Educational strengths and functional resilience at the start of primary school following child maltreatment

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ABSTRACT

Background and objective: This study explored the associations between child maltreatment and functional resilience at school commencement, and investigated factors related to resilience separately for boys and girls.
Participants and setting: Children were part of a birth cohort of all children born in South Australia between 1986 and 2017 who had completed the Early Australian Development Census (AEDC) at about age 5–6 years when starting primary school ($N = 65,083$).
Methods: Multivariable logistic regression analysis was conducted with a subsample of 3414 high-risk children who had a maltreatment substantiation or investigation, with resilience defined as having well or highly developed strengths on the Multiple Strength Indicator of the AEDC.
Results: CPS involvement was strongly associated with poorer functioning at school commencement. Among high-risk children, 51.2% demonstrated resilience. Predictors of resilience in the multivariable model were being older, not having an emotional condition, and being read to at home. Risk factors were being male, living in rural or remote areas, having a physical or sensory disability, or having a learning disability. Boys who had been maltreated demonstrated few strengths and had less resilience than girls. Boys and girls who were read to regularly at home had more than three times the odds of showing resilience than children who were not read to at home.
Conclusions: The early learning environment provides an ideal opportunity to identify and intervene to help those children who are struggling with school adjustment following familial maltreatment. Boys are likely to need additional help.

1. Introduction

While abused and neglected children suffer a large number of adverse social, educational, health and developmental outcomes on average (Patersen & Feit, 2014), not all maltreated children will experience poor outcomes. Maintaining adaptive functioning over time, despite adversity, is a process that has been called resilience (Walsh et al., 2010). Resilience is generally operationalised as a positive or competent outcome in the context of risk, or factors known to be associated with negative consequences of aversive events (Luthar et al., 2000; Vanderbilt-Adriance & Shaw, 2008). Because resilience represents a higher order construct subsuming both

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adversity and positive adaptation, it is not directly measured, but rather indirectly inferred based on evidence of the two subsumed constructs (Luthar et al., 2015).

There has been considerable research investigating factors which promote resilience in individuals who were abused or neglected as children (Afifi & Macmillan, 2011; Dubowitz et al., 2016; Luthar et al., 2015; Kinard, 1998; McGloin & Widom, 2001; Mrazek & Mrazek, 1987). The Adverse Childhood Experiences (ACEs) literature, which includes abuse and neglect in addition to a number of other experiences such as witnessing family violence and parental mental illness, has also explored the role resilience can play in reducing social, emotional and cognitive impairment. Protective factors for resilience have been identified at the individual, family and community level (Luthar et al., 2015) and can be viewed using an ecological systems perspective (Bronfenbrenner, 1994). At the individual-level, protective factors associated with resilience for child maltreatment victims include responsivity to danger, precocious maturity, dissociation of affect, information seeking, formation and utilization of relationship for survival, cognitive restructuring of painful experiences, altruism, optimism and hope (Mrazek & Mrazek, 1987). Family and community level factors include a large number of peer, school, and environmental factors, including positive peer relationships, the quality of child care, and youth-serving community organisations (Luthar et al., 2015). Especially beneficial for building resilience are close supportive relationships with family or non-family members, which may provide a sense of hope in the face of trauma and adversity (Brown & Daly, 2020).

People with a history of child maltreatment may be considered resilient in one area of functioning yet fail to meet criteria for resilience in other areas of functioning (Kinard, 1998; McGloin & Widom, 2001). Thus, measures of resilience that assess multiple domains are preferable (Walsh et al., 2010). As an example, Dubowitz et al. (2016) used a multi-domain measure of resilience based on at least 'adequate' competency across behavioural, social and developmental domains at two points in time in at-risk children. The study found that resilience was predicted by race/ethnicity of the child, maltreatment experience, caregiver depressive symptoms and
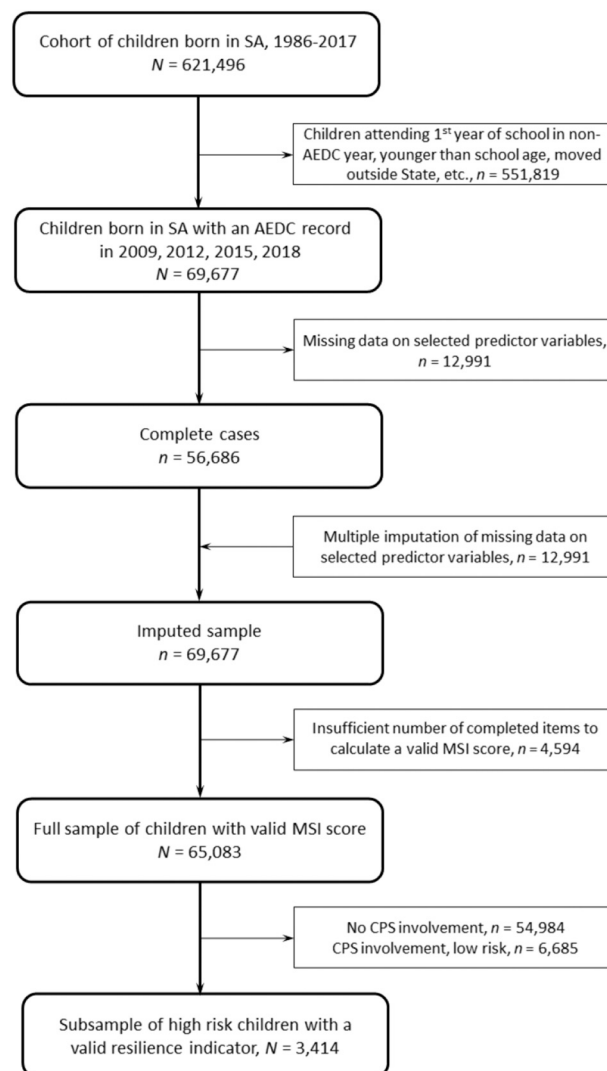

Fig. 1. Study flow chart. AEDC = Australian Early Development Census. MSI = Multiple Strength Indicator. CPS = child protection system.

employment status, and the number of children in the household. Of the 65% of children who were maltreated, 42% were defined as resilient. In another example, a study of adults who had been abused or neglected as children found that 22% of individuals met the criteria for resilience, which required appropriate functioning in 6 of 8 domains (McGloin & Widom, 2001).

There is a considerable literature on resilience and the role it plays in producing positive outcomes in people suffering disadvantage or traumatic upbringings (Cicchetti, 2013). In relation to children specifically, resilience has been associated with improved educational outcomes and fewer adverse long-term consequences from childhood traumas (Condly, 2006). Children who are maltreated are often especially disadvantaged in regards to educational settings, being less attentive and engaged in school, having higher absenteeism, lower grades, lower test scores, and being more likely to drop out of school than children who are not maltreated (Armfield et al., 2020; Palmeri, 2021). Given the importance of schooling for a child's life and future success, being able to functional well at school despite maltreatment occurring at home is a critical requirement.

There is strong theoretical support for early maltreatment being especially important in relation to developmental deficits (Carlson et al., 1997; Keiley et al., 2001). Arguments are variously based on attachment insecurity forming at earlier ages and carrying over into later developmental periods (Cicchetti, 1989), disruption to the process of neurobiological development during early life caused by maltreatment, leading to compromised patterns of brain activity (Dunn et al., 2013), the inability to develop necessary coping mechanisms at a young age (Keiley et al., 2001), and the idea that the inability to reach developmental milestones at earlier ages impacts on a child's capacity to master later stage-salient milestones (Cicchetti & Toth, 1995). Early child maltreatment might be especially important for the transition into fulltime schooling, due to maladaptive development of those skills and abilities necessary for successful school adaptation (Bell et al., 2018).

In relation to both school functioning and educational outcomes, there is a strong vein of evidence indicating that boys do worse than girls throughout the industrialised world (Legewie & DiPrete, 2012). Overall, girls show greater educational success as indicated by grades, enrollment in more rigorous subjects at high school, lower high school drop-out rates, and better enrollment and completion of university or college degrees (Cole et al., 2016). Boys, on the other hand, are almost twice as likely as girls to have developmental vulnerabilities across several functional domains on entering school (Kinnell et al., 2013). Given the educational disadvantage of males across their schooling, which is already apparent at school entry, maltreated boys might be expected to fare poorly in comparison to maltreated girls. Yet, we do not know the difference in resilience between boys and girls in the face of child abuse and neglect, and how this might translate into successful school functioning.

The study aimed to explore factors related to resilience in functioning at school commencement in children at high risk of maltreatment, including a range of child, maternal and socioeconomic characteristics. Further, we sought to examine whether resilience differed by gender, and whether risk and protective factors for resilience varied by gender.

2. Methods

2.1. Data and sample

The study sample was part of a large longitudinal cohort of children ($n = 621,496$) who were born in South Australia (SA), Australia between 1986 and 2017, and established for the iCAN (Impacts of Child Abuse and Neglect) project. Participants were selected if they had linked and valid data from the Australian Early Development Census (AEDC), a population-based survey of children's development at the time they start primary school (with children age 5–6 years) carried out nationally every three years. In SA, the AEDC is completed by approximately 97% of children enrolled in the year level. At the time of our study, surveys had been conducted in 2009, 2012, 2015 and 2018. A study flowchart is provided in Fig. 1.

Study data from a number of government sources were linked by a nationally accredited and authorized data linkage authority (SA NT DataLink), the sole authorized linkage organisation for SA. SA NT DataLink uses best practice of exact and probabilistic matches with detailed and extensive clerical review, drawing on identifying information from over 50 data sets (Schneider et al., 2019). The research team received deidentified data across data sets with a project specific linkage key to enable a data merge.

The full study sample (all children in the SA cohort with linked AEDC data) was used for exploratory analyses and a sub-sample of children (those in the SA cohort with linked AEDC data and who had been investigated for child maltreatment, indicting very high suspicion of CM, or who had substantiated maltreatment) was used to test the study aim relating to resilience.

2.2. Child protection system (CPS) involvement

CPS involvement was based on categories used by the SA Department for Child Protection (DCP), representing eight mutually exclusive levels of 'highest' involvement, and indicating generally increasing likelihood and/or extent of harm: (1) no CPS involvement ('no CPS'); (2) a notification of concern to the notifier only, which does not meet a maltreatment threshold or is vague or unreliable ('NOC only'); (3) a notification indicating potential maltreatment but where this was not actioned by the DCP due to it being historical in nature, extrafamilial, relating to an adolescent at risk, etc. ('Other notification'); (4) a notification indicating potential current maltreatment but which was not investigated ('CPM notification'); (5) an investigation which was investigated but not substantiated ('Investigation only'); (6) substantiated maltreatment but with no time in out-of-home care (OOHC) ('Substantiation only'); (7) a substantiated maltreatment notification with time in OOHC ('Substantiation & OOHC'); and (8) time in OOHC but with no substantiated maltreatment ('OOHC, no Substantiation').

2.2.1. High maltreatment risk

High maltreatment risk was defined by whether the child was the subject of an investigation of child abuse or neglect, whether substantiated or unsubstantiated, indicating high risk of sexual abuse, physical or emotional abuse or neglect. The definition of maltreatment used was that the child "has suffered, or is likely to suffer, physical or psychological injury detrimental to the child's wellbeing; or the child's physical or psychological development is in jeopardy" (Children and Young People (Safety) Act, 2017).

For most children, the AEDC was undertaken when they were aged 5 years. The CPS involvement for each child was based, in the first instance, on categories of involvement up until the child's 6th birthday. However, where substantiated maltreatment was recorded at any subsequent age, this was used to categorise the child as being maltreated at the time of the AEDC, based on extensive research that maltreatment is generally chronic, with documented evidence of harms years prior to substantiation (Bromfield & Higgins, 2005; O'Donnell et al., 2012).

2.3. Outcome measure

2.3.1. Resilience

Resilience was determined from scores on the Multiple Strength Indicator (MSI) of the AEDC, for those children with high maltreatment risk. The MSI focusses specifically on a range of functional skills, competencies and dispositions that children might have developed by the time they start school, rather than other deficit-based measures of the AEDC which focus on vulnerabilities and weaknesses. The MSI uses 39 items from the AEDC selected from the five AEDC domains: 15 items assessing social competence, 7 items assessing emotional maturity, 9 items assessing language and cognitive skills, 6 items assessing communication and general knowledge, and 2 items assessing physical health and well-being. The MSI has demonstrated predictive validity through associations with future academic performance in standardized tests and has been found to provide different and complimentary information to deficit-based indicators out of the AEDC (Gregory & Brinkman, 2016). While the MSI was not developed to measure functional resilience, its multi-domain strength-based items make it well-suited for such a purpose.

Teachers complete the AEDC for children during their first year of schooling (ages 5–6 years), a particularly important period for identifying patterns and predictors of resilience, as children face critical developmental tasks associated with school readiness (Walsh et al., 2010).

The MSI items provide a score between 0 and 100 with higher scores indicating strengths in more areas of child development than lower scores. Cut-off points are used to classify children into three groups based on the number of strengths they exhibit: (1) children with scores falling below the 25th percentile, considered to have 'emerging strengths'; (2) children with scores falling between the 25th and 50th percentile, considered to have 'well developed strengths'; and (3) children with scores above the 50th percentile who were considered to have 'highly developed strengths'. We defined children as 'resilient' if they had substantiated maltreatment and were considered to have well developed or highly developed strengths on the MSI. Scores were provided for each child by the data custodian where there were a minimum number of valid responses for the domain, the child did not have special needs, and was at least 4 years of age.

For explanatory analyses of the full sample (children in the SA cohort with linked AEDC data), we used four categories: children with no CPS involvement ('No CPS'), children with CPS involvement who had never been the subject of a maltreatment investigation ('CPS, lower risk'), children who had been the subject of a maltreatment investigation or substantiation but who did not demonstrate resilience ('High risk, poor resilience') and children who had a maltreatment investigation or substantiation and were demonstrating resilience ('High risk, resilience'). The sub-sample of children who were at high risk of having been abused or neglected were used for the analyses of predictors of resilience.

2.4. Explanatory variables

We used a number of variables which have previously demonstrated associations with CPS involvement and maltreatment substantiation, and which were available to us from the linked datasets, as possible explanators of resilience. Items were selected that reflected socioeconomic circumstances, demographic characteristics, or which the authors in their collective experience believed would be of value to investigate. Included explanatory variables were considered to be potential risk factors for poorer outcomes and relatively unchangeable, or protective factors which were selected because they are capable of being altered.

Risk factors included in this study and which have previously been found to be associated with resilience and/or child maltreatment experience (see, for example: Ammerman, 1990; Armfield et al., 2021; Australian Institute of Family Studies, 2017; Bell et al., 2018; Child Welfare Information Gateway, 2018) were: low birthweight (<2500 g), baby still in hospital 28 days after birth, remoteness of residence, English as a second language (ESL) for child, maternal hospital admission or visit for a mental health issue or drug-related problem, child physical/sensory disability, and child learning disability. Using a similar approach to the 'cumulative risk' conceptual model which guides most ACEs research (LaNoue et al., 2020), a variable measuring cumulative adversities was computed by creating a summed score from 15 potentially disadvantageous family, social and personal characteristics, including: Indigenous status, low birthweight, in hospital 28 days after birth, mother aged <21 years at child birth, mother not employed at child birth, mother not partnered at child birth, mother smoking during pregnancy, parents <Year 12 educational attainment, residence in a rural or remote location, residence in most disadvantaged SES quintile, ESL, mother having had a hospital admission or attendance for a mental health or drug-related problem, child having a sensory or physical disability, learning disability (e.g. dyslexia, intellectual disabilities, etc.), or emotional problem (e.g., anxiety, depression, extreme shyness, etc.). The summed score was recoded to create four categories: '0–1 adversity', '2–3 adversities', '4–6 adversities', and '7+ adversities'.

Potentially protective factors selected for analysis were also based on previous research (see: Armfield et al., 2021; Australian Institute of Family Studies, 2017; Bell et al., 2018; Connelly & Straus, 1992; Tomison, 1996) and included mother's being older at child's birth (<21, 21–30, >30), mother being employed, mother married or de facto, higher level of either parents' education (<Year 12, Not stated, Completed Year 12, Certificate or Diploma, Bachelor Degree or higher), lower area-based disadvantage using the Socioeconomic Indices for Areas (SEIFA) Index of Relative Socioeconomic Disadvantage (IRSD) collapsed into three categories (most disadvantage, middle disadvantage, least disadvantage), the child not having an emotional condition, child being read to at home, and child having attended a pre-school.

We also included child age at the time of the AEDC (up to 5.4 years old, >5.4 years and up to 5.8 years old, >5.8 years old) as this might be expected to show an association with more strengths on the MSI.

Of those 69,677 children born in South Australia between 1990 and 2017 who had an AEDC record, 18.7% of cases ($n = 12,991$)

Table 1

Descriptive frequencies and Chi-Square statistics for predictor variables for full and high risk samples by sex (imputed data).

Predictor variables	Full sample			High-risk subsample		
	n	Boys Col. %	Girls Col. %	*n*	Boys Col. %	Girls Col. %
Age at AEDC		<.001			.530	
≤5.4 years	26,378	24.6	27.0	856	24.4	25.7
>5.4–5.8 years	21,937	40.4	40.7	1,334	38.9	39.3
>5.8 years	16,768	35.1	32.3	1,224	36.7	35.0
Birthweight		<.001			.010	
Low (<2500 g)	4,038	5.4	7.0	448	11.3	14.9
Normal (2500 g+)	61,046	94.6	93.0	2,966	88.7	85.1
Baby still in hospital after 28 days		.281			.780	
No	63,902	98.1	98.2	3,272	95.8	95.9
Yes	1,181	1.9	1.8	142	4.2	4.1
Mother's age at child birth		1.000			.241	
<21	4,296	6.6	6.6	849	25.8	24.0
21–30	31,571	48.5	48.5	1,801	52.9	52.6
>30	29,216	44.9	44.9	764	21.3	23.4
Mother's employment at child birth		.645			.737	
Not employed	21,905	33.7	33.6	2,605	76.5	76.1
Employed	43,178	66.3	66.4	809	23.5	23.9
Mother's marital status at child birth		.944			.411	
Not partnered	6,599	10.1	10.1	2,236	64.8	66.2
Married/De facto	58,484	89.9	89.9	1,178	35.2	33.8
Residential remoteness at age 5		.188			.413	
Major city	45,786	70.0	70.7	2,043	59.1	60.6
Inner or outer regional	16,759	26.0	25.5	1,188	35.1	34.5
Remote or very remote	2538	4.0	3.8	183	5.8	4.9
SES disadvantage at age 5		.499			.475	
Most disadvantage	16,289	25.0	25.1	1,835	54.7	52.8
Middle disadvantage	8075	43.0	43.3	1,210	34.5	36.4
Least disadvantage	20,719	32.0	31.6	369	10.9	10.8
Child, English as a second language		.057			.208	
No	58,321	89.4	89.8	3,080	89.6	90.9
Yes	6,762	10.6	10.2	334	10.4	9.1
Mother mental/drug problem		.557			.867	
No	64,616	99.3	99.3	3,287	96.2	96.3
Yes	467	0.7	0.7	127	3.8	3.7
Child physical/sensory disability		<.001			<.001	
No	54,496	80.4	87.2	2,471	68.1	76.6
Yes	10,587	19.6	12.8	943	31.9	23.4
Child learning disability		<.001			<.001	
No	63,890	97.5	98.8	3,230	92.8	96.4
Yes	1,193	2.5	1.2	184	7.2	3.6
Child emotional problem		<.001			<.001	
No	62,067	94.5	96.2	2,900	82.7	87.2
Yes	3,017	5.5	3.8	514	17.3	12.8
Child read to at home		<.001			<.001	
Not/somewhat true	16,187	27.0	22.7	1,309	35.5	41.2
Very true	48,896	73.0	77.3	2,105	64.5	58.8
Attended preschool		.975			.221	
No	2,134	3.3	3.3	205	6.5	5.5
Yes	62,646	96.7	96.7	3,209	93.5	94.5
Cumulative adversities		<.001			.129	
0–1 adversity	29,277	43.8	46.2	227	6.0	7.3
2–3 adversities	24,939	39.0	37.7	963	27.6	28.8
4–6 adversities	9,998	15.8	14.9	1,842	54.1	53.8
7+ adversities	869	1.5	1.2	382	12.2	10.2

had missing data across 11 of the 17 variables selected for analysis. No variable had >10% missing cases. Multiple imputation was used to replace the missing data with imputed values. The imputation model included the following predictor variables: sex, birthweight, baby in hospital after 28 days, mother's age, employment and marital status at child birth, highest parental education, residential remoteness, SES disadvantage, English as a second language, mother's hospital admission for mental health or drug-related issues, child physical and learning disability, emotional and behavioural problem, child read to at home, preschool enrollment, and cumulative adversities. There were 40 datasets generated with up to 10 iterations per imputed dataset.

We initially examined whether boys and girls differed by categories of MSI scores across the eight categories of CPS involvement. We then examined the extent to which boys and girls who had been maltreated were resilient.

The distribution of explanatory variables for the full sample and the maltreated sub-sample were described for boys and girls for all explanatory variables. To test for differences, we used an online Chi-squared calculator using imputed *n*s available at: http://www. quantpsy.org/chisq/chisq.htm.

A multivariable logistic regression model was used to examine differences between high maltreatment risk children who had poor resilience and those demonstrating functional resilience.

All statistical analyses were carried out using IBM SPSS Statistics v.26.

3. Results

There was a total of 69,677 children born in SA between 1986 and 2017 who had an AEDC record from 2009, 2012, 2015 or 2018. Of these, 65,083 had a valid MSI score and were included in the analyses. There were 3414 children (5.2%) who had both a valid MSI score (resilience indicator) and had been the subject of an unsubstantiated or substantiated investigation for child abuse or neglect. Of those 3414 children, 1666 (48.8%) were categorised as having 'poor resilience' and 1748 (51.2%) were considered to be 'showing resilience'. Substantiated maltreatment occurred in 65.8% of the children with poor resilience, and 59.6% of the children who were showing resilience.

Descriptive statistics for boys and girls in both the full sample and the high-risk subsample are provided in Table 1. In the full sample, in comparison to girls, boys were more likely to be older, have a physical/sensory or learning disability, an emotional problem, and have more cumulative adversities, and less likely to be low birthweight and to be read to at home. Other than for age, these differences were mirrored in the high-risk subsample.

Developmental strengths by CPS contact category and gender are reported in Fig. 2. Overall, both boys and girls demonstrated a general decline in the percentage with highly developed or well-developed strengths across categories of CPS involvement indicating increasing likelihood of child maltreatment. However, other than the 'OOHC, no Substantiation' group, boys had fewer strengths than girls across all CPS categories, including the 'No CPS' group (48.2% of boys demonstrating highly developed strengths compared with 67.9% of girls). For children with some CPS involvement, the percentage with well-developed strengths fell markedly in boys and girls with the effect roughly proportionate to the seriousness of child protection concerns. In boys who had been the subject of substantiated maltreatment just over 17% had highly developed strengths compared to 37.2% for girls. The relative difference between boys and girls increased significantly with higher levels of maltreatment risk.

Differences between boys and girls in resilience are demonstrated in Fig. 3, which shows the gender composition of resilient and
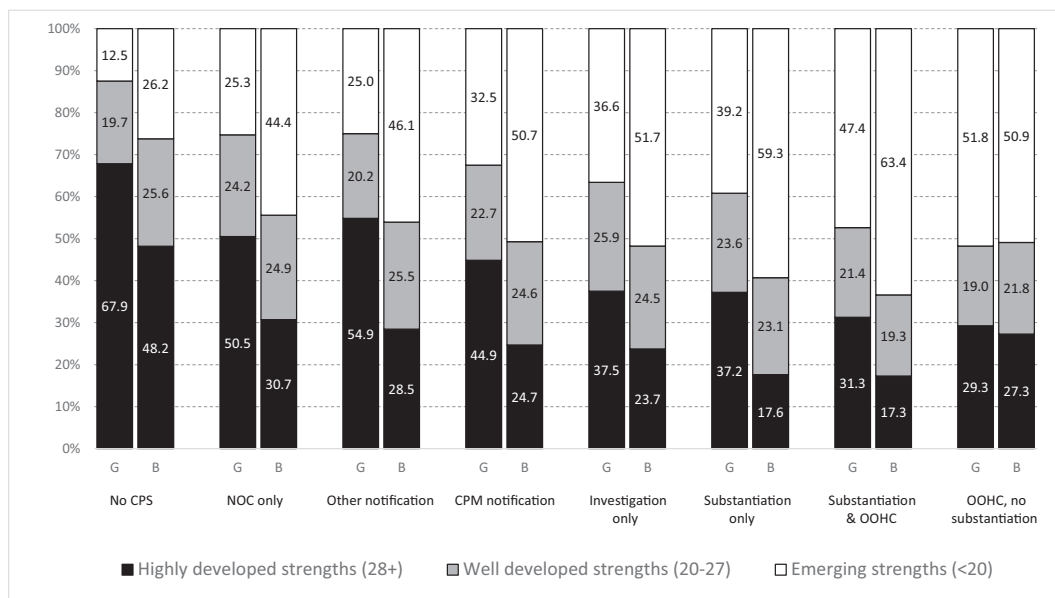

Fig. 2. Percentage of girls (G) and boys (B) in multiple strength indicator (MSI) categories by CPS involvement.
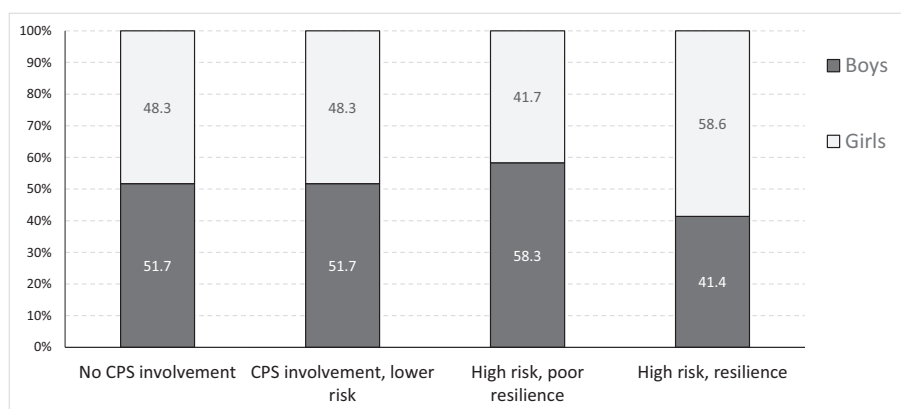
Fig. 3. Distribution of girls and boys by child CPS involvement and resilience.

less resilient high-risk children, in comparison to children with no CPS involvement and those with lower-risk CPS involvement. Approximately half of those children in the 'No CPS' and 'CPS, lower risk' groups were boys. However, boys were more likely to demonstrate poor resilience (58.3%) and girls were more likely to be classified as resilient (58.6%).

In the univariate logistic regression analyses (see Table 2), most variables showed a statistically significant association with resilience in children at high risk of maltreatment. In multivariable analyses (Table 2), significant predictors of greater resilience were: being older when completing the test (aged between 5.4 and 5.8 years, OR = 1.35, 95% CI = 1.12–1.64 or older than 5.8 years, OR = 1.62, 95% CI = 1.34–1.98), in comparison to children aged <5.4 years old, the child not having an emotional condition (OR = 3.02, 95% CI = 2.35–3.90), and being read to at home (OR = 3.15, 95% CI = 2.66–3.73). Statistically significant risk factors for poor resilience were being male (OR = 0.53, 95% CI = 0.46–0.62), being low birthweight (OR = 0.73, 95% CI = 0.56–0.96), living in a

Table 2
Univariate and multivariable logistic regression analyses (imputed data) predicting resilience in the face of substantiated child maltreatment

Predictors	Univariate unadjusted		Multivariable model	
	OR (95% CI)	P	aOR (95% CI)	P
Male (ref: female)	0.51 (0.44–0.58)	<.001	0.53 (0.46–0.62)	<.001
Child age at AEDC (ref: ≤5.4 years)				
>5.4–5.8 years	1.20 (1.01–1.43)	.035	1.35 (1.12–1.64)	.002
>5.8 years	1.31 (1.10–1.56)	.002	1.62 (1.34–1.98)	.001
Low birthweight (ref: >2500 g)	0.72 (0.59–0.88)	.002	0.73 (0.56–0.96)	.024
Baby still in hospital >28 days (ref: not)	0.83 (0.59–1.17)	.287	1.13 (0.74–1.74)	.566
Maternal age at child birth (ref: <21)				
21–30	1.20 (1.02–1.42)	.030	1.16 (0.94–1.43)	.159
>30	1.21 (0.99–1.47)	.065	0.96 (0.75–1.24)	.764
Mother employment (ref: not employed)	1.47 (1.25–1.74)	<.001	0.99 (0.78–1.25)	.923
Mother married/de facto (ref: not)	1.20 (1.04–1.38)	.013	1.05 (0.86–1.27)	.645
Parents' highest education (ref: <Yr12)				
Not stated	1.07 (0.84–1.35)	.595	1.00 (0.77–1.30)	.995
Year 12	1.15 (0.84–1.56)	.381	0.97 (0.67–1.40)	.867
Certificate or diploma	1.27 (1.02–1.57)	.032	1.05 (0.80–1.39)	.715
Bachelor degree or higher	1.74 (1.24–2.45)	.001	0.95 (0.62–1.46)	.829
Remoteness (ref: major city)				
Inner/outer regional	0.82 (0.71–0.95)	.007	0.84 (0.72–0.99)	.034
Remote/very remote	0.53 (0.39–0.73)	<.001	0.64 (0.45–0.92)	.017
Area-based SES (ref.: most disadvantage)				
Middle disadvantage	1.18 (1.02–1.37)	.023	1.02 (0.84–1.23)	.837
Least disadvantage	1.47 (1.17–1.84)	.001	0.98 (0.74–1.30)	.894
English as a second language (ref: no)	0.72 (0.57–0.90)	.004	0.95 (0.72–1.27)	.744
Maternal mental health issue (ref: no)	0.67 (0.47–0.96)	.031	0.72 (0.48–1.07)	.106
Physical/sensory disability (ref: no)	0.47 (0.40–0.56)	<.001	0.70 (0.57–0.86)	.001
Learning disability (ref: no)	0.14 (0.09–0.22)	<.001	0.28 (0.17–0.47)	<.001
No emotional condition (ref: yes)	4.05 (3.25–5.04)	<.001	3.02 (2.35–3.90)	<.001
Read to at home (ref: no)	3.37 (2.90–3.92)	<.001	3.15 (2.66–3.73)	<.001
Attended preschool (ref: no)	1.64 (1.21–2.22)	.002	1.38 (0.98–1.94)	.068
Cumulative adversities (ref: 0–1)				
2–3 adversities	0.58 (0.43–0.80)	.001	0.81 (0.54–1.20)	.285
4–6 adversities	0.36 (0.27–0.49)	<.001	0.67 (0.40–1.13)	.132
7+ adversities	0.16 (0.11–0.23)	<.001	0.58 (0.27–1.22)	.148

regional (OR = 0.84, 95% CI = 0.72–0.99) or remote location (OR = 0.64, 95% CI = 0.45–0.92), having a physical or sensory disability (OR = 0.70, 95% CI = 0.57–0.86) or having a learning disability (OR = 0.28, 95% CI = 0.17–0.47).

Given that boys at high risk of maltreatment demonstrated less resilience than girls, as well as other differences in attributes between boys and girls (shown in Table 1), we ran separate multivariable logistic regression analyses for boys and girls to examine whether predictors of resilience varied by child gender (see Table 3). Significant predictors of risk for both boys and girls were having a physical/sensory disability, learning disability, and emotional condition, while protective factors were being read to at home and being older. However, low birth weight (OR = 0.58, 95% CI = 0.40–0.83) and a mother having had a mental health hospital admission (OR = 0.53, 95% CI = 0.30–0.92) were significant risk factors for girls only. Residing in a rural area was a significant risk factor (OR = 0.77, 95% CI = 0.61–0.97) and attending preschool a significant protective factor (OR = 1.65, 95% CI = 1.00–2.71) for boys only.

4. Discussion

The central objective of resilience researchers is to identify risk and protective factors that might modify the negative effects of adverse life circumstances, and then, to identify mechanisms or processes that might underlie these associations (Luthar et al., 2015). Our study found a number of risk factors that might exacerbate the negative effects of maltreatment as well as protective factors that modify the effects of risk in a positive direction. Risk factors predicting poor resilience included being male, low birthweight, living in a rural or remote area, and having physical, sensory or learning disabilities. Protective factors for greater resilience included being older at school commencement, not having any emotional condition, and being read to at home. Increased child maltreatment concern was strongly associated with fewer strengths at the beginning of primary school.

One of the biggest predictors of resilience in children at high risk for maltreatment was being read to at home. Both boys and girls who were read to at home had over three times the odds of demonstrating resilience in relation to functioning at school commencement. While reading to children is a core aspect of the home learning environment, and there is extensive research demonstrating associations between reading to children, school readiness, and developmental and scholastic outcomes (Kalb & van Ours, 2014), this is the first study we know of that shows a benefit of reading to children as a way of mitigating some of the detrimental outcomes of child maltreatment. As a shared experience between parent and child, reading out loud can create a myriad of positive attachment opportunities and learning opportunities (Duursma et al., 2008). However, these opportunities may be severely compromised for maltreated children. There is a parallel with research into the significantly decreased school readiness of children

Table 3

Multivariable logistic regression analysis models (imputed data) for boys and girls, predicting resilience in the context of substantiated child maltreatment

Predictors	Multivariable - boys		Multivariable - girls	
	aOR (95% CI)	P	aOR (95% CI)	P
Child age at AEDC (ref: ≤5.4 years)				
>5.4–5.8 years	1.47 (1.12–1.94)	.006	1.26 (0.96–1.66)	.095
>5.8 years	1.65 (1.24–2.18)	<.001	1.61 (1.21–2.13)	.001
Low birthweight (ref: >2500 g)	1.00 (0.67–1.50)	.996	0.58 (0.40–0.83)	.003
Baby still in hospital >28 days (ref: not)	0.95 (0.51–1.76)	.863	1.34 (0.73–2.46)	.351
Maternal age at child birth (ref: <21)				
21–30	1.16 (0.87–1.54)	.322	1.19 (0.87–1.61)	.278
>30	0.94 (0.66–1.33)	.720	1.04 (0.73–1.49)	.828
Mother employment (ref: not employed)	0.95 (0.69–1.32)	.759	1.03 (0.74–1.44)	.858
Mother married/de facto (ref: not)	1.01 (0.77–1.32)	.970	1.10 (0.84–1.45)	.487
Parents' highest education (ref: <Yr12)				
Not stated	0.96 (0.67–1.38)	.814	1.06 (0.70–1.60)	.784
Year 12	0.86 (0.51–1.44)	.561	1.13 (0.66–1.94)	.646
Certificate or diploma	1.00 (0.68–1.48)	.983	1.11 (0.73–1.68)	.635
Bachelor degree or higher	0.95 (0.53–1.68)	.846	0.98 (0.54–1.81)	.959
Remoteness (ref: major city)				
Inner/outer regional	0.77 (0.61–0.97)	.024	0.92 (0.73–1.16)	.486
Remote/very remote	0.71 (0.43–1.18)	.182	0.60 (0.36–1.03)	.062
Area-based SES (ref: most disadvantage)				
Middle disadvantage	1.11 (0.86–1.45)	.423	0.93 (0.71–1.23)	.622
Least disadvantage	0.87 (0.43–1.18)	.483	1.17 (0.75–1.82)	.489
English as a second language (ref: no)	0.97 (0.64–1.47)	.880	0.94 (0.62–1.42)	.766
Maternal mental health issue (ref: no)	0.95 (0.54–0.66)	.857	0.53 (0.30–0.92)	.025
Physical/sensory disability (ref: no)	0.75 (0.57–0.98)	.038	0.63 (0.47–0.85)	.003
Learning disability (ref: no)	0.33 (0.17–0.63)	.001	0.25 (0.11–0.57)	.001
No emotional condition (ref: yes)	2.78 (1.95–3.98)	<.001	3.35 (2.32–4.84)	<.001
Read to at home (ref: no)	3.04 (2.40–3.85)	<.001	3.30 (2.58–4.22)	<.001
Attended preschool (ref: no)	1.65 (1.00–2.71)	.050	1.21 (0.72–2.01)	.470
Cumulative adversities (ref: 0–1)				
2–3 adversities	0.84 (0.49–1.44)	.524	0.77 (0.42–1.41)	.396
4–6 adversities	0.84 (0.41–1.70)	.619	0.54 (0.25–1.16)	.115
7+ adversities	0.53 (0.19–1.51)	.234	0.62 (0.21–1.82)	.379

from low income families. This research finds that, in comparison to children from higher income families, poorer children are more likely to live with mothers who score low on providing cognitive stimulation, such as infrequently reading books (Isaacs & Brookings Institute, 2012). In our study, only about 60% of high-risk children were determined by their teachers as being read to at home. While we are unable to establish causality from our study, it would be worthwhile investigating the efficacy of targeted reading programs for maltreated and other disadvantaged children.

A strong finding from our study was that boys are doing considerably worse than girls, in relation to both functioning at school commencement, and in terms of resilience in the face of child maltreatment. Across all categories of child CPS involvement, boys were significantly less likely than girls to have highly or well-developed strengths. Of those boys who had a maltreatment substantiation and time in OOHC, only 17.6% had 'highly developed' strengths, while 63.3% had only 'emerging strengths', signifying relatively poor school preparedness. This compares to 31.5% and 47.0%, respectively, for girls. Boys at high risk of maltreatment were more likely (58.3%) to show poor resilience than were girls, and less likely to evidence resilience (41.4%). And yet we found risk and protective factors to be similar for boys and girls.

It is noteworthy that, even among children with no child protection history, boys appear to do worse than girls in terms of school functioning. However, it is deeply concerning that boys who have been maltreated, or investigated for maltreatment, were rated far more poorly in their development. There is a pressing need to address these adverse outcomes for boys, especially given the findings regarding the intergenerational transmission of child maltreatment (Armfield et al., 2021; Thornberry & Henry, 2013).

In both the unadjusted and multivariable models, we found residence in a rural or remote location to be a risk factor for poor resilience. Generally, psychological well-being (Lawrence et al., 2015) as well as developmental outcomes (Arefadib & Moore, 2017) are better for children in urban areas than for those in rural areas. Given the general imbalance in the provision of and access to services between metropolitan and regional and remote areas, there is a need to ensure access to high quality maternal and childhood education services and for more research into how differences in resilience might translate into different outcomes for children in rural and remote areas.

The measure of resilience used in our study, the Multiple Strengths Index (MSI), assesses developmental functioning in the domains of physical health and wellbeing, social competence, emotional maturity, language and cognitive skills, and communication skills and general knowledge, as relating to school readiness. The MSI was carefully developed in consultation with academic researchers working in early childhood research, in addition to people who worked with young children on a day-to-day basis (Gregory & Brinkman, 2016). The MSI is similar to other widely-used skills-based measures of resilience, such as the Devereux Early Childhood Assessment for Preschoolers, which contains 38 items related to initiative, self-regulation and attachment/relationships (Naglieri & LeBuffle, 2005). The advantage of the MSI in the current study is that it can be considered culturally appropriate to Australian children and that it is applied nationally and is available to be linked to existing administrative data. As such, the MSI provides a novel and powerful way to assess resilience in the Australian child population.

It is important to note, however, that resilience does not imply uniformly positive adjustment across diverse domains. Just as children in general do not manifest consistently positive (or negative) adaptation across different spheres of adjustment, at-risk children can display remarkable strengths in some areas while showing significant deficits in others (Luthar et al., 1993). Most important, children under stress could appear resilient in terms of overt actions and behaviors while still experiencing considerable covert distress in the form of depression or anxiety (Farber & Egeland, 1987).

Relatively few studies have looked at the prevalence of resilience following child maltreatment and findings are disparate due to the use of different resilience domains and different strategies to define resilience (Walsh et al., 2010). Because of this, estimates range from <1% of children being resilient with sustained positive functioning over a four-year period (Bolger & Patterson, 2003) to up to 18% using a summed score of functioning across various domains. We found that 51.2% of children could be classified as demonstrating resilience based on being in the top 75% of a multi-domain strengths indicator. The higher prevalence compared to previous research needs to be qualified by the fact that we were examining functioning at a single point of time and that we used a broad definition on resilience, including children who met normative expectations for their age.

The single most common factor for children who demonstrate resilience is at least one stable, committed relationship with a supportive parent, caregiver, or other adult (Brown & Daly, 2020). And yet, it is precisely these relationships which are most destructive for children who are suffering Adverse Childhood Experiences (ACEs) such as familial abuse or neglect. One area for potential exploration is the important role that early school educators can play in a child's life, providing stability, structure and caring. This might be expected to be especially important for children who are suffering maltreatment at home and are likely experiencing other additional adversities.

There is increasing evidence on the role of high quality intensive early childhood education in relation to school readiness (and other life outcomes), especially for more vulnerable children. A recent randomized clinical trial of a trauma-informed intensive early childhood education program for children exposed to child maltreatment found good improvements across a range of developmental outcomes at 24 months, especially for boys (Tseng et al., 2019). Ensuring access to high quality trauma-informed early childhood education is crucial for all maltreated children, and may be particiularly important for boys. The inclusion of male educators in early childhood and lower primary school, who could provide positive role models and often relate especially well to young boys, needs to be considered. While our study did not show any effect from having attended some form of early learning centre or preschool, this variable excluded important information such as hours of attendance or quality of program and almost all children had some pre-school attendance.

Looking for policy levers in early education and the CPS response requires a better understanding of the causes and consequences of child maltreatment. Building child resilience may prove to be a critical area for reducing educational inequities for maltreated children (Southwick et al., 2014). Early childhood educators can support the child's protective system by building the child's personal attributes

associated with resiliency (Sciaraffa et al., 2018). Personal characteristics that support resilience include low emotionality, activity, sociability, easy temperament, self-help skills, intellect, impulse control, internal locus of control, motivation, and positive self-concept (Werner, 2000). They are also well positioned to develop secure attachments with children and work collaboratively with parents (Sciaraffa et al., 2018). The potential in this space is considerable given the burgeoning number of programs around Australia emphasising the importance of developing resilience, including 'The Resilience Project' in Victoria, the KidsMatter Resilient Kids program nationally, and the Resilience education program in Western Australia as well as Social and Emotional Learning programs which support the development of social and emotional competence, cognition, behavioural self-regulation, mindfulness, coping and resilience, social problem solving, and conversational skills increasing children's school readiness (Blewitt et al., 2018).

Our study had a number of limitations worth mentioning. Firstly, our study examined the important developmental stage of transition into schooling, but it is also the case that resilience and functioning can change over time. Resilience is not immutable but results from dynamic transactions between developmental systems and environmental supports (Masten, 2007). Children who are considered resilient at the commencement of school might be struggling later due to new or increased stressors, while children who are doing poorly might subsequently start doing well. There are a range of changing individual, family, community and cultural factors which come to bear on a child's resilience (Southwick et al., 2014). Resilience can also be reduced through accumulated adversities. While school commencement is a significant milestone in a child's life, there is value in tracking a child's functioning over time. Temporal changes in resilience and how they tie into child maltreatment experiences and other risk and protective factors, is an important future area of study.

Another potential limitation of our study is that we used a relatively conservative sample for our main analyses comprising only children with confirmed child maltreatment from a child protection agency or those who were the subject of an investigation into a maltreatment allegation, indicating serious child protection concerns. However, there is evidence that children with any CPS contact, even if there is no record of substantiated maltreatment, are at increased risk of a range of adverse outcomes (Armfield et al., 2020; Gnanamanickam et al., 2020). Some of these children will be experiencing abuse or significant neglect that has not been identified, others may be experiencing familial maltreatment which falls short of an agency-defined threshold for intervention, and some may be facing other disadvantages such as poverty, ill-health, and family breakups. While children at high risk of maltreatment generally were the least likely to have 'well developed' or 'highly developed strengths', there was a general decline in functioning across categories of CPS involvement indicating greater likelihood of risk. Therefore, while our research focused on high-risk children with investigated or substantiated maltreatment concerns, this should not be taken as indicating that other children might not also be struggling with multiple and/or serious adversities.

5. Conclusion

This is the first published use of the MSI derived from the AEDC to assess school readiness and resilience in children in the face of exposure to child maltreatment. We found that some children are managing well across emotional, cognitive, psychological and physical developmental domains at school commencement while others are doing poorly. Boys, in particular, are struggling and, as the seriousness of CPS concerns increase, their capacity for resilience shows significant declines.

Our work furthers the imperative to address child maltreatment from early in life. Children at risk are being identified by child protection agencies, and yet they are already falling badly behind by school commencement. Children can be resilient but need society's assistance. The beneficial effect of reading at home is telling and we know from other studies that high quality, intensive and extended early childhood education can be transformative especially for the most vulnerable children. In many constituencies there is political push for universal early childhood education, but it will be important that this is not pursued at the expense of more intensive support for the more vulnerable. It is especially vital to attend to the need of our distressed young boys, who are likely to be labelled as 'naughty' or 'difficult', recognising their struggle in the face of adversity.

CRediT authorship contribution statement

JMA was the primary author, conducted the data analysis, and was responsible for obtaining study funding and conceptualising the study. L-AE and CZ assisted with conceptualising the study and provided advice and feedback on the manuscript draft. ESG assisted with data analysis and provided advice and feedback on the manuscript draft. LS was responsible for obtaining project funding, helped conceptualise the study and provided advice and feedback on the manuscript draft.

Declaration of competing interest

The authors declare no conflicts of interest.

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