relevant issues, we concluded that the best approach was to consult with early childhood experts in Australia to develop a new, locally relevant Multiple Challenge Index.

Consultations with Australian Early Childhood Experts

Consultations with early childhood experts considered whether a Multiple Challenge and/or Multiple Strength Indicator would be of value, and if so how we might create one. The early childhood experts were supportive of the idea of creating a Multiple Strength Indicator and felt that it could be beneficial for children, families and communities. However, they were not supportive of a creating a Multiple Challenge Indicator, which they felt would only add more focus on the deficits of children and communities. Early childhood consultants reviewed each of the 96 AvEDI items and reported whether they thought each item would be useful to include in a Multiple Challenge and/or a Multiple Strength Indicator. Consultants indicated that 74 of the 96 AvEDI items could be used to develop a Multiple Challenge Indicator and 39 of the 96 items could be used to develop a Multiple Strength Indicator.

Items from the Multiple Challenge Indicator were spread across all domains and sub-domains of the AvEDI. However, items from the Multiple Strengths Indicator came from just nine of the 16 sub-domains. Specifically, the items indicating strengths came from the following sub-domains (domains):

- Gross and fine motor skills (Physical)
- Overall social competence (Social Competence)
- Responsibility and respect (Social Competence)
- Approaches to learning (Social Competence)
- Readiness to explore new things (Social Competence)
- Pro-social and helping behaviour (Emotional Maturity)
- Interest in literacy, numeracy and memory (Language and Cognitive Skills)
- Advanced literacy (Language and Cognitive Skills), and
- Communication skills and general knowledge

Creation of the new indicators, distribution of scores and association between EDI indicators

On the basis of the consultation with the early childhood consultants a Multiple Challenge Indicator (MCI) and a Multiple Strength Indicator (MSI) were created with scores from 0 to 100, where higher scores indicated more challenges and strengths, respectively. The MSI was able to differentiate between children with high and low strengths, with low ceiling effects suggesting that it offers promise as a new indictor for the AEDC program. The MCI, on the other hand, was highly skewed with most children scoring between 0 and 10 (out of 100). This suggests that this indicator is not likely to be useful at a population level but might be useful to identify children with very high needs for targeting.

After reviewing the relationship between the new indices and the five AvEDI domain scores, we concluded that the two indices were measuring quite different aspects of child development, although both incorporate aspects of all five developmental domains. The MCI correlates most strongly with language and cognitive skills, and social competence, whereas the MSI primarily taps aspects of social and communication skills.

Predictive validity of the MCI and MSI and their utility as individual level indicators for targeting supports to children

The most important aspects of validity testing on any new indices is predictive validity. It is important that any indicator that is created has strong predictive power. If the aim is to provide an evidence base for service providers and policy makers to use to determine resource allocation and policy priorities then it is important that the indicators that they are using actually predict later outcomes. That is, if the Multiple Challenge and/or Multiple Strength Indicator doesn't actually predict later outcomes then there is little value to the education system in trying to improve children's results on the indicator.

Statistical analyses were conducted to explore whether the two new indices had predictive power for academic performance in school as measured by the National Assessment Program – Literacy and Numeracy (NAPLAN). Analyses utilised a group of 1,781 children who participated in the original EDI pilot in Perth in 2003, and whose NAPLAN scores in Year 3, 5, 7 and 9 have been linked to their EDI results. We ran Receiver Operated Characteristic (ROC) curve analyses on all the five EDI domain scores and the MCI and MSI to explore their predictive validity for Year 3 and 9 NAPLAN Reading and Numeracy results. The main conclusions from these analyses were that 1) the language and cognitive skills and communication and general knowledge domain scores were the strongest predictors of NAPLAN, and 2) both the MCI and the MSI were significant predictors of NAPLAN Reading and Numeracy in Years 3 and 9.

Throughout the history of the AEDC in Australia there has been debate around the use of the Instrument at an individual level – that is to use either the whole AvEDI or a subset of specific items within the AvEDI for the teacher to then use at an individual level. The use of the EDI at an individual level is prohibited by the licence agreement and is considered to go against the philosophy of the intent of the instrument as a population measure to support universal and geographically targeted services rather than individual "treatment". Despite the arguments one way or the other, no research has been conducted (prior to this study) to determine if a valid individual assessment could even be constructed from the AvEDI. Considering these discussions, the consultation we undertook with the early childhood consultants actually represents the best efforts thus far to determine a selection of items from the AvEDI that may individually identify a child as being "challenged" and thus potentially needing additional supports.

As such, we explored specific cut points to classify children into 'challenged' and 'not challenged' and 'low strengths' and 'high strengths'. This practice is used frequently in clinical health settings to determine the sensitivity and specificity of diagnostic instruments (i.e. mammography screening for breast cancer). Using the ROC analyses one can determine the best cut points on the full scale to maximise both sensitivity and specificity. The results suggested that the MCI showed some promise as a screening instrument, with both high sensitivity and specificity, but it would not be practical to use the MCI as an individual screening tool because we would need to intervene on over 40% of the population with individual targeted intervention to reach an adequate level of sensitivity. With respect to the MSI, we would not recommend using it as an individual screening tool either. However, we note that the Multiple Strength Indicator may have promise when applied at the population level and might provide supplementary information to the current deficit based indicators.

Utility of the Multiple Strength Indicator in Australia

We explored the distribution of scores on the Multiple Strength Indicator (MSI) and grouped children into three categories based on their score on the MSI – emerging strengths (25%), well-developed strengths (25%) and highly developed strengths (50%). The cut-points were based on the 2009 AEDC data and were designed to remain fixed over time so that we can explore changes in the MSI over time.

Cross-tabulations were run to explore whether the MSI was providing different and complementary information to the current suite of deficit based indicators. Results suggested that the MSI provides complementary information to the main deficit based indicator as there was a sizeable number of children (n = 14,000) that were developmentally vulnerable on 1 or more domains but also had well-developed or highly developed strengths. We also identified communities with both high vulnerability and high strengths, providing further support for the idea that the MSI provides complementary information to the deficit based indicators.

Finally, we apply the categorical MSI variable to the 2009, 2012 and 2015 AEDC data and explored whether there had been changes in the MSI over time. All states and territories demonstrated reductions in the percentage of children in the emerging strengths group, and most states also showed improvements in the percentage of children with highly developed strengths between 2009 and 2015. However it was not possible to determine if these changes were significant. We note that it would be possible to calculate a critical difference for the MSI if there was interest in using the MSI in Australia.

Summary

The MCI and MSI both had adequate predictive validity for NAPLAN results in Year 3 and 9. However, it is not economically feasible to use either of the indices at an individual level to classify children into those who are 'challenged' or have 'low strengths'. To achieve the levels of sensitivity and specificity needed for a diagnostic measure, we would identify 40% or more of the population for individual targeted intervention and it would not be feasible to intervene on this many children. As such, we would not advocate using the MCI or the MSI at an individual level for targeting interventions.

The MCI could be used to identify communities with high needs who might benefit from targeted intervention. However, it is not likely to provide any additional information to the current set of deficit based indicators, and there wasn't a lot of support from the early childhood consultants for adding another deficit based indicator. As such, at this stage we would not recommend adding the MCI to the current suite of AEDC indicators.

The MSI on the other hand, shows some promise when applied at the population level and appears to provide supplementary information to the deficit based indicators. At the community level, results indicate that there are some communities with high levels of developmental vulnerability that also show high levels of strengths. The MSI focuses on strengths in the social and emotional wellbeing domains. Therefore, some communities might have high levels of vulnerability on language and communication domains, while exhibiting strengths in social competence and pro-social behaviours in children. It is important to note that the MSI also showed good predictive power onto later NAPLAN outcomes. The MSI will identify strengths in these areas of child development. The MSI could be reported in the National Report, Community Reports and mapped on-line, and the percentage of children in each of the MSI groups – emerging, well-developed and highly developed strengths - could be compared over time. With respect to the MSI, we recommend:

1. Conducting broad consultation with various stakeholders across Australia on the utility of the MSI. These consultations should include exploring the ways that policy makers, communities and schools might use the indicator. Deficit based indicators are often used to allocate resources. How could a strengths based indicator be used?

2. If the MSI is adopted, then we would recommend calculating the critical difference for this indicator, to allow calculation of whether changes over time are significant.

Section One: The Multiple Challenge Index

How is the Multiple Challenge Index different to the other AEDC indicators?

Currently in Australia we report on the percentage of children who are developmentally vulnerable, at risk and on track on each of the five developmental domains, as well as reporting on two summary indicators (1) vulnerable on 1 or more domains, and (2) vulnerable on 2 or more domains. In each case, the classification of a child into these categories is based on where the child sits in a distribution of scores (see Figure 1). The cut-points used to define "vulnerable", "at risk" and "on track" on each domain were based on the 2009 AEDC data, and these cut-points provide a reference point which later AEDC results can be compared. For example, in the 2009 AEDC data the bottom 10% of scores on the social competence domain were scores below 5.79 out of 10. Thus, all children with scores below 5.79 on this scale in 2009 or any subsequent cycle of the AEDC will be classified as developmentally vulnerable.

The Multiple Challenge Index (MCI) offers a complementary way of presenting the EDI results based on whether the child meets *developmental expectations* rather than their position in a distribution.

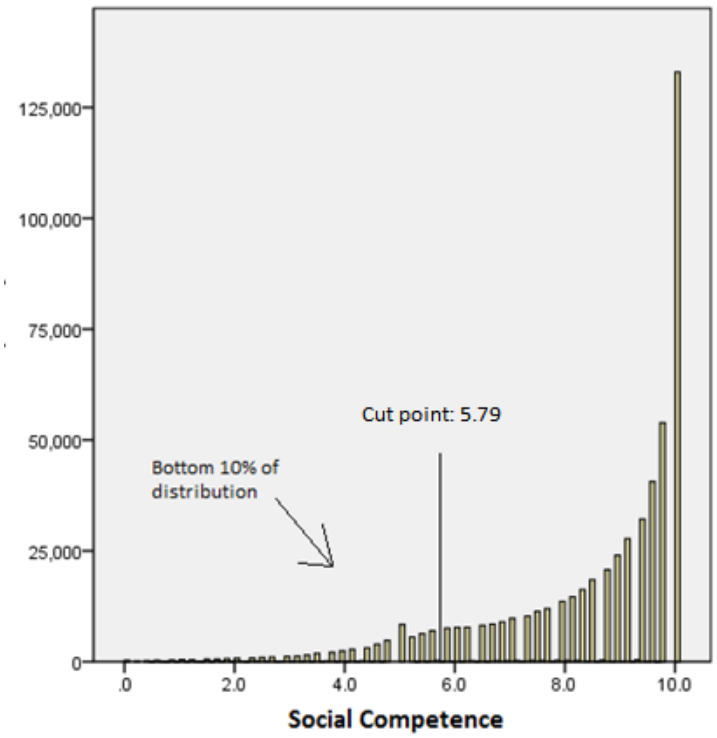


Figure 1: Classification of developmental vulnerability on the Social Competence domain

Development of the Multiple Challenge Index in Canada

A panel of experts reviewed the items from the AvEDI from each of the 16 sub-domains, and made a judgement about the level of development that children should have achieved when they started their first year of full time school. For example, the basic literacy sub-domain is made up of eight items about whether kids have mastered specific skills such as attaching sounds to words, reading simple words, and writing their own name. The experts decided that children should have mastered at least six of the eight skills in this sub-domain by the time they started school. Children who had mastered fewer than six of the skills were classified as 'challenged' and children who had mastered six or more of the skills were classified as 'not challenged'.

These classifications were then converted to a specific cut-point from 0 to 10 on the sub-domain. If children mastered six of the eight skills they would get a score of 7.50 on the basic literacy sub-domain. Thus, the cut point was set at 7.49 so that children who receive a scores less than or equal to 7.49 were classified as 'challenged' and children with scores greater than 7.49 were classified as 'not challenged'. This same process was repeated for all sub-domains of the EDI (see Janus, Walsh, & Duku, 2010 for developmental expectations on all sub domains).

Once the child has been classified as 'challenged' or 'not challenged' on each of the 16 sub-domains, this information is summed to calculate the total number of challenges that the child has. If a child experiences challenges in nine or more sub-domains they are deemed to have multiple challenges. Janus et al. (2005, p.6) stated that

> *"Analysis of the distribution of the number of challenges in one or more sub-domain indicated that having scores below the challenge ability in 9 or more pointed to serious problems in multiple domains. Three of the 5 domains have 4 sub-domains, one has 3, and the last one has 1. Therefore experiencing challenge in 9 sub-domains means that they are from at least 3 of the major five developmental domains".*

Table 1 presents the percentage of children who were classified as challenged on each of the sub-domains in the Canadian Normative sample (Janus et al., 2005). Given that this classification is based on whether the child meets developmental expectations rather than being in the bottom 10% of the distribution, the percentage of children who were challenged varied considerably across sub-domains from 2.1% on the anxious and fearful behaviour sub-domain to 33.5% on pro-social and helping behaviour. Janus et al. (2005) found that 4.3% of children were classified as having "multiple challenges" in a national representative sample in Canada. This compares to 25.9% of children who were vulnerable on 1 or more domains and 12.9% who were vulnerable on 2 or more domains. Therefore, the MCI identifies a much smaller group of children than either of the other two summary indictors of the EDI, which is consistent with the idea that the MCI could be used as an indicator to show where communities would benefit from additional targeted services.

Table 1: Percentage of children who were challenged on each sub-domain in Canada

Domains and sub-domains	% of children who were challenged
Physical Health and Wellbeing	
Physical readiness for school day	3.9%
Physical independence	8.9%
Gross and fine motor skills	21.8%
Social Competence	
Overall social competence	8.4%
Responsibility and respect	4.7%
Approaches to leaning	8.1%
Readiness to explore new things	3.2%
Emotional Maturity	
Pro-social and helping behaviour	33.5%
Anxious and fearful behaviour	2.1%
Aggressive behaviour	7.8%
Hyperactivity and inattention	13.1%
Language and Cognitive Skills	
Basic literacy	11.0%
Interest in literacy, numeracy and memory	15.8%
Advanced literacy	19.4%
Basic numeracy	14.2%
Communication skills and general knowledge	
Communication skills and general knowledge	29.0%
Summary indicators	
% Multiple Challenges	4.3%
% Vulnerable on 1 or more domains	25.9%
% Vulnerable on 2 or more domains	12.9%

Calculation of the Multiple Challenge Indicator[1] in Australia

There are some differences between the EDI and the Australian version of the EDI (AvEDI) that impact on the calculation of the MCI in Australia, and make it difficult to directly adapt the Canadian rules and cut points for the Australian context. During the process of piloting the EDI for use in Australia, Rasch modelling was conducted to explore the psychometric properties of the instrument. These analyses suggested the removal of some items from the EDI (Andrich & Styles, 2004). In Australia, these recommendations were adopted and nine items were dropped from the instrument. However, in Canada no items were removed from the instrument. In addition to the Rasch modelling, the AEDI Indigenous Adaptation Study (Silburn et al., 2009) recommended that an item should be added to the Physical Health and Wellbeing scale. This recommendation was adopted in Australia but not in Canada.

Table 2: Number of items in each of the sub-domains on the EDI and the AvEDI

Domains (sub-domains)	**Differences between EDI and AvEDI**	**Number of items that measure each sub-domain**	
		EDI	**AvEDI**
Physical health and wellbeing			
Physical readiness for school day	✓	4	4
Physical independence	✓	4	3
Gross and fine motor skills	-	5	5
Social competence			
Overall social competence	✓	5	4
Responsibility and respect	-	8	8
Approaches to leaning	✓	9	8
Readiness to explore new things		4	4
Emotional maturity			
Pro-social and helping behaviour	-	8	8
Anxious and fearful behaviour	✓	8	5
Aggressive behaviour	-	7	7
Hyperactivity and inattention	✓	7	6
Language and cognitive skills	-		
Basic literacy	-	8	8
Interest in literacy, numeracy and memory	-	5	5
Advanced literacy	-	6	6
Basic numeracy	-	7	7
Communication skills and general knowledge			
Communication skills and general knowledge	✓	9	8

[1] Throughout the remainder of this report, we use the term Multiple Challenge Indicator (rather than Index).

Based on these modifications, the Australian version of the EDI[2] has the same number of domains and subdomains as the EDI but fewer items. The EDI is made up of 104 items and the AvEDI has 96 items. Table 2 presents the number of items in each of the sub-domain in the two versions. There are differences between the EDI and the AvEDI for seven of the 16 sub-domains. In most cases, a single item was removed from the sub-domain during the adaptation process. However, in the 'anxious and fearful behaviour' sub-domain, three of the eight items were removed from the scale. For the 'physical readiness for the school day' sub-domain, the two versions have the same number of items but one item is different.

The removal of items has implications to the classification of children to 'challenged' or 'not challenged' for seven of the 16 sub-domains. For the hyperactivity and inattention sub-domain, the rules specify that a child should be rated 'never' on at least one item and rated 'sometimes' or 'never' on the other six items to be classified as "not challenged". These rules equate to a specific cut point of 5.71, so that children who receives a score below 5.71 would be classified as challenged. In Australia, we have six items rather than seven items, so these rules would need to be changed (e.g. one never, five never/sometimes), and a new cut point calculated. For the physical readiness for the school day sub-domain, one of the items from the EDI was dropped in Australia and a new item was added following the Indigenous Adaptation Study (Silburn et al., 2009). Regarding the new item, we have no existing information on the developmental expectations to use in developing the rules, and these would need to be developed through consultation.

To calculate the Canadian MCI in Australia, we would need to modify the Canadian rules for seven of the 16 sub-domains, and calculate new cut-points. Furthermore, we believe that it would be methodologically more robust to understand the developmental expectations at the item level of the EDI, rather than at the sub-domain level. For example, on the hyperactivity and inattention sub-domain, the rules specify that a child should be rated 'never' on at least one item and rated 'sometimes' or 'never' on the other six items. This rule means that all seven items are considered equally important, and that it does not matter which of the seven items the child is rated 'never' on. The calculation of the MCI at an item level allows for some items of the EDI to be more important indicators of developmental challenges than other items, which offers some advantages over the current approach.

After considering not only the merits of the Canadian computation in its own right, but also the added difficulty of applying the Canadian computation to the Australian version of the EDI, we decided to create a new MCI. After consultation with the EDI team at McMaster University, we decided that the best approach was to consult with early childhood experts in Australia about the AvEDI items and develop a new Multiple Challenge Index, known as the Multiple Challenge Indicator, based on developmental expectations for Australian children. Details of the Australian consultations are provided in **Section two**.

[2] We use the acronym AvEDI to refer to the Australian version of the Early Development Instrument

Section Two: Consultations with Australian Early Childhood Experts

In preliminary discussions about the Multiple Challenge Index in 2012-14, various stakeholders expressed an interest in the idea of creating a strength based indictor for the AEDC Program. The current suite of AEDC indicators are all deficit based, focusing on the percentage of children who are vulnerable on each developmental domain, with "vulnerable on 1 or more domains" used as the national progress measures for the AEDC program. More recently, some stakeholders have focused on the percentage of children who are "on track", aiming to use this as a more positive indicator. To this end, the critical difference was extended from just focusing on "vulnerable" so that it could also be applied to the "at risk" and "on track" categories to see whether significant increase in the percentage of children who are "on track" as occurred between AEDC cycles (Gregory & Brinkman, 2016). However, these indicators are applied to each domain (i.e. on track on the social competence domain) rather than providing an overall indicator of strengths, which might be parallel to the overall vulnerable summary indicator "vulnerable on 1 or more domains". Given the support for the idea of a strengths based indicator, we decided to additionally consult with early childhood experts about the potential of the AvEDI to indicate strengths at school entry.

The objectives of the consultations with Australian early childhood experts were:

1. To evaluate whether the a Multiple Challenge and/or Multiple Strength Indicator would be a useful addition to the existing suite of indicators currently used in the AEDC program

2. To review each of the AvEDI items, to determine whether the experts believed they were indicative of whether a child was facing challenges at school entry, and if so, what rating on the likert scale a child would need to receive to indicate that they were facing challenges

3. To review each of the AvEDI items, to determine whether the experts believed they were indicative of whether a child had particular strengths at school entry, and if so, what rating on the likert scale a would child need to receive to be showing strengths

Early childhood experts

Two types of early childhood experts were considered for the consultations. Firstly, we considered bringing together a group of academic researchers working in early childhood research from different fields such as developmental psychology, educational psychology, paediatrics, social epidemiology, and social work. Second, we considered bringing together a group of people who work with young children on a day-to-day basis such as teachers, social workers, pre-school staff, and childcare workers. After considering a range of different groups, we decided to bring together a group of early childhood consultants.

Early childhood consultants have tertiary degrees in early childhood education and experience working as teachers. These consultants are employed by state/territory education departments to work with preschools, childcare centres, and schools to implement early childhood initiatives and programs for children's services in the first years of school. They also provide advice to the education departments on early childhood reforms. Thus, this group has expertise in child development, have an intimate understanding of the education system, and additionally have experience working with children in their first year of full time school. Furthermore, most early childhood consultants have had experience with the AEDC and are familiar with its use in schools, the community and within the education department.

We sought permission from the relevant line manager in the Department for Education and Child Development (DECD) in South Australia to contact Early Childhood Consultants working at DECD and invite them to participate in the consultation forum on the Multiple Challenge and Multiple Strength Indicators. Contact details for early childhood consultants working in the Adelaide region were provided. It was not deemed feasible to meet with early childhood consultants working in regional areas of South Australia because of the travel time. Of the nine early childhood consultants who were invited to take part in the forum, seven attended the forum and two were unable to attend due to pre-existing commitments.

Format of the forum

The forum started with a broad discussion about the idea of a Multiple Challenge Indicator (MCI) and a Multiple Strength Indicator (MSI), followed by background about the use of the Multiple Challenge Index in Canada and the reasons behind its creation. We noted that there has been a push from some people within education departments to use the AvEDI or a subset of the AvEDI items at an individual level, as a screening tool to identify children who would benefit from further assessment or targeted interventions. This idea was discussed and the consultants were asked whether they felt the MCI would be useful for this purpose, and whether a screening tool for developmental problems was needed. We also discussed the idea of a MSI and noted that while this has not been used in Canada it might be of use in Australia. We asked the consultants about whether they felt that the Multiple Challenge and/or Multiple Strength Indicators would be useful additions to the current AEDC indicators.

After this initial discussion, the consultants were each provided with the set of items from each of the AvEDI sub-domains and the rating scales used for each one. Each item was read out and we asked the consultants whether they felt that a teachers rating on this item would be indicative of whether a child had a challenge or strength, and if so, what rating they would need to receive to indicate a challenge or strength. For instance, if a child 'sometimes' did a certain behaviour would this be sufficient to classify them as challenged or would they need to do that behaviour 'often'. Where consultants requested clarification on the item, we looked at the AEDC teacher guidelines and read out the instructions. Generally, there was broad agreement by the consultants about whether items were indicative of a challenge and/or strength. However, when the consultants had disparate views on an item, we counted the number in favour of each position and went with the majority position.

After reviewing each of the items, we had another open discussion about the AvEDI, MCI and MSI. We talked to the consultants about whether there were other groups they thought we should consult with. We provided them the opportunity to make any other comment, and also indicated that they could contact us later with additional comments if they so desired. We committed to providing the consultants with a draft version of our summary of the forum for comment prior to finalising it and circulating it more widely.

Major themes from the forum

- AEDC helps us focus on the 'whole' child
- AEDC not useful at the individual level
- Challenges - from a child development or education system perspective?
- Multiple Challenge Indicator – just another deficit based indicator
- Multiple Strength Indicator – beneficial for children, families and communities

AEDC helps us focus on the 'whole' child

The consultants felt that one of the most positive aspects of the AEDC program was that it helped shift the focus from just literacy and numeracy. Within the education system, there is significant focus on the more formal academic abilities of the children at the expense of the social and emotional skills of the child. Many of the consultants felt that if you support the child in their social and emotional wellbeing, then the academic learning will follow. They noted that the use of the five domains and the 16 sub-domains of the EDI helps people realise that there are many aspects of a healthy child and we need to move beyond just looking at literacy and numeracy.

AEDC not useful at the individual level

Within the education system in Australia, there has been a push by some people to be able to use the AvEDI at an individual level to screen for developmental problems and in the development of individual learning plans. Consultants agreed that education departments tend to be more individual focused than health departments who have more of population based approach. However, they did not feel that individual level data would be useful as schools already have a lot of information for the children. They also felt that using the AEDC data at in individual level could have negative implications. For instance, they suggested that individual level assessments might make the teacher only target programs towards those children who are classified as 'challenged'. They felt that this could have negative impacts on the children who are deemed 'not challenged' who might also benefit from additional supports. The consultants also felt that changing the focus from the population level to the individual level may have an impact on resource allocation, putting the focus back onto the educator rather than the community, which may impact negatively on the child and school system.

Challenges - from a child development or education system perspective?

The consultants made frequent comments that that some of the AvEDI items may indicate that the child would be facing a challenge 'in our system' but not from a child development perspective. For instance, one of the EDI items asked about the child's proficiency in holding a pen, crayon or brush. There was a general consensus that a child who is not proficient at holding a pencil may not be developmentally vulnerable, but the lack of this skill may present challenges for the child fitting into a classroom where they are learning to write.

I have actively worked against the perception that children should be at a certain point before they go to school. My concern is that a Multiple Challenge Index says to everybody, all of these children should be here (at this level) and therefore why are they not. What is going on?

Quote from one of the
Early Childhood Consultants

Multiple Challenge Indicator – just another deficit based indicator

The consultants were not supportive of creating a MCI. They felt that the AEDC was already deficit based by focusing on the children with developmental vulnerabilities, and that the MCI would only add more focus on deficits of children and communities. Some of the consultants suggested that they had actively worked against the perception that children should be at a certain point before they enter the school system, so the idea of the MCI was totally at odds to their thinking about child development. They expressed concerns that if the child was not at the "right level" when they start school then there may be a perception that the pre-school or child care centre has not prepared the child properly for entry into the school system.

Another consultant mentioned that the AEDC focuses on identifying whether there is something "wrong with the child", rather than something wrong with the environment that they enter. They noted that children have varied temperaments, dispositions and previous experiences and we try to fit them into the education system. They felt that the AEDC helps promote the idea that there is a "right kind of child" at school entry, one that fits well into the education system. However, it would be better to embrace the range of different types of children and try to create a flexible education system that caters for all types of children.

Multiple Strength Indicator – beneficial for children, families and communities

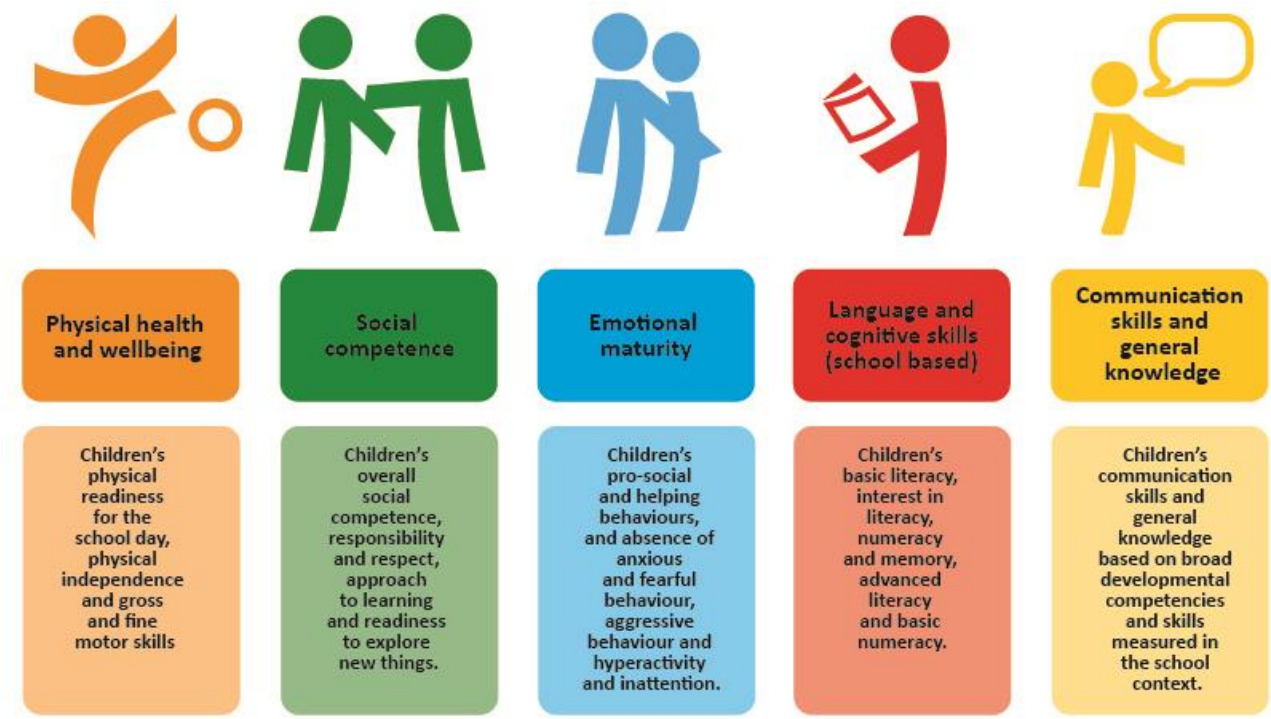
The consultants expressed support and enthusiasm about the idea of generating a MSI. They suggested that sharing information about strengths could be potentially very beneficial for the child, families and communities. They felt that focusing on the children who are developmentally vulnerable makes assumptions about what is right or not, and that a strengths based indicator might help to give a different focus.

One of the consultants mentioned that they had struggled to promote the AEDC as a positive measure because it is seen as an indicator of what is 'wrong' with communities. They mentioned that we often talk about sub-populations (e.g. Aboriginal children, children from low socio-economic areas) in a very negative manner and fail to focus on the strengths within these communities. There is some evidence from the literature that there are some positive resilience factors in lower SES groups, and it would be great to pull some of this out from the AEDC. The consultants mentioned that the deficit based model can leave communities feeling disempowered, and felt that a strengths based focus might help engage communities and the broader public more easily than the deficit based model.

The consultants advocated that any indicator that is created should take into account the complexity of the child, rather than trying to refine everything down to a single score or classification (vulnerable or not). They felt there was a tendency to produce simple categorical information about children rather than recognising the wide varieties of temperaments and dispositions that children have.

Review of the AvEDI items

This section presents each of the AvEDI items in full with their corresponding response options and consultant feedback. There are 96 AvEDI items that are used to calculate the current suite of indicators for the AEDC program. We investigated which of these could be used to create a MCI and MSI. Early Childhood Consultants looked over each of these items and discussed whether they could contribute to a Multiple Challenge and/or a Multiple Strength Indicator. Consultants made quick and unanimous decisions for some of the items. However, many of the items generated significant discussion in the group. In some cases the consultants asked for clarification on an item and we provided the instructions from the AEDC teacher guidelines, these are indicated by ** throughout the section.



DOMAIN:	**PHYSICAL HEALTH AND WELLBEING**
SUB-DOMAIN:	**Physical readiness for the school day**

1- Since the start of the year, has the child sometimes (more than once) arrived over or under-dressed for school related activities?

RESPONSE OPTIONS: Yes, No

MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants felt that this item provided information about the child's family and culture but does not really tell us much about the child. They noted that a child could arrive well-dressed because the parent is over-protective and does everything for the child. Another child could be less well dressed because they are more independent and have dressed themselves.

2- Since the start of the year, has the child sometimes (more than once) arrived too tired and/or too sick to do schoolwork?

RESPONSE OPTIONS: Yes, No

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

3- Since the start of the year, has the child sometimes (more than once) arrived hungry?

RESPONSE OPTIONS: Yes, No

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

4- How would you rate this child's daily personal hygiene?

RESPONSE OPTIONS: Poor/very poor, average, good/very good

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants felt that poor personal hygiene would present a challenge to the child's wellbeing and social interaction, although not necessarily to their learning. They also noted that personal hygiene is linked to children's health so poor hygiene would present a challenge. They acknowledged that there may be different expectations about the level of personal hygiene across cultural groups or different social groups. However, if a teacher has a group of children within a specific social context and indicates that a child has poor or very poor hygiene then this is probably informative and represents a challenge. Children will react to other children with poor personal hygiene (e.g. if the child smells) and will not want to play with that child, therefore having an impact on the child's social competence and overall wellbeing.

DOMAIN: **PHYSICAL HEALTH AND WELLBEING**
SUB-DOMAIN: **Physical Independence**

5 - Would you say this child is independent in toileting habits most of the time?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

One of the consultants noted that many children have toileting issues at certain times during the first eight years of their life. A child can be toilet trained until 4 and ½ years and then go through a period of disruption in their life and have toilet issues. The teacher might pick up on it but it doesn't mean there is anything wrong with them from a developmental perspective. However, the consultants also noted that the teacher was answering this item after knowing the child for 6-months and if they child was not independent in their toileting 'most of the time' then this would present a challenge.

6 - Would you say this child shows an established hand preference (right vs. left or vice versa)?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

There was broad agreement around the table that this is not a useful item. However, there was a suggestion that health professionals (e.g. occupational therapist) may feel this items is useful.

7 – Would you say this child is well co-ordinated (i.e. moves without running into or tripping over things)?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

DOMAIN:	**PHYSICAL HEALTH AND WELLBEING**
SUB-DOMAIN:	**Fine and Gross Motor Skills**

8- How would you rate this child's proficiency at holding a pen, crayon or brush?

RESPONSE OPTIONS: Poor/very poor, average, good/very good

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

There was a general consensus that a child who could not hold a pencil properly at age 5 was not necessarily having a problem from a developmental perspective, but it would certainly present challenges for the child fitting into the education system where they need to practice writing from reception onwards. A child who was good or very good at holding a pen, crayon or brush would have an advantage within the education system, so it could contribute to a strength based indicator.

9- How would you rate this child's ability to manipulate objects?

RESPONSE OPTIONS: Poor/very poor, average, good/very good

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants felt that this item was quite ambiguous and vague. They suggested that it might be referring to using scissors and those sorts of implements, and that if so then it would present a challenge if a child was not able to manipulate these types of objects.

10- How would you rate this child's ability to climb stairs?

RESPONSE OPTIONS: Poor/very poor, average, good/very good

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

If a child was rated poor or very poor on their ability to climb stairs then this would indicate they are facing challenges in their gross motor skills development.

11- How would you rate this child's level of energy throughout the school day?

RESPONSE OPTIONS: Poor/very poor, average, good/very good

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants felt that a child who was rated poor or very poor in their overall energy levels would face challenges at school. The consultants noted that in the context of the classroom, a child with high levels of energy can be problematic and at the most extreme these children are sometimes diagnosed with Attention Deficit Hyperactivity Disorder. However, they did not feel that a teacher rating a child as having good or very good overall energy levels represented a problem and more likely indicated the normal energy levels for a young child. The consultants did not feel that there was any rating on this item that would indicate that the child has particular strengths.

12- How would you rate this child's overall physical development?

RESPONSE OPTIONS: Poor/very poor, average, good/very good

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants indicated that good or very good overall physical development would represent a strength for the child and poor or very poor overall physical development would indicate that the child is facing some challenges, so this item could contribute to both indices.

Table 3. Physical Health and Wellbeing: Number of items from each sub-domain in MCI and MSI

	Multiple Challenge Indicator	Multiple Strength Indicator
Physical health and wellbeing	**(10 of 12)**	**(2 of 12)**
Physical readiness for school day	3	0
Physical independence	2	0
Gross and fine motor skills	5	2

DOMAIN: **SOCIAL COMPETENCE**
SUB-DOMAIN: **Overall Social Competence**

13- How would you rate this child's overall social/emotional development?

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants suggested that a high rating on this item (good/very good) would indicate that the child had strengths in their overall social and emotional development, and that a low rating (poor/very poor) would suggest that they were facing challenges.

14- How would you rate this child's ability to get along with peers?

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

15- Would you say that this child plays and works cooperatively with other children at the level appropriate for his/her age?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

16- Would you say that this child is able to play with various children?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

DOMAIN: **SOCIAL COMPETENCE**
SUB-DOMAIN: **Responsibility and respect**

17 - Would you say that this child follows rules and instructions?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants found this item to be problematic. A child who is very compliant rather than an independent thinker would be rated highly on this item but they wouldn't necessarily see this as a positive attribute to have. Some of the consultant thought that a child who questioned a seemingly unfair rule or instruction would be showing signs of strengths. They noted that in some situations, following instructions can be indicative of strengths but in other situations questioning rules and instructions can also be indicative of strengths.

18- Would you say that this child respects the property of others?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

There was agreement that respecting the property of others was indicative of empathy, recognising human rights, and personal respect, which were all important. All consultants agreed that a child who never respected the property of others would be demonstrating challenging behaviour. However, there was debate about whether a child who 'often' respected the property of others was exhibiting a strength or whether they were simply following rules and behaving as expected. Only three of the seven consultants felt it was a strength and the other four consultants did not. Therefore, this item will not be included in the MSI.

19- Would you say that this child demonstrates self-control? **[3]

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants suggested that a child who was never showing self-control would present a big challenge, and a child who was often showing self-control would be displaying a strength. They commented that self-control is related to self-regulation and also executive functioning, which are both important abilities to develop in early childhood.

** Indicates the consultants sought clarification from the AEDC Teacher Guidelines on this item

20- Would you say that this child demonstrates respect for adults? **

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

One of the consultants noted that a child who has experienced trauma or abuse will often not show respect for adults. Therefore not showing respect for adults could provide some indication of a problem with the child, and thus it is indicative of a challenge. They also noted that if a child often shows respect for adults then this is an indication of the child's wellbeing so this item is also informative about a child's strengths.

21- Would you say that this child demonstrates respect for other children? **

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

22- Would you say that this child accepts responsibility for actions?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

There was broad agreement that a child who often takes responsibility for their actions is exhibiting a strength. However, there was discussion about whether a child who did not take responsibility for their actions would be exhibiting challenging behaviour. Some consultants suggested it was normal for a child to blame others if they knocked something over. However, there was general consensus that if a child 'never' took responsibility for their actions, then this did present a challenge.

23- Would you say that this child takes care of school materials?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants noted that taking care of school materials is similar to the item about respecting the property of others and felt that it could indicate a challenge or strength.

24- Would you say that this child shows tolerance to someone who made a mistake (e.g. when a child gives a wrong answer to a question posed by the teacher)?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

Tolerance for others who made a mistake was seen a sign of empathy, and highly empathetic children were viewed as having strengths in their social competence. The consultants felt that if a child never showed tolerance for other children when they make a mistake then this would indicate that they were facing challenges in their social competence skills.

DOMAIN: **SOCIAL COMPETENCE**
SUB-DOMAIN: **Approaches to learning**

25- Would you say that this child listens attentively?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

One of the consultants mentioned that within the early childhood system the learning environment should be very engaging. If it is engaging and a child is not listening attentively, then this might represent a problem. However, if the child is being presented with information that is very simple and not engaging or is pitched too high for them then inattention is a natural response, and may not indicate a developmental challenge. Other consultants agreed that this item might reflect the quality of the teacher and the active learning environment more than the developmental status of the child. However, there was agreement that if a child 'never' listened attentively then this would be a concern. There was disagreement about whether or not a child who 'often' listened attentively was behaving as expected or exhibiting a strength. Several of the consultants indicated that you needed to know about the context when the children was or was not listening attentively to make a judgement about whether it indicated problems from a developmental perspective. Only three of the seven consultants felt that this item indicated a strength but the other four consultants did not, therefore it will not be included it in the MSI.

26 - Would you say that this child completes work on time?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants did not feel that this item provided useful information about the development of the child.

27- Would you say that this child works independently?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants discussed cultural differences in expectations about independence. In some cultures, children are expected to work more independently, and in other cultures it is highly desirable that children work collaboratively. However, they agreed that if a child 'never' worked independently then this would be concerning. Within our education system, they felt that it would be viewed as a strength if a child 'often' worked independently.

28 - Would you say that this child works neatly and carefully?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants did not feel that this item provided useful information about the development of the child. While it might be desirable in the education system, the neat or messy writing was not a sign of developmental problems or strengths.

29- Would you say that this child is able to solve day-to-day problems by him/herself?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

30- Would you say that this child is able to follow one-step instructions?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

31- Would you say that this child is able to follow class routines without reminders?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

If the child 'never' followed class routines then this would represent a challenge. The consultants felt that this item was about the child showing independence but could also be about processing information.

32- Would you say that this child is able to adjust to changes in routines?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

DOMAIN: **SOCIAL COMPETENCE**
SUB-DOMAIN: **Readiness to explore new things**

33- Would you say that this child is curious about the world?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

All consultants felt that curiosity about the world was an important attribute for children and that it would represent a challenge if a child never exhibited curiosity. They also felt that a child who often expressed curiosity would have advantages in a developmental sense.

34- Would you say that this child is eager to play with a new toy?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants suggested that if a child never displayed eagerness to play with a new toy this would represent a challenge. However, always showing eagerness to play with a new toy was considered normal behaviour for most children and not indicative of any specific strengths.

35- Would you say that this child is eager to play a new game?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

This item was considered very similar to the previous item, and was classified in the same way.

36- Would you say that this child is eager to play with/read a new book?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

All consultants considered that a child who 'never' displayed eagerness to read a new book would be exhibiting challenges. Two of the seven consultants indicated that a child who was 'often' eager to read a new book would be exhibiting strengths. They suggested that children who really want to read all the time have definite strengths. However, the other consultants suggested that this was not really what the item was asking. Given that that most consultants did not consider that this item was useful for a strength indicator it will not be included.

Table 4. Social Competence: Number of items from each sub-domain in MCI and MSI

	Multiple Challenge Indicator	**Multiple Strength Indicator**
Social competence	**(21 of 24)**	**(15 of 24)**
Overall social competence	4	4
Responsibility and respect	7	6
Approaches to leaning	6	4
Readiness to explore new things	4	1

DOMAIN:	**EMOTIONAL MATURITY**
SUB-DOMAIN:	**Pro-social and helping behaviour**

37- Would you say that this child will try to help someone who has been hurt?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

There was broad agreement that a child who 'often' tried to help someone who was hurt was exhibiting signs of strength. The consultants were somewhat divided about whether a child who never helped other people when they were hurt was exhibiting abnormal or concerning behaviour. For instance, they suggested that some children might be squeamish and might not want to help directly if a child was hurt. However, they also noted that the child could seek an adult to help the sick or injured child, and that if a child neither helped directly nor sought help from an adult then this would be concerning behaviour.

38- Would you say that this child volunteers to help clear up a mess someone else has made?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

39- Would you say that this child, if there is a quarrel or dispute, will try to stop it? **

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

After clarification from the AEDC teacher guidelines there was broad agreement that a child who often tried to stop other children who were quarrelling was exhibiting strengths.

40- Would you say that this child offers to help other children who have difficulty with a task?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

41- Would you say that this child comforts a child who is crying or upset?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

42- Would you say that this child spontaneously helps to pick up objects which another child has dropped (e.g. pencils, books)?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants indicated that this item was directly related to parenting expectations at home but did not really tell much about the child's development.

43- Would you say that this child will invite others to join in a game?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

44- Would you say that this child will help others who are feeling sick?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants felt that this item was very similar to the first item about helping a child who was hurt. They felt it would be useful to indicate strengths in pro-social behaviour but they would not be concerned if a child did not help other children who were feeling sick.

DOMAIN: **EMOTIONAL MATURITY**
SUB-DOMAIN: **Anxious and fearful behaviour**

45- Would you say that this child seems to be unhappy, sad or depressed?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

For all of the items in the anxious and fearful behaviour sub-domain, a child who was exhibiting these behaviours was thought to be experiencing challenges. However, children who never experienced them were developmentally normal, rather than showing strengths.

46 - Would you say that this child appears worried?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

47- Would you say that this child cries a lot?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

48- Would you say that this child is nervous, highly strung or tense?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

49- Would you say that this child is incapable of making decisions?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

DOMAIN:	EMOTIONAL MATURITY
SUB-DOMAIN:	Aggressive behaviour

50- Would you say that this child gets into physical fights?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

51- Would you say that this child bullies or is mean to others?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

52- Would you say that this child kicks, bites, hits other children or adults?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

53- Would you say that this child takes things that do not belong to him/her?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

54- Would you say that this child laughs at other children's discomfort? **

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants suggested that sometimes children will laugh if another child falls over and this is quite normal. The teacher guidelines suggest that teachers should only report laughter that is malicious, if the child seems to be deriving pleasure from another child's discomfort or laughter that draws negative attention to the other child. After this clarification, the consultants agreed that this behaviour would indicate a challenge.

55- Would you say that this child is disobedient? **

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants disliked this item and thought more information was needed in the teacher guidelines. For example, does it specifically refer to the child being disobedient to the teacher?

56- Would you say that this child has temper tantrums? **

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

If a child was sometimes having temper tantrums then this would be considered normal but if they were often having temper tantrums then this would be a challenge.

DOMAIN: EMOTIONAL MATURITY
SUB-DOMAIN: Hyperactive and inattentive behaviour

57- Would you say that this child can't sit still, is restless?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

58- Would you say that this child is distractible, has trouble sticking to any activity?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

59- Would you say that this child is impulsive, acts without thinking? **

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

This item generated a lot of discussion from the consultants. There was some suggestion that this behaviour reflects a temperament or personality type rather than a developmental problem. While these children might present challenges for their teachers within the current educational system, there nothing intrinsically problematic about them. However, other consultants felt that if a child was acting impulsively and were not able to inhibit their behaviour then this would reflect a challenge. Moreover, if they were doing dangerous things like jumping off tall objects or running on the road this would indeed indicate a challenge. Six of the seven consultants indicated that if a child was 'often' impulsive and acting without thinking this would represent a challenge.

60- Would you say that this child has difficulty awaiting turn in games or groups?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

61- Would you say that this child cannot settle to anything for more than a few moments?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

62- Would you say that this child is inattentive? **

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

Table 5. Emotional Maturity: Number of items from each sub-domain in MCI and MSI

	Multiple Challenge Indicator	Multiple Strength Indicator
Emotional maturity	**(22 of 26)**	**(7 of 26)**
Pro-social and helping behaviour	1	7
Anxious and fearful behaviour	5	0
Aggressive behaviour	6	0
Hyperactivity and inattention	5	0

DOMAIN:	**LANGUAGE AND COGNTIIVE SKILLS**
SUB-DOMAIN:	**Basic literacy skills**

63- Would you say this child knows how to handle a book (e.g. turn a page)?

RESPONSE OPTIONS: No, Yes

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

64- Would you say this child is able to identify some letters of the alphabet?

RESPONSE OPTIONS: No, Yes

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

65- Would you say this child is able to attach sounds to letters? **

RESPONSE OPTIONS: No, Yes

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

66- Would you say this child is showing awareness of rhyming words?

RESPONSE OPTIONS: No, Yes

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

67- Would you say this child is able to participate in group reading activities? **

RESPONSE OPTIONS: No, Yes

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

68- Would you say this child is experimenting with writing tools?

RESPONSE OPTIONS: No, Yes

MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

69- Would you say this child is aware of writing directions in English (left to right, top to bottom)?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

One of the consultants mentioned that directionality (i.e. knowing that writing in English goes from left to right and top to bottom) is one of the standards of Australian curriculum by the end of the foundation year. Whether we should expect children who are 6-months through their foundation year to be aware of directionality was discussed, and was finally deemed to be a reasonable expectation.

70- Would you say this child is able to write his/her own name in English?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants suggested that in the first year of full time schooling it would be more important that the child could recognise their name rather than to write it. They also noted that the task of writing ones name was much more challenging for some children than others based on the length of their name (e.g. Anastasia or Anna). One of the consultants mentioned that for some children, they could not handle a pen or crayon very well and that the lack of fine and gross motor skills influenced whether they could write their name rather than language skills per se. Two of the seven consultants felt that this item could contribute to a challenge indicator. Given that five did not believe that this item indicated the child was experiencing a challenge, it will not be included in the MCI. None of the consultants believed that this item provided information about whether the child had strengths in language skills.

DOMAIN: **LANGUAGE AND COGNTIIVE SKILLS**
SUB-DOMAIN: **Interest in literacy/numeracy and memory**

71- Would you say this child is generally interested in books (pictures and print)?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

Five of the consultants indicated that children who were not interested in books would represent a challenge. However, they also noted the impact of technology and suggested that some children might be interested in ipads, ibooks and computers but not in books per se. Two of the consultants suggested that interest in books represented a strength but the other five consultants did not agree.

72- Would you say this child is interested in reading (inquisitive/curious about the meaning of printed material)?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

73- Would you say this child is able to remember things easily?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

If children could not remember things easily this would present a challenge for learning sight words, which is one of the tasks they need to do in their foundation year.

74- Would you say this child is interested in mathematics? **

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants noted that the teacher guidelines make no mention of natural elements but focus on very "culturally white concepts" such as counting blocks. They noted that Aboriginal children in remote areas might sort things or refer to the distance of things from where they are (i.e. a long way away).

75- Would you say this child is interested in games involving numbers?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

This item was viewed as similar to the previous item and not adding anything additional.

DOMAIN: **LANGUAGE AND COGNTIIVE SKILLS**
SUB-DOMAIN: **Advanced literacy skills**

76- Would you say this child is able to read simple words?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

Five of the consultants agreed that children who could not read simple words would be facing challenges. One consultant reflected on their experience with Running Records and suggested that reading simple words would be a strength because many children get the little words wrong ('is', 'a', 'at'). Four of the consultants believed that being able to read simple words would indicate a strength and thus will be included in the MSI.

77- Would you say this child is able to read complex words?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

78- Would you say this child is able to read simple sentences?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

79- Would you say this child is interested in writing voluntarily (and not only under the teacher's direction)?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

80 - Would you say this child is able to write simple words?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

81- Would you say this child is able to write simple sentences?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

DOMAIN: **LANGUAGE AND COGNTIIVE SKILLS**
SUB-DOMAIN: **Basic numeracy**

82- Would you say this child is able to sort and classify objects by common characteristics (e.g. shape, colour, size)?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

83- Would you say this child is able to use one-to-one correspondence?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

84- Would you say this child is able to count to twenty? **

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants sought clarification about whether the child needed to be able to count objects or state the number from 1 to 20 by rote. It was noted that at the end of their foundation year the child should be able to count from one to one hundred. Therefore, when they are 6-months into their foundation year they should be able to count to twenty. If they cannot then this was thought to represents a challenge.

85- Would you say this child is able to recognise numbers one to ten?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

86- Would you say this child is able to say which number is bigger of the two? **

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants sought clarification from the AEDC teacher guidelines on this item. The guidelines clarified that children were only expected to compare numbers between 1 to 10 but not any higher numbers. After this clarification, the consultants felt that a child who could not identify the higher number from two numbers between 1 and 10 would be facing some challenges.

87- Would you say this child is able to recognise geometric shapes (e.g. triangle, circle, square)?

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants felt this item was not useful in understanding whether children met developmental expectations.

88- Would you say this child understands simple time concepts (e.g. today, summer, bedtime)? **

RESPONSE OPTIONS: No, Yes
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

The consultants noted that children should learn simple time concepts in their foundation year so it would represent a challenge if they did not know these simple time concepts.

Table 6. Language and Cognitive skills: Number of items from each sub-domain in MCI and MSI

	Multiple Challenge Indicator	Multiple Strength Indicator
Language and cognitive skills	**(19 of 26)**	**(9 of 26)**
Basic literacy	7	0
Interest in literacy, numeracy and memory	4	3
Advanced literacy	2	6
Basic numeracy	6	0

DOMAIN: **COMMUNICATION SKILLS AND GENERAL KNOWLEDGE**
SUB-DOMAIN: **Communication skills and general knowledge**

89 - How would you rate this child's ability to use language effectively in English?

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants believed that a child who had a good or very good ability to use language effectively would indicate a strength for a child. If a child's ability to use language effectively in English was poor or very poor this would indicate a challenge in school.

90 - How would you rate this child's ability to listen in English?

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

This item was viewed in the same way as the previous item.

91 - How would you rate this child's ability to tell a story?

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

The consultants noted that a child's ability to tell a story would be impacted by recall memory and working memory, so this would present a challenge if they could not tell a story. If the child was good or very good at telling a story this may indicate strong recall memory and working memory skills, which would put the child at an advantage in school.

92 - How would you rate this child's ability to take part in imaginative play?

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

93 - How would you rate this child's ability to communicate their own needs in a way understandable to adults and peers? **

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☑

94- How would you rate this child's ability to understand on first try what is being said to him/her? **

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

95- How would you rate this child's ability to articulate clearly without sound substitutions? **

RESPONSE OPTIONS: Poor/very poor, average, good/very good
MULTIPLE CHALLENGE INDICATOR: ☑ **MULTIPLE STRENGTH INDICATOR:** ☒

96- Would you say that this child answers questions showing knowledge about the world (e.g. leaves fall in autumn, apple is fruit, dogs bark etc.)?

RESPONSE OPTIONS: Never or not true, sometimes or somewhat true, often or very true
MULTIPLE CHALLENGE INDICATOR: ☒ **MULTIPLE STRENGTH INDICATOR:** ☑

Table 7. Communication skills and general knowledge: Number of items in MCI and MSI

	Multiple Challenge Indicator	Multiple Strength Indicator
Communication skills and general knowledge	**(7 of 8)**	**(6 of 8)**
Communication skills and general knowledge	7	6

Summary of the AvEDI items indicative of challenges and strengths

The vast majority of AvEDI items were considered to be indicative of challenges, strengths or both. Of the 96 items, there were only 10 items that the consultants had some reservations about from a child development perspective and were not thought to provide information about challenges or strengths. These included items about whether children come to school appropriately dressed, whether they have a developed hand preference, follow rules, work neatly and carefully, volunteer to clean up a mess, and have difficulty waiting their turn.

Table 8: Items from each sub-domain that contribute to the MCI and MSI

	Multiple Challenge Indicator	Multiple Strength Indicator
Physical health and wellbeing	**(10 of 12)**	**(2 of 12)**
Physical readiness for school day	3	0
Physical independence	2	0
Gross and fine motor skills	5	2
Social competence	**(21 of 24)**	**(15 of 24)**
Overall social competence	4	4
Responsibility and respect	7	6
Approaches to leaning	6	4
Readiness to explore new things	4	1
Emotional maturity	**(22 of 26)**	**(7 of 26)**
Pro-social and helping behaviour	1	7
Anxious and fearful behaviour	5	0
Aggressive behaviour	6	0
Hyperactivity and inattention	5	0
Language and cognitive skills	**(19 of 26)**	**(9 of 26)**
Basic literacy	7	0
Interest in literacy, numeracy and memory	4	3
Advanced literacy	2	6
Basic numeracy	6	0
Communication skills and general knowledge	**(7 of 8)**	**(6 of 8)**
Communication skills and general knowledge	7	6
TOTAL	**74**	**39**

Table 8 shows the number of items from each sub-domain that could contribute to the MCI and MSI. There were far more items in the AvEDI that provided information about challenges than strengths. Approximately 80% of AvEDI items (74 out of 96) provided information about challenges, whereas only 40% of AvEDI items (39 out of 96) provided information about strengths. It is not surprising that the AvEDI contains more items about challenges than strengths. For each of the five domains, the distribution of scores is skewed with a ceiling effect, indicating that the AvEDI cannot differentiate very well between children who are on track or showing strengths in their development. If there were equal numbers of items about challenges and strengths then we would expect to see a normal curve rather than such a skewed distribution.

For the **Multiple Strength Indicator**, the 'useful' items were not evenly distributed across the sub-domains.

- Within the *physical health and wellbeing* domain, there were only two items that allowed for the identification of strengths, and these were from the *gross and fine motor skills* sub-domain.
- All four of the sub-domains in the *social competence* domain provided information about children's strengths, with a total of 15 items coming from this domain.
- The *emotional maturity* domain, which focuses on emotional problems such as anxiety, aggressive behaviour, and hyperactivity, did not include many items that identified children with strengths. One exception was the *pro-social and helping behaviour* sub-domain, where all seven items were deemed useful for developing a multiple strength indicator.
- In the *language and cognitive skills* domain, the *interest in literacy, numeracy and memory* sub-domain and the *advanced literacy* sub-domain contained some items that could be used in a strength indicator but the *basic literacy* and *basic numeracy* sub-domains did not.
- Finally, most items in the *communication skills and general knowledge* sub-domain were deemed indicative of strengths.

The Multiple Strength Indicator measures the presence of developmental strengths at school entry. The indicator focuses primary on strengths in social and emotional development such as self-control, pro-social skills, respectful behaviour towards peers, teachers and property, and curiosity about the world. The indicator also identifies children who have advanced literary skills, a particular interest in reading, numeracy and memory, and very good communication skills.

Comments after the AvEDI item review

- Broad feedback on the AvEDI item review process
- Support for a MSI but not a MCI
- MSI – how would we use it?

Broad feedback on the AvEDI item review process

The consultants mentioned that from an Early Years perspective, they don't tend to think about whether children have met developmental expectations. They felt that use of developmental instrument was more common in health, but noted that in long day care they are used. However, one of the consultants noted that working through this process made it quite clear that they did all have expectations of what a child should be able to do at school entry, even if they don't tend to think in that way. The consultants noted that for several of the items that they had debated and discussed in depth, there were was no information in the teacher guidelines and they felt that these could be improved.

Support for a Multiple Strengths Indicator but not a Multiple Challenge Indicator

After reviewing the AvEDI items, the consultants reinforced their support for the MSI but not the MCI. They noted that the majority of the items were indicative of challenges, and therefore they did not feel that a MCI would add much more than the current set of deficit based indices. The consultants noted that there were no items about resilience, which they felt would be really important in developing a MSI. While the consultants supported creating a MSI, they emphasised that it was important to think about what it would be used for and whether this was in the best interest of children.

Multiple Strength Indicator – how would we use it?

The consultants encouraged us to think about whether the MSI would be useful for schools and/or communities, and if so what purposes it would be used for. The current methods of identifying deficits can be used to channel more money and resources towards the areas (geographical or domain specific) that need assistance. However, they were unsure how we could use the information about strengths. The consultants felt there was a risk of communities recognising that they are strong in some area(s) and thinking this means they don't need to do anything to support their children.

The consultants felt that it would be really beneficial to identify communities with vulnerabilities that also have strengths, and that this would be a really positive conversation to have with communities. One of the consultants mentioned that in some of the communities there have been significant improvements between 2009 and 2012, and that this could be viewed as signs of strength. This led to discussion about whether we could use a MSI to explore changes between 2009 and 2012. We noted that we could graph the MSI in the same way as the other AEDC indicators and compare it over time too.

Section Three: Creation of the new indices, distribution of scores and association between AEDC indicators

In this section, we describe the calculation of the two new indices (MCI and MSI), explore the distribution of scores on the new indices in the 2009 AEDC census data, and look at the association between the two new indices and the five AEDC domain scores.

Calculation of the new indices

Multiple Challenge Indicator

Each of the 74 items used to define the MCI were recoded to 0 or 1, based on the feedback from the early childhood consultants about the rating a child would need to receive from their teacher to represent challenging behaviour. For example, the first item flagged by the consultants as indicative of challenges was "How would you rate this child's proficiency at holding a pen, crayon or brush?" This item was scored on a three point likert scale ("very poor/poor", "average", "good/very good"), and consultants indicated that children would need to be rated "very poor/poor" by their teacher to indicate that they were facing challenges in their development. As such, scores of "poor/very poor" were recoded to 1 ("facing challenges") and scores of "average" or "good/very good" were recoded to 0 ("not facing challenges"). The same process was followed for each of the 74 items. We created a MCI by calculating the average score of all 74 MCI items and multiplying this score by 100. This produced a continuous score between 0 and 100, with higher scores indicating challenges in more areas of child development.

Multiple Strength Indicator

We followed the same process as described above to create the MSI. Each of the 39 items used to define the MSI were recoded to 0 or 1, based on the feedback from the Early Childhood Consultants. Using the same example as above, consultants indicated that children who were rated "good/very good" by their teacher in their proficiency at holding a pen, crayon or brush were showing were strengths in their development. As such, all ratings of "good/very good" were recoded to 1 ("developmental strength"), and ratings of "average" or "very poor/poor" were recoded to 0 ("no development strength"). We calculated the average of the 39 MSI items and multiplied this by 100 to calculate a MSI, with higher scores indicating strengths in more areas of child development.

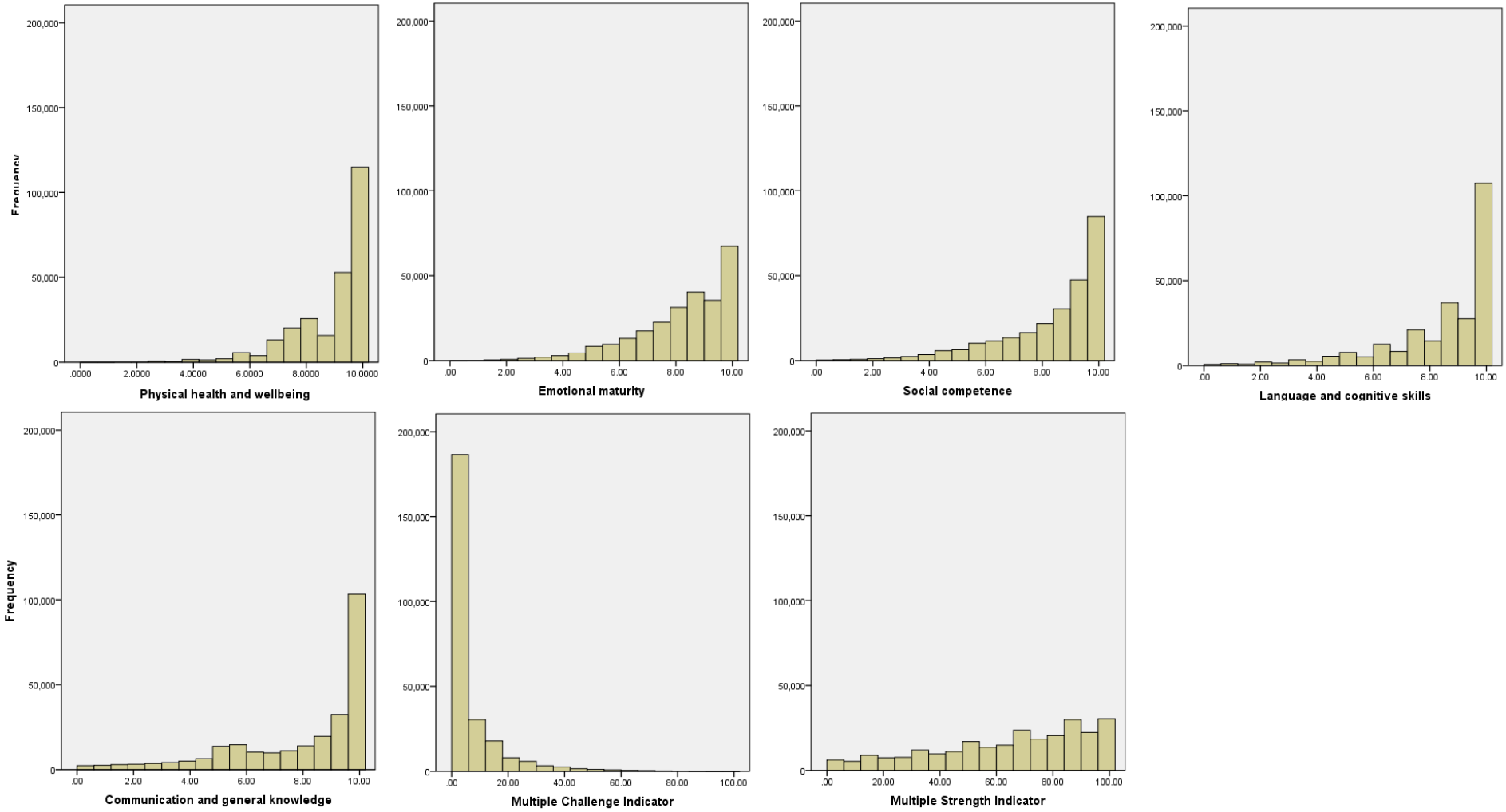


Figure 2. Distributions on the five domains and two new indicators (MCI and MSI) in the 2009 AEDC

Distributions of five domains, the MCI and MSI

Figure 2 shows the distribution of scores on each of the five AEDC domain, the Multiple Challenge Indicator (MCI) and the Multiple Strength Indicator (MSI) from the 2009 AEDC cohort. The five domain scores were all skewed left with a marked ceiling effect (i.e. lots of children receive the highest possible score). The ceiling effects were most pronounced for the physical health and wellbeing domain where 44% of the children receive a score of 10, followed by the communication and general knowledge domain (40%), the social competence and language and cognitive skills domains (23%) and finally the emotional maturity domain (15%).

The MCI was even more skewed than each of the five domain scores with 39% of children scoring 0 on the MCI, and 81% of children receiving scores between 0 and 10 (out of 100). To identify a group of children with "multiple challenges" we would need to set a cut point on the MCI scale between 0 and 100, where all children with a score higher than that point would be classified as having multiple challenges. In the next section, we explore the predictive validity of the MCI for a range of different outcomes and these analyses will help in defining the cut-point.

The MSI was much less skewed than any of the other indictors. All of the distributions in Figure 2 have been put onto the same scale to make them easier to compare. However, this makes is difficult to see the distribution of scores for the MSI so this is presented separately below (see Figure 3). Just 7% of children received the top score of 100 on this indicator, and 20% of children received scores between 90 and 100 (out of 100). As such, the MSI is much better at differentiating between children with different strengths at school entry, than any of the other indicators are at differentiating between children's deficits at school entry, suggesting that it has promise as a new indicator for the AEDC program.

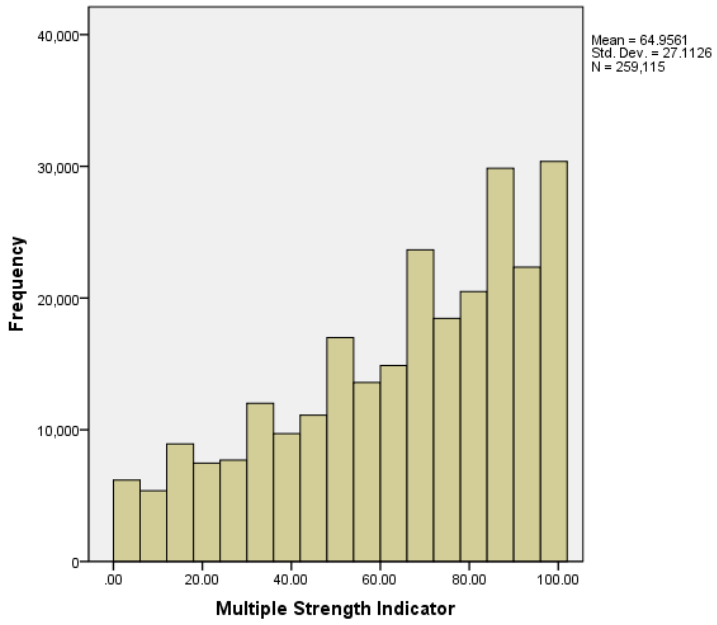


Figure 3. Distribution of scores on the Multiple Strength Indicator in the 2009 AEDC cohort

Relationship between the new indices and the five AEDC domain scores

Table 9 shows the correlation between the two new indicators and the five domain scores for the children from the 2009 AEDC cohort. The two new indicators correlated strongly with all five domains scores (r > 0.60) and the negative correlations for the MCI simply indicates that high scores on the domains were associated with fewer challenges. The MCI correlated most highly with the language and cognitive skills domain (r = -0.83) and the social competence domain (r = -0.77) but the relationships with all of the five domains were strong. We know that the language and cognitive skills domain correlates most highly with academic achievement (Brinkman et al., 2013) so this would suggest that the MCI should predict academic achievement.

Table 9: Correlations between the AEDC domain scores and new indicators

		1	2	3	4	5	6
1	Physical Health and Wellbeing						
2	Social Competence	.62					
3	Emotional Maturity	.49	.82				
4	Language and Cognitive Skills	.54	.61	.49			
5	Communication and General Knowledge	.64	.67	.52	.65		
6	Multiple Challenge Indicator	-.60	-.77	-.67	-.83	-.71	
7	Multiple Strength Indicator	.66	.89	.81	.71	.78	-.71

For the MSI, the highest correlations were with the social competence domain. Almost 40% of the items that make up the MSI are from the social competence domain so this is not surprising. The MSI also correlated highly with the emotional maturity domain, specifically the items measuring pro-social behaviours, and the communication and general knowledge domain. This suggests that the two indices are measuring quite different aspects of child development, although both incorporate aspects of all five developmental domains.

The **Multiple Challenge Indicator** identifies 'challenges' across a range of developmental areas but it is most strongly related to challenges in language and cognitive skills and social competence

The **Multiple Strength Indicator** predominantly identifies strengths in social competence and pro-social skills and communication skills

Section Four: Predictive validity of the MCI and MSI, and their utility as individual level indicators

Background

One of the key tests of the validity of any new measure or indicator is whether it can predict important outcomes for the child at some later point in time, referred to as the *predictive validity* of the indicator. In this section, we explore the ability of the MCI and MSI to predict children's scores on the NAPLAN assessment (Reading and Numeracy in Year 3 and 9) in an attempt to establish the predictive validity of these two new indicators.

The 2009 AEDC cohort completed their Year 3 and 5 NAPLAN assessments in 2012 and 2014, respectively, and will be completing their Year 7 NAPLAN assessment in 2016. Some of the education departments across Australia are working towards gaining access to the 2009 AEDC data for the government school student in their jurisdiction in an identified format, which will allow them to link students AEDC results to their subsequent NAPLAN assessments. In time, these datasets will be able to be used to explore the predictive validity of the AEDC domains, and the MSI and MCI for a range of different school outcomes including NAPLAN scores. However, in the interim we have run the predictive validity analyses on a sample of children who participated in the original Early Development Instrument (EDI) data collection in the North Metropolitan Health Service area of Perth in 2003. These children completed their Year 9 NAPLAN assessment in May 2012. In 2013, the EDI data was linked to Year 3, 5, 7 and 9 NAPLAN assessments for children in government schools in Western Australia. We explore the predictive validity of the MCI and MSI in this dataset. For further details of this study and the data linkage see Brinkman et al. (2013).

Receiver Operated Characteristic (ROC) curve analysis was used to compare the predictive validity of the MCI, the MSI and the five EDI domain scores for their ability to distinguish between children who score *at or below* the National Minimum Standard (NMS) and those score *above* the NMS on the Reading and Numeracy aspects of NAPLAN. We have run these analyse on NAPLAN outcomes from Year 3, 5, 7 and 9. However, for brevity, we present the results for the first NAPLAN assessment (Year 3) and the last NAPLAN assessment (Year 9). This analyses tests whether the MSI and MCI can predict near term academic achievement, and whether they can also predict academic achievement in middle high school, up to nine years later.

In the original Early Development Instrument (EDI) data collection in the North Metropolitan Health Service area of Perth in 2003, teachers used the Canadian version of the EDI, which has some differences to the currently used AvEDI (see *Section 1*). These differences have some implications for the calculation of the MCI and the MSI used in this predictive validity analyses.

Methods

Early Development Instrument (EDI)

There are two key differences between the EDI and AvEDI that are relevant to the calculation of the MCI and the MSI. First, there are differences in the likert response scales in the EDI and the AvEDI. Second, the additional item added to the AvEDI following the Indigenous Adaptation Study in 2007 was not included in the EDI. Details of these changes are below.

Different response scales: Following the Rasch analyses on the EDI (Andrich & Styles, 2004), changes were made to the response scales for 17 items so that the 5-point likert scales were changed to 2-point or 3-point likert scales. For the physical readiness for the school day sub-domain, the 5 point likert scale (always, usually, sometimes, rarely, never) was changed to 2-point likert scale (yes, no). For all other items where modifications were recommended, the 5-point scales (very poor, poor, average, good, excellent) were changed to 3-point scales (very poor/poor, average, good/very good). To make the 2003 EDI data comparable with the AvEDI instrument, responses using the old likert were re-coded to the new likert scale, prior to calculating the MCI and the MSI (i.e. very poor and poor categories were combined into a very poor/poor category).

Additional item from the AEDI Indigenous Adaptation Study: During the AvEDI review, the early childhood consultants indicated that item 4 (how would you rate this child's daily personal hygiene?) would be a useful item to include in the Multiple Challenge Indicator. However, this item was not in the original EDI used during piloting in 2003. Therefore, the MCI indices used in the predictive validity analyses do not include this item.

National Assessment Program – Literacy and Numeracy (NAPLAN)

NAPLAN is an annual assessment of academic achievement completed by students in Year 3, 5, 7 and 9 across Australia. The NAPLAN assessment provides information on children's academic skills across four domains: reading, writing, numeracy and language conventions (spelling, grammar and punctuation). For the current analyses we present data on the NAPLAN Reading and Numeracy domains from Years 3 and 9. NAPLAN results are presented as a score between 0 the 1,000 with higher scores indicating better skills in reading, writing, etc. In addition, the NAPLAN assessment scale is divided into ten proficiency bands and children are expected to move up the bands throughout their time in formal schooling. Each band represents a range of scores on the NAPLAN assessment, and specific expectations are set for children within each year level.

The National Minimum Standard (NMS) represents the agreed minimum acceptable standard of knowledge and skills without which a student will have difficulty making sufficient progress at school. Students who score *below* the NMS have not achieved the learning outcomes expected for their year level and are at risk of being unable to progress through school without targeted interventions. However, students who are performing *at* the NMS may also need additional assistance to be able to achieve their potential. Therefore, in the predictive validity analyses that require a dichotomous (1,0) NAPLAN variable, we combine together children who scored *below* the NMS with children who scored *at* the NMS as both of these groups would be considered to be experiencing problems with their literacy, and compared them to children who scored *above* the NMS.

Sample description

In 2003, all schools, government and non-government, in the North Metropolitan Health Service region of Western Australia were informed of the EDI project and invited to participate. At the same time some interested schools in the Swan Valley region participated along with some schools across the Great Southern region of WA (Katanning and Kojonup, Manjimup and Bridgewater). Some schools chose not to participate for the following reasons: Teacher reluctance to take time out of class to complete the EDI; were recently involved in other research projects or had teachers that were ill. Materials from three schools were not returned. Two of these schools withdrew due to teacher illness and one due to the "industrial climate". Of all schools approached, 72% participated in the study (121 schools out of 168) comprising of 83% government and 51% of non-government schools. The EDI was completed by pre-primary teachers and teacher relief time was allocated teachers to complete the Instrument during the third term, having known the children for several months.

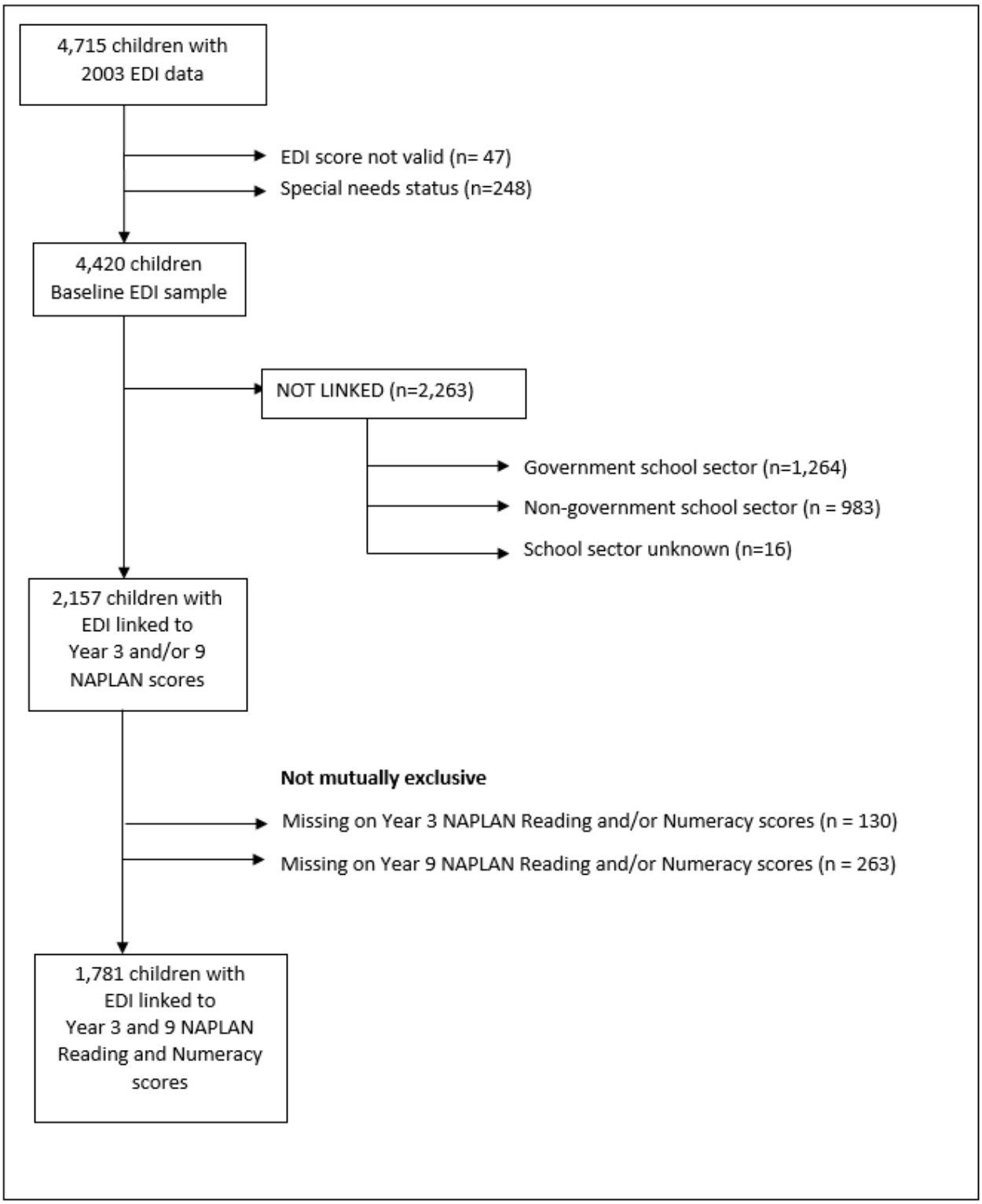


Figure 4: Flow chart of participants

Of the 4,715 children in the original EDI data set, 47 children were excluded as their EDI score was not valid (see Figure 4). This included children who had been in the class for less than one month as the teacher could not assess them adequately. An additional 248 children were excluded as they had a special need status. The 'Baseline EDI sample' consisted of 4,420 children aged 4 to 8 years (Mean=5.7; SD=0.3). Half of the children were male, 8% of children lived in a rural region, 8% spoke English as a second language, and 3 % of children were of Aboriginal descent.

Data Linkage

In 2013, the 2003 EDI data set was linked at an individual level to reading and numeracy assessments from NAPLAN, completed when the participants were in Year 9. The EDI was collected under passive consent and there was no recording of the student's name on the EDI. In addition, while children from both government and non-government schools (Independent and Catholic) completed the NAPLAN, linkage was only possible for government schools. Of the 4,420 children in the baseline EDI sample, NAPLAN data could not be linked for 2,263 children. Many of these children (n = 983) attended non-government schools at baseline, so their NAPLAN data would not be in the government systems making the linkage impossible.

However, EDI and NAPLAN data could not be linked for a significant number of children (n = 1,264) who attended government schools at baseline. There are various explanations for this including children moving interstate, children moving into the non-government school sector, and children skipping a grade or being held back. Data from the EDI was linked to NAPLAN results in Year 3 and/or Year 9 for 2,157 children (49% of the baseline EDI sample). After excluding children who had missing data on the Reading and/or Numeracy assessment in Year 3 or 9, there were a total of 1,781 children with valid scores for the EDI and the four NAPLAN assessments.

Data Analysis

For the purpose of the Receiver Operated Characteristic (ROC) curve analyses, all predictor variables need to be scored in the same direction. The EDI domain scores and the Multiple Strength Indicator are scored so that higher scores represent better outcomes. The MCI is scored in the opposite direction, with low scores representing a small number of challenges (i.e. better outcomes). Therefore, we have reverse scored the MCI variable for the ROC curve analyses.

We used ROC curves to explore the predictive validity of the MCI, the MSI and the EDI domain scores. Specifically we have explored different AEDC indicators for their ability to predict which children will score *at or below* the NMS on NAPLAN and which children score above the NMS. We present the ROC curves and the Area under the Curve (AUC) statistic for each of the predictors. Higher values of the AUC statistic indicate better the predictive validity of the indicator.

Table 10: Sample characteristics of children in baseline sample and analysis sample

		Baseline sample (n = 4,420)		Analysis sample (n = 1,781)	
		N	%	N	%
Sex	Females	2227	50.4	867	48.7
	Males	2193	49.6	914	51.3
Geographic location	Metropolitan	4065	92.0	1,610	90.4
	Rural	355	8.0	171	9.6
Aboriginal status	Non-Indigenous	4259	97.0	1,734	98.0
	Indigenous	131	3.0	36	2.0
English as a second language (ESL)	No	4090	92.5	1,658	93.1
	Yes	330	7.5	123	6.9
Socioeconomic Position (SEIFA) category[1]	Most disadvantaged	661	15.2	237	13.6
	2	197	4.5	96	5.5
	3	770	17.7	323	18.5
	4	627	14.4	233	13.3
	5	1482	34.0	639	36.6
	Least disadvantaged	616	14.2	220	12.6
EDI vulnerability (number of domains)	No vulnerability	3,246	73.4	1,359	76.3
	1	605	13.7	232	13.0
	2	318	7.2	108	6.1
	3	142	3.2	47	2.6
	4	83	1.9	26	1.5
	5	26	0.6	9	0.5

Notes. [1]Socioeconomic status was measured by the SEIFA Index of Relative Disadvantage and matched based on postcode of residence of the child (Australian Bureau of Statistics, 2006). There were missing data for 67 children on the SEIFA category in the Baseline EDI sample.

Results

Table 10 shows sample characteristics for the baseline sample (n=4,420) and the final analysis sample (n = 1,781). Compared to the Baseline sample, the NAPLAN analysis sample has a slightly higher percentage of boys, a higher percentage of children living in rural areas, and a slightly lower percentage of Indigenous children. The NAPLAN analysis samples have a lower percentage of children living in the most disadvantaged areas but also the least disadvantaged areas. This may reflect a tendency for the most affluent parents to send their children to independent schools, and the more transient nature of families in the most disadvantaged areas. Both of these factors would mean that the children would not be picked up during the linkage process. Children in the NAPLAN analysis samples had slightly better EDI results at age 5 than the broader baseline EDI sample.

Table 11 shows the number and percentage of children who were performing poorly on NAPLAN (at or below the NMS) and performing well on NAPLAN (above the NMS) in Year 3 and Year 9 in the sample. Between 10 and 22% of children scored at or below the NMS, and the proportion of children in this group was higher in Year 9 than in Year 3. In each of the subsequent analyses, we compare the ability of the AEDC indicators to correctly classify which children NAPLAN group children will end up in.

Table 11: Number and percentage of children in NAPLAN groups for ROC curve analysis

	At or below National Minimum Standard n (%)	Above National Minimum Standard n (%)
NAPLAN Year 3		
Reading	264 (14.8)	1,517 (85.2)
Numeracy	191 (10.7)	1,590 (89.3)
NAPLAN Year 9		
Reading	361 (20.3)	1,420 (79.7)
Numeracy	384 (21.6)	1,397 (78.4)

ROC curve analyses

Figure 5 shows ROC curves for all of the EDI indices, the MCI and the MSI predictor variables for NAPLAN Year 3 Reading Scores. Table 12 shows the area under the curve (AUC) statistic for each of the predictors. The best predictor of Year 3 Reading was the language and cognitive skills domain score from the EDI (AUC statistic = .715) followed closely by the MCI (AUC = 0.701). The communication and general knowledge domain score was the next strongest predictor (AUC = 0.686), followed by the MSI (AUC=0.665). It is not surprising that the language and cognitive skills domain and the communication and general knowledge domain, and the MCI which includes many of the items from these two domains, are the strongest predictors of subsequent reading scores. However, it is important to note that *all* seven indicators provide significant information about whether children will score above the NMS in Year 3, including the indicators focused on children's social and emotional skills at school entry.

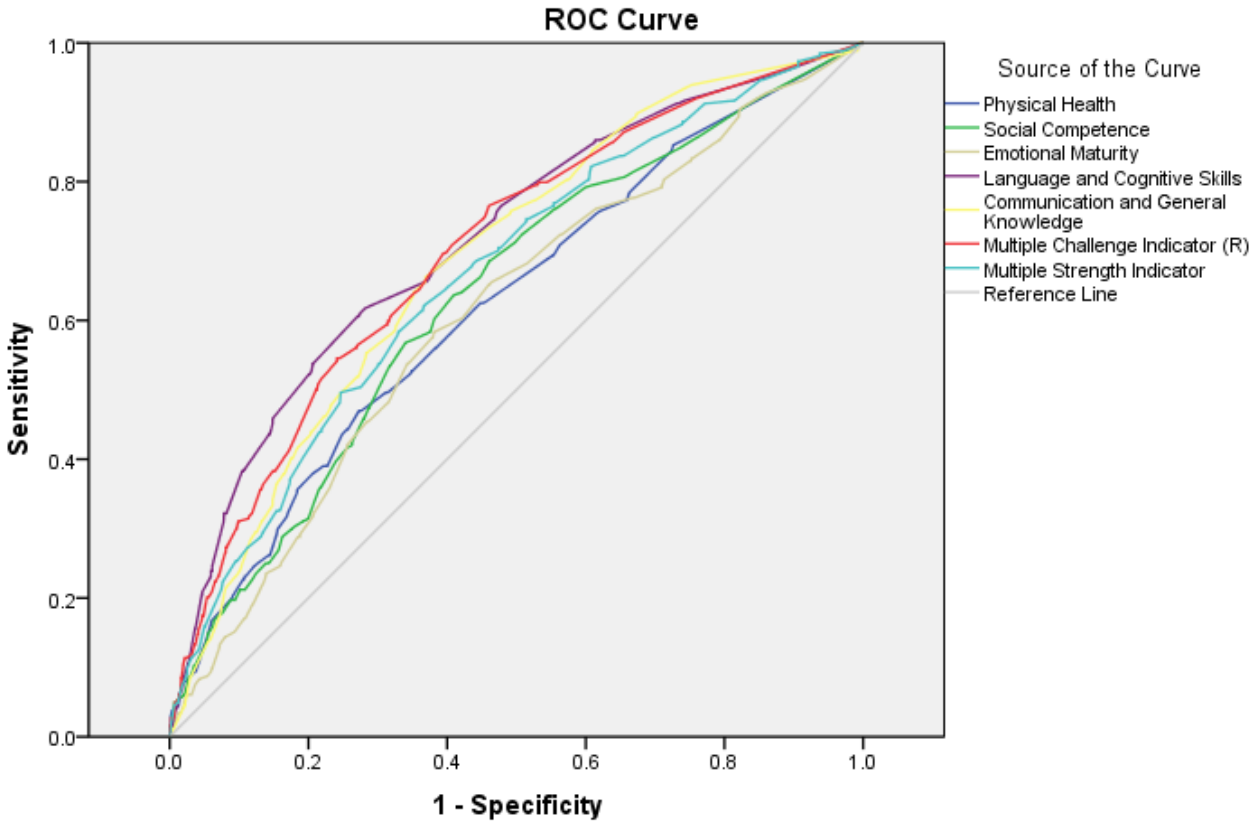


Figure 5. ROC curve for NAPLAN Year 3 Reading outcome

Table 12: Area under the curve statistics for all EDI, MCI and MSI variables for NAPLAN Year 3 Reading

				95% Confidence Interval	
Predictor	Area	Std. Error	Sig.	Lower Bound	Upper Bound
Physical Health and Wellbeing	.623	.019	.000	.585	.660
Social Competence	.635	.019	.000	.599	.672
Emotional Maturity	.609	.019	.000	.572	.646
Language and Cognitive Skills	.715	.018	.000	.681	.750
Communication and General Knowledge	.686	.017	.000	.653	.720
Multiple Challenge Indicator	.701	.018	.000	.666	.735
Multiple Strength Indicator	.665	.018	.000	.629	.700

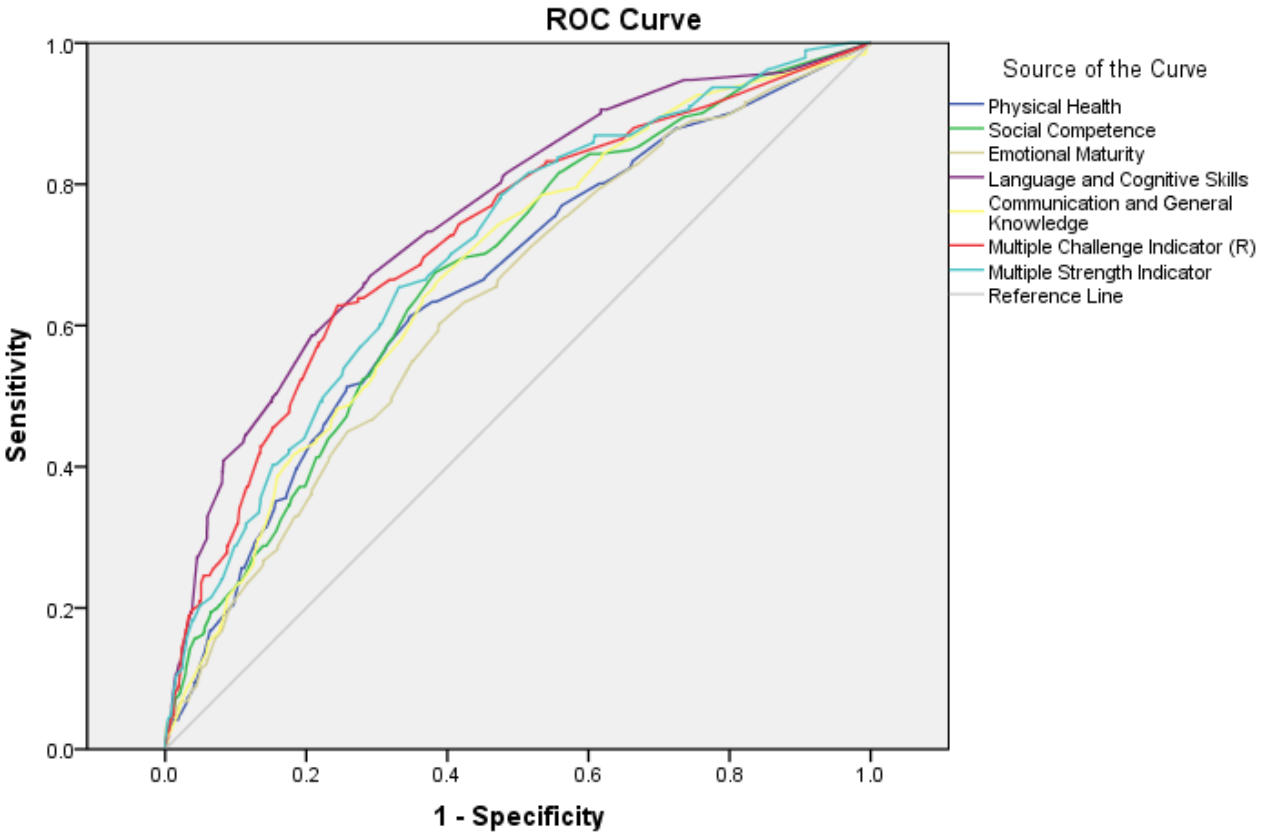


Figure 6. ROC curve for NAPLAN Year 3 Numeracy outcome

Table 13: Area under the curve statistics for all EDI, MCI and MSI variables for NAPLAN Year 3 Numeracy

				95% Confidence Interval	
Predictor	Area	Std. Error	Sig.	Lower Bound	Upper Bound
Physical Health and Wellbeing	.657	.021	.000	.616	.699
Social Competence	.674	.020	.000	.635	.713
Emotional Maturity	.635	.021	.000	.594	.677
Language and Cognitive Skills	.753	.019	.000	.716	.791
Communication and General Knowledge	.676	.020	.000	.636	.715
Multiple Challenge Indicator	.723	.020	.000	.683	.763
Multiple Strength Indicator	.706	.020	.000	.668	.745

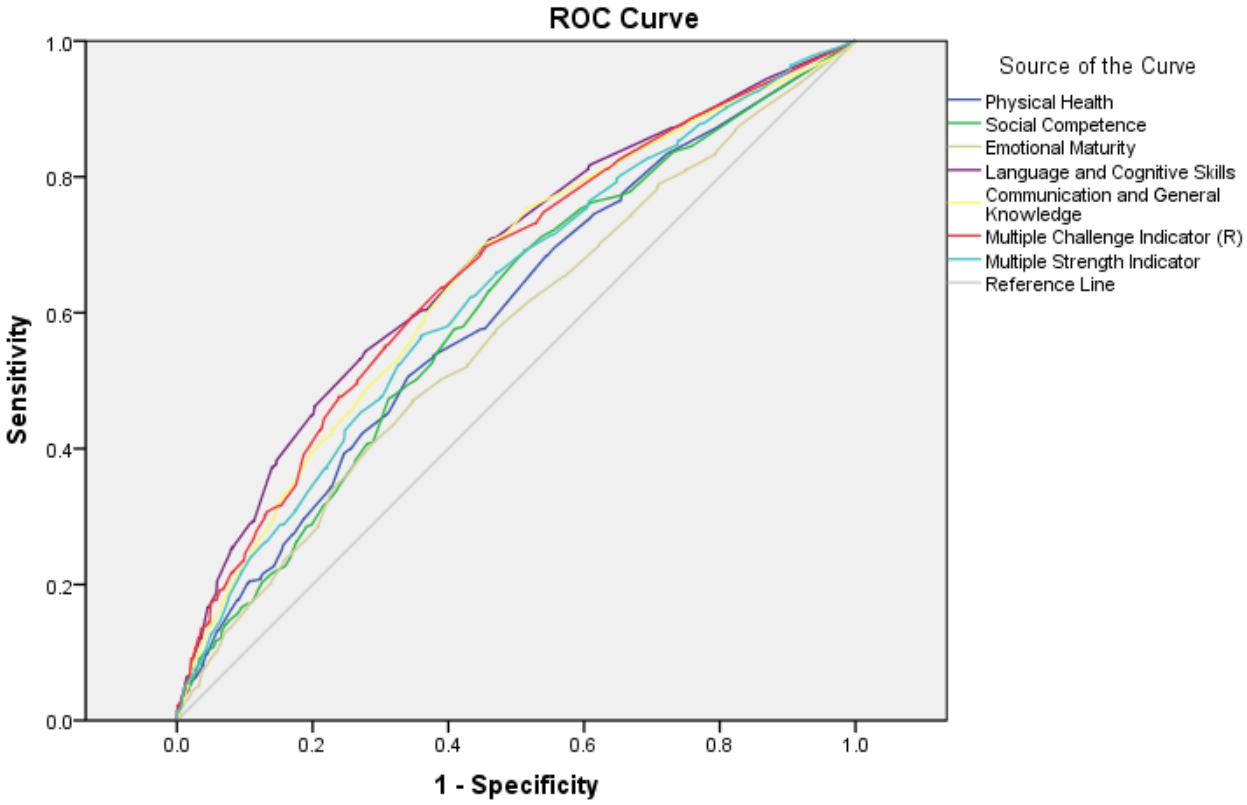


Figure 7. ROC curve for NAPLAN Year 9 Reading outcome

Table 14: Area under the curve statistics for all EDI, MCI and MSI variables for NAPLAN Year 9 Reading

				95% Confidence Interval	
Predictor	Area	Std. Error	Sig.	Lower Bound	Upper Bound
Physical Health and Wellbeing	.601	.017	.000	.568	.634
Social Competence	.602	.017	.000	.570	.635
Emotional Maturity	.571	.017	.000	.537	.605
Language and Cognitive Skills	.674	.016	.000	.642	.705
Communication and General Knowledge	.651	.016	.000	.619	.683
Multiple Challenge Indicator	.660	.016	.000	.628	.692
Multiple Strength Indicator	.628	.016	.000	.596	.660

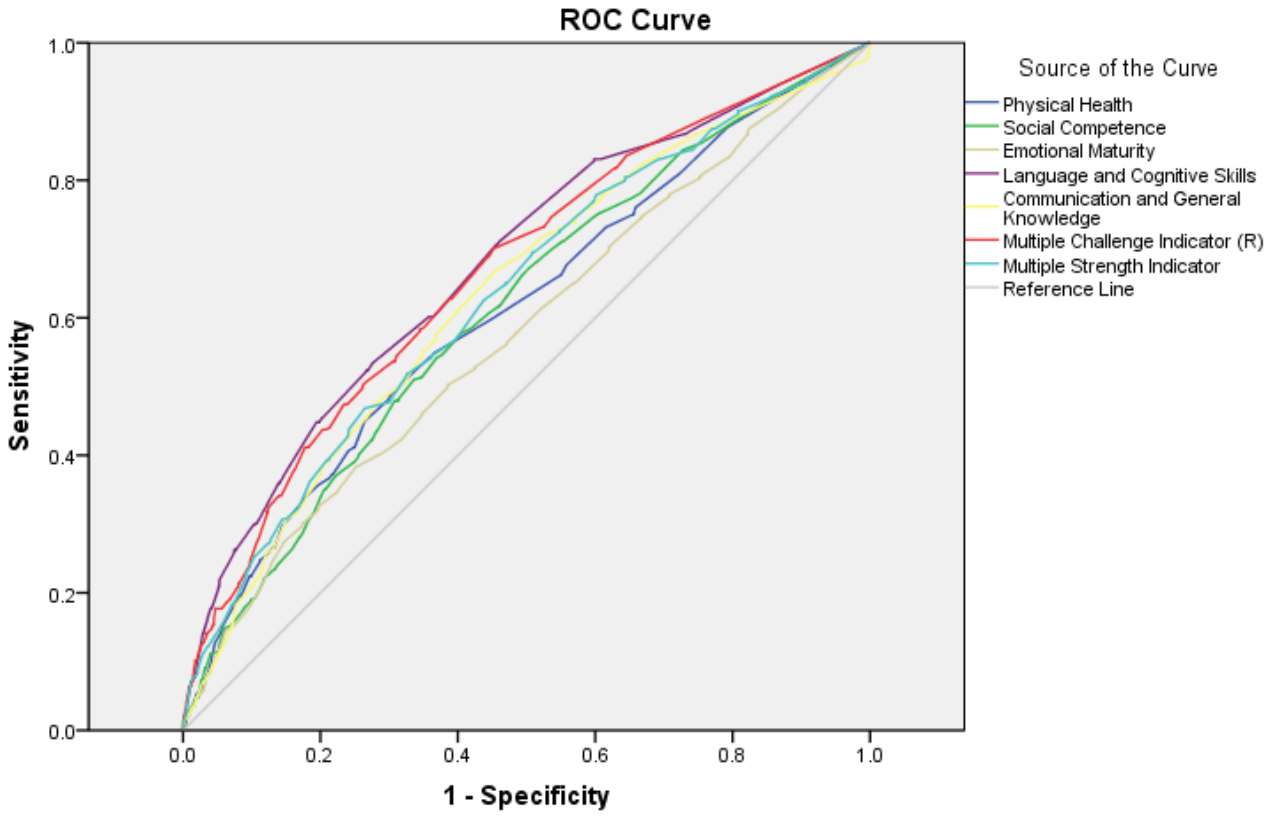


Figure 8. ROC curve for NAPLAN Year 9 Numeracy outcome

Table 15: Area under the curve statistics for all EDI, MCI and MSI variables for NAPLAN Year 9 Numeracy

				95% Confidence Interval	
Predictor	Area	Std. Error	Sig.	Lower Bound	Upper Bound
Physical Health and Wellbeing	.611	.017	.000	.578	.644
Social Competence	.613	.016	.000	.581	.645
Emotional Maturity	.578	.017	.000	.545	.611
Language and Cognitive Skills	.677	.016	.000	.646	.708
Communication and General Knowledge	.632	.016	.000	.600	.664
Multiple Challenge Indicator	.666	.016	.000	.634	.697
Multiple Strength Indicator	.634	.016	.000	.602	.666

The results of ROC curve analyses for three additional outcomes – Year 3 Numeracy, Year 9 Reading and Year 9 Numeracy are presented in Figure 6 to Figure 8 and Table 13 to Table 15. The AEDC indicators tended to be stronger predictors of Year 3 NAPLAN results than Year 9 NAPLAN results. For example, the MSI had an AUC statistic of 0.706 for Year 3 Numeracy and 0.634 for Year 9 Numeracy. The pattern of results for these three outcomes is similar to those found for Year 3 Reading, with the language and cognitive skills domain consistently the strongest predictor.

Use of the MSI and MCI as individual level indicators for targeting supports to children

Throughout the history of the AEDC in Australia there has been debate around the use of the Instrument at an individual level – that is to use either the whole AvEDI or a subset of specific items within the AvEDI for the teacher to then use at an individual level. The use of the EDI at an individual level is prohibited by the licence agreement and is considered to go against the philosophy of the intent of the instrument as a population measure to support universal and geographically targeted services rather than individual "treatment". The current suite of AEDC indicators cannot be used for the purpose of targeting individual children but the MCI or MSI might be able to identify a group of children with high needs. As such, we explored whether the MCI or the MSI might be suitable*, from a statistical perspective*, for this purpose.

The ROC curve analysis looks at the predictor variable (e.g. the MCI) and explores every possible cut-point from 0 to 100 for its ability to distinguish between children who score *at or below* the NMS on NAPLAN Year 9 Reading and those who score above the NMS. For instance, if we take the cut-point of 10 out of 100, and assumed that children scoring higher that this cut-point were 'at risk' for scoring below or at the NMS on NAPLAN, we could calculate the corresponding sensitivity and specificity of the test and these values form one of the points on the ROC curve. If we shifted the cut-point to 15, we could recalculate the sensitivity and specificity and see if this cut-point was better or worse at predictive NAPLAN scores. If we wanted to use the MCI or MSI as an indicator to target supports to children then we would need to decide what specific cut-point made most sense to use.

Sensitivity

Ability of the MCI (or MSI) to correctly predict children who have poor NAPLAN result

The proportion of children that score at or below the National Minimum Standard Year 3 Reading who have multiple challenges (or low strengths) age 5

Specificity

Ability of the MCI (or MSI) to correctly predict children who have good NAPLAN result

The proportion of children that score above the National Minimum Standard on Reading in Year 3 who do not have multiple challenges (or low strengths) at age 5

Table 16 shows several alternative cut points on the MCI and the resulting sensitivity and specificity. We focus on the Year 3 NAPLAN Reading scores as the outcome. Sensitivity refers to the ability of the MCI to predict which children will score *at or below* the NMS on NAPLAN in Year 3 (see text box above). Specificity refers to the ability of the MCI to predict which children will score above the NMS on NAPLAN. The aim is to find a cut-point that lead to high sensitivity and high specificity.

Table 16: Sensitivity and specificity of the MCI

Cut point	% children above cut point	Sensitivity	Specificity
3	56.8%	.80	.47
6	44.0%	.70	.60
12	28.6%	.54	.76
20	14.3%	.32	.89

If we made the cut point at 3 on the MCI scale (i.e. all children with a score above 3 on the MCI scale are deemed to have multiple challenges), then we would identify 56.8% of children, the sensitivity would be 0.80 and the specificity would be 0.47. That is, 80% of children who scored *at or below* the NMS on NAPLAN Reading in Year 3 had scores above 3 on the MCI scale at age 5 (sensitivity), and 47% of children who scored above the NMS on NAPLAN Reading in Year 3 had scores of 3 or lower on the MCI scale at 5 (specificity). These levels of sensitivity and specificity are quite good. However, more than half of all children score above 3 on the MCI scale. It is not practical to intervene on 50% of the population of 5 year olds with a targeted intervention in an attempt to ameliorate the possibility of children having poor NAPLAN Reading results in Year 3.

As the cut point is raised to be more conservative, we identify a smaller group of children, and the specificity increases. However, the sensitivity of the test drops. For example, if we use a cut-point of 20 on the MCI scale, we only identify 14.3% of children for intervention. However, the sensitivity of the test drops to 32%, and the specificity is 89%. That is, we would only identify 32% of the children who score *at or below* the NMS on NAPLAN Reading in Year 3 using a cut-point of 20. However, we can be confident that most of the children (89%) with good scores on the NAPLAN will have scores below 20 on the MCI scale. Therefore, while the MCI shows some promise, with both high sensitivity and specificity, it would not be practical to use the MCI as an individual screening tool because we would need to intervene on over 40% of the population with targeted interventions to reach as adequate level of sensitivity.

While the Multiple Challenge Indicator shows some promise, with both high sensitivity and specificity, it would not be practical to use the MCI as an individual screening tool because we would need to intervene on over 40% of the population with targeted interventions to reach an adequate level of sensitivity.

Table 17 shows the sensitivity and specificity of the MSI to predict Year 3 NAPLAN results. Given that the MSI is scored in the opposite direction (i.e. higher scores represent a positive outcome), we explore how dropping the cut point down from 100 impacts the sensitivity and specificity. A cut point of 70 indicates that all children with scores below 70 would be predicted to score at or below the NMS on NAPLAN. Using this cut point we would identify 54.9% of children, have a sensitivity level of 0.75 and specificity of 0.49. That is, we would identify 75% of the children who score *at or below* the NMS on NAPLAN Reading in Year 3, and identify 49% of children who score above the NMS. While this level of sensitivity and specificity is acceptable, we would need to intervene on 55% of children with targeted interventions, which is not practical.

Table 17: Sensitivity and specificity of the MSI Language and Cognitive Skills domain

Cut point	% children below cut point	Sensitivity	Specificity
70	54.9%	.75	.49
60	40.1%	.61	.64
50	28.0%	.48	.75
40	18.3%	.33	.85

If we drop the cut point down to 40, we would still have to intervene on almost 20% of the population but the sensitivity and specificity would not be acceptable. Therefore, there is no cut point on the MSI that can produce an acceptable level of sensitivity and specificity to predict NAPLAN unless we are willing to intervene on over 40% of the population, which is not feasible.

There is no cut point on the Multiple Strength Indicator that can produce an acceptable level of sensitivity and specificity to predict NAPLAN unless we are willing to intervene on over 40% of the population

Discussion

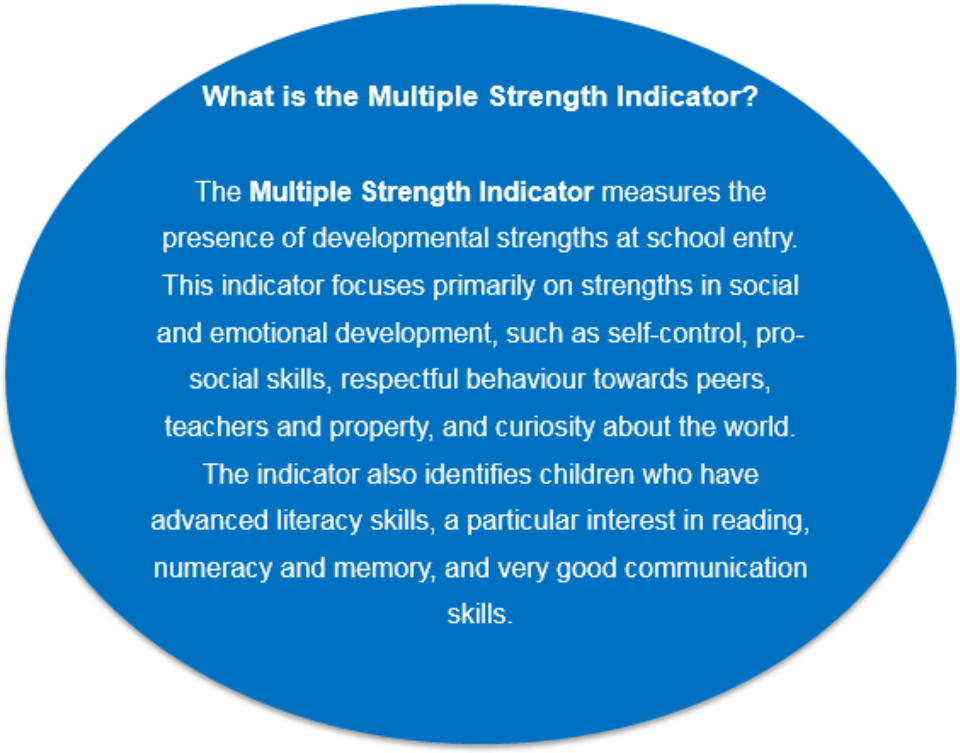
One of the continued critiques of the AEDC program is that doesn't provide an individual assessment for the teacher. Without trying to get into the debate around the pros and cons of an individual diagnostic test, these results would suggest that certain items within the AvEDI would provide a measure with suitable predictive power. The MCI shows promise with reasonable levels of sensitivity and specificity. However, to reach the necessary level of sensitivity to be confident in using the MCI as a screening tool (Sensitivity = 0.70, Specificity = 0.60), we would classify 40% of the population as 'at risk' and eligible for a targeted intervention. From a practical perspective, it is not feasible to intervene on such a large proportion of the population. Therefore, while the MCI shows some promise, with both high sensitivity and specificity, it would not be practical to use the MCI as an individual screening tool because we would need to intervene on over 40% of the population with targeted interventions to reach as adequate level of sensitivity.

With regards to the MSI, the same argument holds. That is, the predictive validity is adequate but it would not be feasible to use it at an individual level because we would need to intervene on too many children. Stepping back from idea of an individual diagnostic tool, the MSI has good predictive validity for academic outcomes with an AUC over 0.70 for Year 3 Numeracy and AUC between 0.60 and 0.70 for the other NAPLAN outcomes. As such, the MSI may be useful as a supplementary indicator to the current suite of primarily deficit based indicators presented through the maps and community reports. We know that the MSI predominantly identifies strengths in social competence and pro-social skills so it may provide supplementary information to the national indicator of vulnerable on 1 or more domain of the AEDC. In the **Section five,** we explore the utility of the Multiple Strength Indicator.

Section Five: Utility of the Multiple Strength Indicator in Australia

In this section, we explore the distribution of scores on the Multiple Strength Indicator (MSI) and create a categorical variable that can be used to explore changes over time in the MSI at the national, state/territory, community and local community level. We provide some information to help interpret the different MSI categories, and also explore whether the MSI provides additional information to the two summary indicators by identifying communities with both high vulnerability and high strengths. Finally, we apply the categorical MSI variable to the 2009, 2012 and 2015 AEDC data and explore whether there have been changes in the MSI over time.

To recap, the MSI combines together the information from 39 of the AvEDI items that have been identified by child development experts as indicative of strengths when starting school. For example, a child who has particularly high pro-social skills, well developed self-regulation skills or can read simple sentences is showing strengths that go beyond what might be expected at school entry. These and other strength based items are combined together to create the MSI. The definition below may be helpful in communicating the MSI to the general public and people using the AEDC data.



MSI categories – emerging, well developed, and highly developed strengths

Figure 9 shows the distribution of scores for the MSI for the 2009 AEDC cohort with valid scores[4] on the MSI (n = 247,061). Children receive a score between 0 and 100 on the MSI, where a score of 100 indicates that they have strengths in all 39 of the items. Using the 2009 AEDC data, cut-off points (or benchmarks) were established for the MSI to classify children into three groups based on the number of strengths they exhibited.

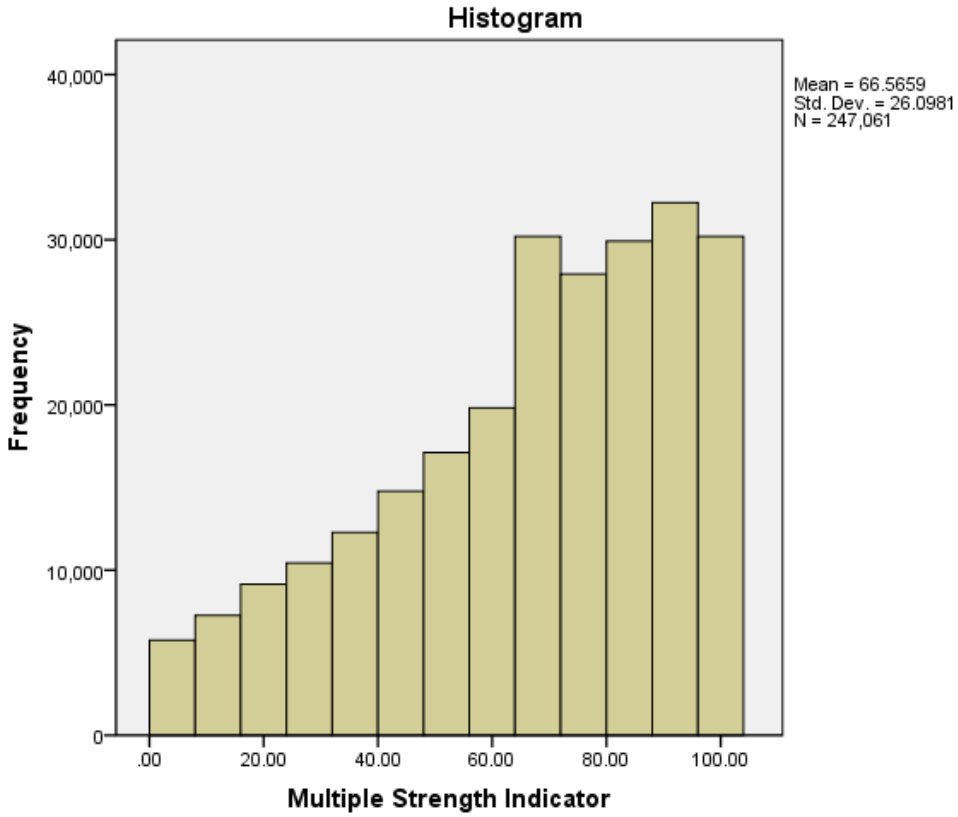


Figure 9. Distribution of scores on the Multiple Strength Indicator

- Children with scores falling below the 25th percentile were considered to have '*emerging strengths'*.
- Children with scores falling between the 25th and 50th percentile were considered to have '*well developed strengths*'.
- Children with scores above the 50th percentile were considered to have '*highly developed strengths*'

[4] We filtered out children with special needs, children who were in school less than 1 month and the teacher felt they could not make a valid assessment, and children who were aged 3 years of age. In addition, we created a variable to indicate whether the MSI was valid, and children with missing data on more than 10 of the 39 MSI items (25%) were also excluded.

To help understand these different groups, we have explored the number of strengths that children in each of the three groups possess, and the corresponding total score on the MSI.

- Children with '*emerging strengths*' had strengths in between 0 and 18 of the different areas, and this corresponded to a score between 0 and 48 on the MSI.
- Children with '*well developed strengths*' had strengths in 19 to 27 of the different areas, and this corresponded to scores between 49 and 71 on the MSI.
- Children with '*highly developed strengths*' had strengths in between 28 and 39 of the different areas, and this corresponded to scores on the MSI between 72 and 100.

Figure 10 presents a summary of the different MSI groups that might be useful to adapt for use in any AEDC products that present data on the MSI.

Emerging strengths	Children may be meeting developmental expectations when they start school but they do not demonstrate a high number of strengths. Children in this category range from those with strengths in none of the 39 MSI items, to children with strengths in about half of the MSI items.
Well developed strengths	Children are showing strengths in 50-70% of the following skills: relating to peers and teachers, self-control, curiosity about the world, working independently, reading and writing simple words, communicating effectively with peers and teachers, and storytelling.
Highly developed strengths	Children have strengths in most of the 39 MSI items. These children are likely to be on track on all five AEDC domains, and show strengths in their social and emotional, literacy and communication skills.

Figure 10. Description of each of the three Multiple Strength Indicator categories

MSI results for the 2009 AEDC cohort

Table 18 replicates the standard tables in the AEDC National Reports using the MSI outcome. There were differences in the percentage of children with emerging and highly developed strengths by socio-economic status, geographical remoteness, gender, Aboriginal and Torres Strait Islander status, and state/territory. For example, 43% of children in the most disadvantages areas have highly developed strengths compared to 60% of children in the most advantaged areas of Australia. However, there were limited differences in the well-developed group based on any of the child and community level characteristics.

Table 18. Summary statistics on the MSI for the 2009 AEDC cohort

	Number of children	Multiple Strength Indicator			
		Median Score	Emerging strengths	Well-developed strengths	Highly developed strengths
Australia	247,061	66.57	24.2	24.1	51.7
Socio-economic status (SEIFA Index of Relative Disadvantage)					
Quintile 1 *(most disadvantaged)*	47,093	60.82	32.1	24.7	43.2
Quintile 2	46,696	64.92	26.3	24.7	49.0
Quintile 3	46,638	65.71	25.3	24.7	50.0
Quintile 4	51,259	68.36	21.6	24.0	54.4
Quintile 5 *(least disadvantaged)*	55,304	71.91	17.4	22.5	60.1
Geographic Location (ASGC Remoteness Areas ARIA+)					
Major Cities of Australia	170,959	67.46	23.1	23.9	53.0
Inner Regional Australia	46,844	66.42	24.5	24.0	51.4
Outer Regional Australia	22,932	63.08	28.5	25.0	46.5
Remote Australia	3,794	60.25	31.6	26.2	42.2
Very Remote Australia	2,504	49.90	46.4	24.3	29.4
Sex					
Male	124,603	61.23	31.1	25.8	43.1
Female	122,458	71.99	17.2	22.3	60.5
Indigenous					
Indigenous	11,189	51.14	45.2	25.0	29.9
Non-Indigenous	235,872	67.30	23.2	24.0	52.7
State/Territory					
Australian Capital Territory	4,195	68.11	22.2	24.6	53.1
New South Wales	82,922	69.57	20.8	22.9	56.3
Northern Territory	2,878	56.74	37.4	22.6	40.0
Queensland	52,722	58.66	33.6	27.0	39.4
South Australia	15,052	67.54	23.6	23.0	53.4
Tasmania	5,705	69.63	20.8	22.8	56.4
Victoria	57,456	71.52	18.8	21.2	60.0
Western Australia	26,103	61.68	28.4	29.0	42.6

Overlap between the MSI and other AEDC indicators

One of the most important issues with the MSI is whether it provides different information to the deficit based indicators. If the MSI is simply the reverse of 'developmentally vulnerable on 1 or more domains' then it is probably not a useful addition to the suite of AEDC indicators. As there are 39 items that are used for calculating both the AEDC and the MSI, there will inevitably be a strong relationship between the MSI and the other AEDC indicators. Specifically, there is expected to be a strong association between the MSI and the Social Competence domain as the bulk of MSI items were derived from this domain. However, the MSI is designed to be a strengths based *summary* indicator so the most important issue is whether it provides complementary information to the main deficit based summary indicator 'developmentally vulnerable on 1 or more domains'.

In this section, we explore the relationship between the MSI and the other AEDC indicators, and then explore whether there are communities with both high vulnerability *and* high strengths. If so, this would suggest that the MSI provided different information to the other indicators and may be a useful additional indicator for the AEDC program. Table 19 looks at the children from the 2009 AEDC cohort who were developmentally vulnerable on 1 or more domains, and developmentally vulnerable on 2 or more domains and considers the number and percentage of children classified into each of the three MSI categories (emerging, well developed and highly developed strengths).

Of the children who were vulnerable on 1 or more domains of the AEDC, most were in the emerging strengths group (76%). However, there was a sizable group of children who were vulnerable on 1 or more domains but also had well-developed strengths (20%) or highly developed strengths (5%). Of the children who were not vulnerable on any of the AEDC domains, most had highly developed strengths (66%), but a sizeable number of these children (9%) had emerging or well-developed strengths. As such, there is a clear association between the different summary indicators but the MSI does provide different information to the "vulnerable on 1 or more domains" indicator.

Table 19. Cross-tabulation of the MSI and two summary AEDC indicators

Multiple Strength Indicator	Vulnerable on 1 or more domains		Vulnerable on 2 or more domains	
	Yes	No	Yes	No
Emerging	43,858 (75.7%)	15,920 (8.5%)	27,667 (94.8%)	32,031 (14.7%)
Well developed	11,352 (19.6%)	47,874 (25.4%)	1,453 (5.0%)	57,927 (26.6%)
Highly developed	2,723 (4.7%)	124,588 (66.1%)	63 (0.2%)	127,674 (58.7%)

Table 20. Cross-tabulation of the MSI and the AEDC domains

	Physical Health and Wellbeing		
MSI	Vulnerable	At risk	On track
Emerging	17,420 (75.7%)	16,344 (50.9%)	26,121 (13.6%)
Well developed	4,041 (17.6%)	9,635 (30.0%)	45,765 (23.8%)
Highly developed	1,550 (6.7%)	6,131 (19.1%)	120,045 (62.5%)
	Social Competence		
MSI	Vulnerable	At risk	On track
Emerging	22,942 (98.1%)	26,456 (70.6%)	10,486 (5.6%)
Well developed	438 (1.9%)	10,474 (28.0%)	48,530 (26.1%
Highly developed	(0.0%)	532 (1.4%)	127,727 (68.3%)
	Emotional Maturity		
MSI	Vulnerable	At risk	On track
Emerging	19,082 (87.4%)	21,961 (57.6%)	18,456 (9.9%)
Well developed	2,480 (11.4%)	13,241 (34.7%)	43,520 (23.4%)
Highly developed	259 (1.2%)	2,948 (7.7%)	124,204 (66.7%)
	Language and Cognitive Skills		
MSI	Vulnerable	At risk	On track
Emerging	18,258 (83.4%)	17,836 (51.6%)	23,633 (12.4%)
Well developed	3,032 (13.8%)	11,338 (32.8%)	44,997 (23.7%)
Highly developed	610 (2.8%)	5,386 (15.6%)	121,624 (63.9%)
	Communication and General Knowledge		
MSI	Vulnerable	At risk	On track
Emerging	19,356 (85.5%)	22,335 (57.3%)	18,176 (9.8%)
Well developed	2,920 (12.9%)	12,550 (32.2%)	43,966 (23.7%)
Highly developed	366 (1.6%)	4,090 (10.5%)	123,265 (66.5%)

Table 20 shows children who were who were vulnerable, at risk and on track on each of the five AEDC domains, and explores the number and percentage who fell into each of the MSI categories. For example, of the children who were vulnerable on the physical health and wellbeing domain, 76% had emerging strengths, 17% had well-developed strengths, and 7% had highly developed strengths. There is a clear relationship between the MSI and each of the five AEDC domains, and this relationship is strongest for the social competence domain where almost 100% of children who were developmentally vulnerable, were also in the emerging strengths group. Overall, most of the children who were developmentally vulnerable tended to have emerging strengths (76-98%) but there was a sizeable group who were vulnerable with well-developed strengths (2-18%) and a small group who were vulnerable with highly developed strengths (0-7%). In addition, the MSI was able to differentiate between children who were developmentally on track for each of the AEDC domains. Of the children who were developmentally on track, about 5-14% had emerging strengths, 23-26% had well-developed strengths and 63-68% had highly developed strengths.

There is a strong relationship between the MSI and the domain scores as both the MSI and the AEDC domains measure child development, using overlapping items from the AvEDI. For example, if we look at the relationship between two of the AEDC domains – social competence and emotional maturity – we would expect a high level of overlap for the results of a population reported through the MSI and the other summary indicators. In the 2009 AEDC cohort, about 60% of children who were vulnerable on the Social Competence domain were also vulnerable on the emotional maturity domain, and the two domain scores correlated highly (r = 0.80). Similarly, if we explored the overlap between the individual domains and the summary indicator "vulnerable on 1 or more domains" there would also be a strong relationship. Nonetheless, the MSI is designed as a summary indicator, so the most important issue is whether it offers complementary information to the main deficit based indicator, and the results suggested that is does because there were a sizable group of children (24%) who were developmental vulnerable on 1 or more domains but had well developed or highly developed strengths. The next test of the MSI is to see whether there are communities with high vulnerability and high strengths.

Table 21: Communities with high vulnerability and high strengths

Community	State	N*	% vulnerable on 1 or more domains (National average = 23.6%)	% with highly developed strengths (National average = 51.7%)
Northampton/Chapman Valley	WA	58	25.5	54.5
Lower Eyre Peninsula	SA	212	28.6	54.3
Weston Creek	ACT	303	27.9	57.9
Wongan-Ballidu	WA	31	27.6	62.1
Hindmarsh	VIC	70	29.4	54.4
Boorowa	NSW	27	25.9	74.1
Break O'Day	TAS	61	25.0	80.0

Note. * N = Number of children in the community who were involved in the AEDC in 2009. The number of children with valid scores on these two indicators will be a little less than this value.

We explored the percentage of children with highly developed strengths on the MSI for all communities in 2009 across Australia, and attempted to identify communities where the MSI was telling a different story to the national indicator (% vulnerable on 1 or more domains). Table 21 presents a selection of communities where the percentage of children vulnerable on 1 or more domains was higher than the national average and the percentage of children in the highly developed strengths group was also better than the national average.

For instance, children in Hindmarsh, Victoria, had high levels of developmental vulnerability (29.4%) but a high percentage of children in the community were also showing highly developed strengths (54.4%). In Boorowa, NSW, the level of developmental vulnerability was higher than the national average at 25.9% and 74.1% of the children in this community had highly developed strengths. In Break O'Day, Tasmania, the level of developmental vulnerability was a little higher than the national average at 25.0%, however 80% of the children in this community had highly developed strengths on the MSI. These results indicate that, in some cases at least, communities can have high levels of vulnerability on the AEDC but also have highly developed strengths, suggesting that the MSI does provide different information to the standard AEDC deficit based indicators.

Table 22: Communities with average vulnerability and high strengths

Community	State	N	% vulnerable on 1 or more domains (National average = 23.6%)	% with highly developed strengths (National average = 51.7%)
Benalla	VIC	145	22.1	65.7
Yarra	VIC	556	22.2	64.9
Moira	VIC	331	22.3	57.5
Botany Bay	NSW	460	22.4	60.2
Loxton Waikerie	SA	107	22.9	59.0
Swan Hill	VIC	274	23.4	61.8
Huon Valley	TAS	177	23.5	60.2
Kogarah	NSW	441	24.0	60.0

Table 22 presents a selection of communities where the percentage of children vulnerable on 1 or more domains was close to the national average but the percentage of children with highly developed strengths was much better than the national average. For instance, children in Swan Hill in Victoria had developmental vulnerability very close to the national average (23.4%) but 61.8% of children in the community had highly developed strengths. These results suggest that the MSI is not simply identifying those communities who have low levels of developmental vulnerability. Rather the two indices provide complementary information for communities.

Given the encouraging results for the MSI at the community level, we have applied the MSI to the 2012 and 2015 AEDC cohorts to see whether there has been a change in percentage of Australian children with emerging, well-developed and highly developed strengths between 2009 and 2015. The 2009 cut point remained fixed for all AEDC cycles so that, like the other AEDC indices, we can explore change over time in the percentage of children in each category.

Changes in the MSI in Australia from 2009 to 2015

Table 23 to Table 25 presents the percentage of children with emerging, well developed and highly developed strengths in 2009, 2012 and 2015 at the national level and for a range of different population sub-groups. The results show that there has been a decrease in the percentage of children with emerging strengths (24.2% to 21.7%) and well developed strengths (24.1 to 22.5%) and an increase in percentage of children with highly developed strengths (51.7% to 55.8%) at the national level. While there were large differences between population sub-groups in the percentage of children in the emerging and highly developed strengths groups, there were minimal differences in the well-developed strengths group, and only minor changes over time.

At this stage, it is not possible to determine whether these differences are statistically significant. The critical difference values were created for each of the five developmental domains and the two indicators - vulnerable on 1 or more domains and vulnerable on 2 or more domains. However, it would be possible to calculate a critical difference for the MSI categories if there was interest in using the MSI in Australia.

Table 23. Children with emerging strengths in the 2009, 2012 and 2015 AEDC cohorts

	Emerging strengths (%)		
	2009	**2012**	**2015**
Australia	24.2	22.1	21.7
Socio-economic status (SEIFA Index of Relative Disadvantage)			
Quintile 1 *(most disadvantaged)*	32.1	30.4	29.7
Quintile 2	26.3	25.0	23.8
Quintile 3	25.3	21.8	21.8
Quintile 4	21.6	19.4	19.0
Quintile 5 *(least disadvantaged)*	17.4	15.7	16.2
Geographic Location (ASGC Remoteness Areas ARIA+)			
Major Cities of Australia	23.1	21.2	20.8
Inner Regional Australia	24.5	22.2	21.6
Outer Regional Australia	28.5	25.4	25.1
Remote Australia	31.6	28.1	28.8
Very Remote Australia	46.4	42.3	45.8
Sex			
Male	31.1	28.4	28.2
Female	17.2	15.7	15.1
Indigenous			
Indigenous	45.2	40.8	39.8
Non-Indigenous	23.2	21.1	20.6
State/Territory			
Australian Capital Territory	22.2	20.4	20.7
New South Wales	20.8	19.5	19.4
Northern Territory	37.4	34.2	34.8
Queensland	33.6	27.8	27.1
South Australia	23.6	23.7	23.4
Tasmania	20.8	19.2	18.8
Victoria	18.8	18.0	18.4
Western Australia	28.4	26.1	23.0

Table 24. Children with well-developed strengths in the 2009, 2012 and 2015 AEDC cohorts

	Well-developed strengths (%)		
	2009	**2012**	**2015**
Australia	24.1	22.6	22.5
Socio-economic status (SEIFA Index of Relative Disadvantage)			
Quintile 1 *(most disadvantaged)*	24.7	23.4	24.1
Quintile 2	24.7	23.0	22.8
Quintile 3	24.7	22.9	22.6
Quintile 4	24.0	22.4	22.3
Quintile 5 *(least disadvantaged)*	22.5	21.3	21.3
Geographic Location (ASGC Remoteness Areas ARIA+)			
Major Cities of Australia	23.9	22.5	22.5
Inner Regional Australia	24.0	22.6	22.4
Outer Regional Australia	25.0	22.8	22.9
Remote Australia	26.2	23.7	23.2
Very Remote Australia	24.3	22.6	23.0
Sex			
Male	25.8	24.9	24.9
Female	22.3	20.2	20.2
Indigenous			
Indigenous	25.0	23.8	23.6
Non-Indigenous	24.0	22.5	22.5
State/Territory			
Australian Capital Territory	24.6	23.3	25.8
New South Wales	22.9	21.3	21.7
Northern Territory	22.6	23.5	22.4
Queensland	27.0	24.2	23.6
South Australia	23.0	22.6	23.6
Tasmania	22.8	21.4	21.5
Victoria	21.2	20.8	21.2
Western Australia	29.0	26.6	24.9

Table 25. Children with highly developed strengths in the 2009, 2012 and 2015 AEDC cohorts

	Highly developed strengths (%)		
	2009	**2012**	**2015**
Australia	51.7	55.3	55.8
Socio-economic status (SEIFA Index of Relative Disadvantage)			
Quintile 1 *(most disadvantaged)*	43.2	46.1	46.3
Quintile 2	49.0	52.0	53.4
Quintile 3	50.0	55.3	55.6
Quintile 4	54.4	58.2	58.8
Quintile 5 *(least disadvantaged)*	60.1	63.0	62.5
Geographic Location (ASGC Remoteness Areas ARIA+)			
Major Cities of Australia	53.0	56.3	56.7
Inner Regional Australia	51.4	55.1	56.1
Outer Regional Australia	46.5	51.8	52.0
Remote Australia	42.2	48.1	47.9
Very Remote Australia	29.4	35.0	31.2
Sex			
Male	43.1	46.7	47.0
Female	60.5	64.1	64.7
Indigenous			
Indigenous	29.9	35.4	36.5
Non-Indigenous	52.7	56.4	56.9
State/Territory			
Australian Capital Territory	53.1	56.4	53.5
New South Wales	56.3	59.2	58.9
Northern Territory	40.0	42.3	42.8
Queensland	39.4	48.0	49.3
South Australia	53.4	53.8	53.0
Tasmania	56.4	59.4	59.7
Victoria	60.0	61.2	60.4
Western Australia	42.6	47.4	52.1

Section Six: Summary of Findings and Recommendation

The primary aim of this research was to explore the feasibility and utility of using the Multiple Challenge Indicator Australia. In addition, there has been significant interest in the concept of identifying children or communities with 'strengths' in child development, and as such, the secondary aim of this project was to explore the feasibility of creating a Multiple Strength Indicator (MSI).

After detailed analysis it became clear that it was not possible to calculate the Multiple Challenge Indicator by directly adapting the Canadian syntax. As an alternative, consultations were held with Australian Early Childhood Experts who reviewed the AvEDI items and provided advice on which items could contribute to a Multiple Challenge Indicator (MCI). Most of the items provided information about whether children were facing challenges at school entry. A total of 74 of the 96 items provided information about challenges, and these items were spread across all of the five developmental domains. About 40% of the items provided some information about children who were showing signs of strengths in school entry. Most of the strengths based items came from the social competence domain and the pro-social and helping behaviour sub-domain, but a smaller number came from the sub-domains of 1) gross and fine motor skills, 2) interest in literacy, numeracy and memory, 3) advanced literacy, and 4) communication skills and general knowledge.

Based on the advice of the Early Childhood Consultants, two new indicators were created to represent the level of challenges and strengths that each child displayed at school entry. We explored the predictive validity of each of these indicators to predict which children scored *at or below* the National Minimum Standard on their NAPLAN assessment in Year 3 and 9. Results showed that the MCI and the MSI were good predictors of NAPLAN results. However, when we explored possible cut points to classify children into 'challenged/not challenged' or 'high/low strengths' it was clear that these indicators would not work as individual diagnostic measures. Specifically, there was no cut point that could identify a small enough group of children for targeted intervention, while maintaining high levels of sensitivity and specificity. We conclude that while the MCI showed some promise, with both high sensitivity and specificity, it was not practical to use the MCI as an individual screening tool because we would need to intervene on over 40% of the population with targeted individual intervention to reach an adequate level of sensitivity. With respect to the MSI, we also do not recommend using it as an individual screening tool.

At the population level, the MCI could be calculated in Australia and used to identify communities with high needs for targeted intervention. However, it is not likely to provide any additional information to the current set of deficit based indicators. The MCI is constructed based on items from all of the five developmental domains and correlates most highly with items from the language and cognitive skills domain. Therefore, using the MCI to identify high needs communities is likely to yield similar results to identifying communities with high levels of developmental vulnerability on the language and cognitive skills domain. Early Childhood Consultants were not supportive of adding in another deficit based indicator, and given that the MCI is unlikely to provide any additional information, it is unlikely to be a fruitful exercise.

The MSI, on the other hand, shows some promise when applied at the population level and appears to provide supplementary information to the deficit based indicators. At the community level, results indicated that the MSI provides supplementary information to the standard set of deficit indicators and it is not simply the opposite of the percentage of children who are developmentally vulnerable on 1 or more domains. A set of communities with high vulnerability and high strengths were provided as examples. By keeping the 2009 cut point fixed over time, the MSI could be used to explore changes over time in child development in Australia. After applying the MSI to the 2012 and 2015 AEDC cohorts, showed that most states and territories saw improvements in the percentage of children with highly developed strengths. At this stage, it is not possible to determine if these changes are significant. However, it would be possible to calculate a critical difference for the MSI if there was interest in using it in Australia.

Specific recommendations from this report are:

1. The Multiple Challenge Indicator should not be used at an individual level to identify children who might benefit from targeted interventions.

2. The Multiple Strength Indicator should not be used at an individual level to identify children who might benefit from targeted interventions.

3. The Multiple Challenge Indicator could be used at a population level to identify communities or sub-populations with high needs. However, it is not likely to add substantial information to the current suite of deficit based indices already in use, and thus we would not recommend using the Multiple Challenge Indicator in Australia.

4. The Multiple Strength Indicator shows promise as an additional indicator for the AEDC program, which could be reported in the National Report, Community Reports and mapped on-line. With respect to the Multiple Strength Indicator, we recommend:

    a. Conducting broad consultation with various stakeholders across Australia on the utility of the Multiple Strength Indicator. These consultations should include exploring the ways that policy makers, communities and schools might use the indicator. Deficit based indicators are often used to allocate resources. How would a strengths based indicator be used?

    b. If the Multiple Strength Indicator is adopted, then we would recommend calculating the critical difference for this indicator, to allow calculation of whether changes over time are significant.

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