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Cohort Profile. The 2015 Middle Childhood Survey (MCS) of mental health and wellbeing at age 11 years in an Australian population cohort Kristin R. Laurens^{1,2}, Stacy Tzoumakis³, Kimberlie Dean^{1,2,4}, Sally A. Brinkman^{5,6}, Miles Bore⁷, Rhoshel K. Lenroot^{1,2}, Maxwell Smith⁸, Allyson Holbrook⁸, Kim M. Robinson⁸, Robert Stevens⁹, Felicity Harris^{1,2}, Vaughan J. Carr^{1,2,10}, Melissa J. Green^{1,2} ^{1.} School of Psychiatry, University of New South Wales, Sydney, Australia ². Neuroscience Research Australia, Sydney, Australia ^{3.} School of Social Sciences, University of New South Wales, Sydney, Australia ^{4.} Justice Health & Forensic Mental Health Network, NSW, Australia ^{5.} Telethon Kids Institute, University of Western Australia, Perth, Australia ^{6.} School of Public Health, University of Adelaide, Adelaide, Australia ^{7.} School of Psychology, University of Newcastle, Newcastle, Australia ^{8.} School of Education, University of Newcastle, Newcastle, Australia ^{9.} New South Wales Department of Education, Sydney, Australia ^{10.} Department of Psychiatry, School of Clinical Sciences, Monash University, Melbourne, Australia *Contact information for corresponding author: Dr Kristin Laurens, UNSW Research Unit for Schizophrenia Epidemiology, O'Brien Centre Level 4, St Vincent's Hospital, 394-404 Victoria Street, Darlinghurst NSW 2010. Email: Kristin.Laurens@unsw.edu.au; Telephone: +61 (0)2 8382 1409; Facsimile: +61 (0)2 8382 1402 Word Count (Abstract): 279 Word Count (Text): 4827 Number of Tables: 5 Number of Figures: 1

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ABSTRACT

Purpose: The Middle Childhood Survey (MCS) was designed as a computerised self-report assessment of children's mental health and wellbeing at approximately 11 years of age, conducted with a population cohort of 87 026 children being studied longitudinally within the New South Wales (NSW) Child Development Study.
Participants: School Principals provided written consent for teachers to administer the MCS in class to Year 6 students at 829 NSW schools (35.0% of eligible schools). Parent or child opt-outs from participation were received for 4.3% of children, and MCS data obtained from 27 808 children (mean age 11.5 years, SD 0.5; 49.5% female), representing 85.9% of students at participating schools.

Findings to date: Demographic characteristics of participating schools and children are representative of the NSW population. Children completed items measuring Social Integration, Prosocial Behaviour, Peer Relationship Problems, Supportive Relationships (at Home, School, and in the Community), Empathy, Emotional Symptoms, Conduct Problems, Aggression, Attention, Inhibitory Control, Hyperactivity-Inattention, Total Difficulties (internalising and externalising psychopathology), Perceptual Sensitivity, Psychotic-Like Experiences, Personality, Self-esteem, Daytime Sleepiness, and Connection to Nature. Distributions of responses on each item and construct demarcate competencies and vulnerabilities within the population: most children report mental health and wellbeing, but on every construct there are children who report the most extreme level of developmental vulnerability.

Future plans: Multiagency, intergenerational linkage of the MCS data with health, education, child protection, justice, and early childhood development records took place late in 2016. Linked data will be used to elucidate patterns of risk and protection across early and middle child development, and provide a foundation for future record linkages in the cohort that will track mental and physical health, social, and educational/occupational outcomes into adolescence and early adulthood.

STRENGTHS AND LIMITATIONS The MCS assessed psychosocial and behavioural constructs reflecting mental health and wellbeing by self-report in a large sample of 27 808 children aged approximately 11 years (31.4% of eligible children), which is representative of the New South Wales population. Constructs were assessed using items selected from measures with established reliability and validity for • assessment of children aged 11 years, but item reduction and modifications made to item wording, response options, and scale scoring limits direct comparison with published data on some measures. The depth of information obtained was constrained by the time available within schools for survey administration, lack of accompanying parent- and/or teacher-reports, and sensitivities associated with assessing psychosocial and behavioural constructs in children by self-report. The MCS measured the full spectrum of personal competencies and vulnerabilities in the population, • providing capacity to guide the development and implementation of universal mental health promotion programs alongside targeted approaches for vulnerable children. The MCS is embedded within an intergenerational, multi-agency record linkage study, the New South Wales • Child Development Study (NSW-CDS), that permits MCS data to be interpreted in the context of longitudinal data that is subject to minimal selection and participation bias.

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INTRODUCTION

Middle childhood (age 6-12 years) is a critical period in which to establish social, emotional-behavioural, cognitive, and physical competencies that support successful transition to adolescence¹². Children are increasingly exposed to influences beyond the home, and encounter various new challenges, particularly at school. During this time, mental health problems emerge for some children, causing impairments in functioning and increasing risk for future adverse health, social, and educational outcomes³⁴. Thus, middle childhood represents an important period for establishing strong psychosocial foundations to support future mental health and wellbeing. Here we introduce the 2015 Middle Childhood Survey (MCS), designed as a self-report measure of children's psychosocial experiences in middle childhood (at approximately 11 years of age) administered online during the final year of primary (elementary) school for a population cohort of children being studied longitudinally within the New South Wales Child Development Study⁵ (NSW-CDS; <u>http://nsw-cds.com.au/</u>).

The NSW-CDS is a multi-generational record linkage study that combines administrative health, education, child protection, and justice records for an Australian state-based population cohort of children (n=87 026) and their parents. The cohort was defined as those children who entered their first year of full-time schooling (Kindergarten) in NSW in 2009 at approximately 5 years of age and for whom class teachers completed the Australian Early Development Census⁶ (AEDC) on each child (99.7% coverage). The AEDC data on early childhood social, emotional-behavioural, cognitive, communication, and physical development were linked with child and parent administrative records in a first record linkage conducted in 2013³; a second record linkage to include MCS data and update administrative records to the age of 12 years was undertaken in late 2016.

Reflecting the primary interest of the NSW-CDS in identifying childhood predictors of later mental health and related outcomes⁵, the MCS items focussed on the assessment of social and emotional-behavioural competencies that are typically attained during middle childhood^{1 2} and which have been demonstrated as predictive of various adolescent and adulthood health and social outcomes^{3 4 7}. These competencies include establishing and maintaining positive social relationships, understanding and appreciating the perspectives of others, recognising and managing emotions and behaviours, and the development of personality and self-

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esteem. Other aspects of childhood mental health and wellbeing that are associated with health, social, and educational outcomes, such as psychotic-like experiences⁷⁸, daytime sleepiness⁹, and engagement with the natural environment¹⁰ were also included. Like the AEDC, the MCS was designed as a population measurement tool rather than a diagnostic instrument for the identification of children presenting needs that require specialist support services or therapeutic intervention¹¹. Thus, the MCS measured both successful attainment of these competencies as well as vulnerabilities or immaturity of these skills relative to age peers. This paper describes the content and administration of the MCS, and presents the mental health and wellbeing profiles of children in the MCS sample.

COHORT DESCRIPTION

Eligible sample

The target sample for the study included all Year 6 students enrolled at government (public) and nongovernment (private) schools in the Australian state of New South Wales (NSW) during 2015 (88 572 children enrolled in 2371 schools), in order to capture the same cohort of children assessed within the AEDC in 2009. A two-stage recruitment procedure was used (Figure 1) to ensure that students remained anonymous to researchers for future record linkage purposes: Principals (Head Teachers) provided active consent for their school to participate; subsequent child recruitment within participating schools was managed by school personnel using an opt-out consent procedure for parents and/or children.

Procedures

<u>Pilot testing</u>: Commencing in October 2012, school sector representatives and stakeholders representing various education and parent and communities groups (see Acknowledgements) were consulted regarding the method of MCS administration in schools. During 2014, the feasibility of administration procedures (and acceptability of the MCS items) was tested with Year 6 students (n=645) enrolled at 11 schools spanning the government and non-government sectors, and metropolitan and rural regions of NSW. Minor adaptations to administration procedures and MCS items were made on the basis of feedback received from participating schools, and on psychometric analysis of the pilot data (including factor and item response theory analyses).

<u>Data management</u>: The MCS data collection was managed by a third party information technology (IT) contractor that delivered the online student survey and the automated email correspondence with schools on

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behalf of the researchers. The IT contractor was provided with all Principal/school email addresses by the school sector representatives, and received all NSW Year 6 students' identifying information (e.g., name, date of birth), based on 2014 (Year 5) enrolment records, directly from the *NSW Board of Studies, Teaching and Educational Standards*, under a confidential data usage agreement. Identifying information for these eligible students was pre-populated into an online administration portal that was accessible only to school teachers assisting with MCS administration. To account for new enrolments in 2015, teachers were able to update the personal identifiers to include new students. A unique access code was generated by the IT contractor for each child to ensure that the survey responses were associated with the correct personal identifiers for later linkage processes.

<u>School recruitment</u>: From March 2015, the school sector representatives and study stakeholders used their established avenues for communicating with school personnel and/or parents to seek their support and participation in the study. In April 2015, Principals of NSW schools with an enrolment of Year 6 students were sent an electronic study information leaflet by email, inviting the school to participate in the study. Principals (or an authorised representative) provided written informed consent for their school to participate, or declined participation, using a unique web-link for each school. Where no responses were received from schools during a four-month school recruitment period, telephone contact was made by researchers and supplemented by automated reminder emails. Principals of participating schools were able to nominate a preferred two-week window during July-September 2015 to administer the MCS, and a dedicated coordinator (i.e., teacher or support person) to supervise MCS administration at their school.

<u>Child recruitment</u>: Both printed and electronic copies of study information leaflets were sent to participating schools for distribution to parents/carers of Year 6 students at least a fortnight prior to the scheduled MCS administration. Electronic copies of these leaflets were also available on the study website in English and the ten most common languages spoken by families of children enrolled in NSW schools; an audio version in English was also available at this site. Parents/carers could opt-out their child from participation using online forms, or by written or verbal instruction to class teachers. Children could opt-out either online or by verbal instruction to class teachers. Teachers recorded online any written or verbal opt-outs received from parents or children prior to administration of the MCS. Opting out of the study was also possible after MCS

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administration; capacity to withdraw MCS data remained available until the closure of the survey portal to data collection on 16 October 2015. MCS data were then de-identified by the IT contractor for provision to the researchers, at which point removal of a specific child's responses was no longer possible.

<u>Survey administration</u>: The MCS was administered within participating schools during class time over a three-month period commencing July 2015. Classroom teachers supervised the survey administration according to instructions provided in an online administration guide. Schools determined the setting of survey administration depending on availability of computing resources, while maintaining confidentiality for participants. Children could complete the survey over multiple sessions, using the unique access code provided to the child by their teacher. Children with special needs could complete the survey with the assistance of their normal classroom support (e.g., adult helper) and/or an audio-recording of the survey. Researchers monitored the administration of MCS in schools via an online portal (which held school-level information only), and arranged alternative administration times for any school that had not administered the survey within their nominated 2-week window.

<u>Data provision</u>: During the administration process, participating students' personal identifiers were stored by the IT contractor separately from MCS responses. Only de-identified survey data (coded by unique identification number) was provided to the researchers in December 2015. A separate dataset containing only the minimum identifying information for the cohort of participating students (i.e., without the survey response data) was provided to a third party linkage provider – the *Centre for Health and Record Linkage* (CHeReL; <u>http://www.cherel.org.au/</u>) - to be retained under a confidential data usage agreement that enables linkage of MCS data with administrative data collections in the NSW-CDS; at no time during the study execution were personal identifiers available to researchers.

Measures

The content of the MCS was established via consensus among a working group comprising NSW-CDS Scientific Committee members who are co-authors on this manuscript. Members represented expertise in child development, developmental psychopathology, education, psychology, psychiatry, and population health. The group reviewed measures with established reliability and validity for assessment of children aged 11 years, and incorporated measures both of competencies and vulnerabilities in social and emotional-behavioural

development. Each construct of interest was assessed by multiple items; in some instances only a subset of the items from the original scales was included due to constraints on the number of items that could be administered to children during class time. In such cases, the subset of items demonstrated in previous studies as providing the most coherent but comprehensive assessment of the construct was selected. Minor wording changes were made to several MCS items to increase their acceptability to Australian children (modified items are indicated by * in Table 3 and Supplementary Table 1-X). Further, to avoid children having to adapt their responses to the different response formats used in the original scales, a standardised response format was adopted for all items, modelled on the 3-choice format of the *Strengths and Difficulties Questionnaire* (SDQ)¹² ¹³, namely: Not True (scored 0); Somewhat True (1); and Certainly True (2). A standard approach of summing items on all scales (after reverse scoring of some items, as indicated in Table 3 and Supplementary Table 1-X) to compute total scale scores was also adopted.

In total, the MCS comprised 116 items with specific forced-choice response options. The first eight items assessed demographic information: age, sex, month of birth, residential postcode, number of people living in the child's usual residence, main language spoken at home, and whether the child used the audio-recording or received assistance from an adult to complete the survey (Table 1). The remaining 108 items assessed a range of child mental health and wellbeing constructs, including: Social Integration, Prosocial Behaviour, Peer Relationship Problems, Supportive Relationships (at Home, School, and in the Community), Empathy, Emotional Symptoms, Conduct Problems, Aggression, Attention, Inhibitory Control, Hyperactivity-Inattention, Total Difficulties (internalising and externalising psychopathology), Perceptual Sensitivity, Psychotic-Like Experiences, Personality, Self-esteem, Daytime Sleepiness, and Connection to Nature (engagement with natural environment). The source measure for each of these constructs is described following; for brevity, these are presented according to their questionnaire of derivation:

- a. Social Integration at school was assessed using the full, unmodified 8-item Social Integration subscale of the Quality of School Life questionnaire¹⁴. Response options were reduced from the original 4-choice to the standard 3-choice response format, and the total sum of items derived in place of an average of items used in previous research.
- b. Prosocial Behaviour and Psychopathology were assessed using the 25-item SDQ¹²¹³, which comprises four

psychopathology subscales (*Emotional Symptoms, Peer Relationship Problems, Conduct Problems, Hyperactivity-Inattention*), and a *Prosocial Behaviour* subscale. Items and response options were unmodified from the original scale, and the standard scoring metric applied: five items assessed each of the subscales, and *Total Difficulties* was computed by summing the 20 items from the four psychopathology subscales.

- c. Supportive Relationships at Home, at School, and in the Neighbourhood/Community were assessed using
 12 items (four per subscale) selected from the Healthy Kids Survey¹⁵. These items included those (three per subscale) used in the Middle Years Development Index¹⁶ [MDI] plus an additional item for each subscale.
 Item wordings were unmodified from the MDI, but the 4-choice rating scale and averaged total score were replaced.
- d. Sixteen items from four subscales in the Early Adolescent Temperament Questionnaire Revised (EATQ-R)¹⁷ assessed Attention (four items; selected from seven), Inhibitory Control (seven items; selected from 11), Perceptual Sensitivity (four items; selected from six), and Aggression (two items; selected from 11). The first three of these subscales comprise part of a measure of Effortful Control within the EATQ-R. Minor modifications to the wording of several items were made, and the original 5-point rating response scale and averaged total score replaced.
- e. **Empathy** was assessed using four items from the 12-item *Feeling and Thinking Instrument*¹⁸; item wording was unmodified, but the original 5-point rating response scale replaced.
- f. **Psychotic-like experiences** were assessed with nine items from the *Psychotic-Like Experiences Questionnaire for Children*^{8 19} (two with minor rewording from the original), with the original 3-choice response format retained.
- g. Dimensions of personality (*Extraversion, Neuroticism, Conscientiousness, Agreeableness, and Intellect/Openness*) were assessed using 25 items (five per dimension) modified from an unpublished 30 item short-form of the 65-item *Big Five Questionnaire for Children* [BFQ-C²⁰] supplied by the author
 (Barbaranelli, personal communication). Items were reworded to simplify the translation from Italian to

from the full BFQ-C, to improve psychometric properties. The original 5-point rating response scale was

English. Following pilot testing in 2014, five of the 25 items were replaced with other candidates, adapted

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replaced.

- h. Self-esteem was measured with three unmodified items from the 7-item Self-Satisfaction subscale of the *Multidimensional Students' Life Satisfaction Scale*²¹. The original 4-choice response scale and averaged total score were replaced.
- i. **Daytime Sleepiness** was assessed with three items selected from the 8-item *Pediatric Daytime Sleepiness Scale*⁹, with minor rewording of items and replacement of the original 5-point response scale.
- j. Connection to Nature (or, children's engagement with the natural environment) was measured with three items; two were modified from the 7-item Enjoyment of Nature subscale of the Connection to Nature Index²² and one modified from the 14-item Connectedness to Nature Scale²³. The original 5-point rating scales of both measures were replaced.

FINDINGS TO DATE

Sample characteristics

A flow diagram summarising the stages of school and child recruitment is provided in Figure 1; this also details the reasons for non-participation of schools¹ and/or children in the MCS. Of the 2371 NSW schools with an eligible Year 6 student enrolment, 829 (35.0%) administered the MCS. These schools provided a total enrolment of 32 389 children who were invited to complete the MCS (representing 36.6% of Year 6 enrolments in NSW schools). Among these, 27 808 participated in the MCS (85.9% of invited children). Parent and child opt-outs totalled 4.3% of eligible children (the remaining 9.9% did not participate for other reasons detailed in Figure 1). The mean age of participating children was 11.5 years (SD 0.5); other demographic information on participants is summarised in Table 1. Average survey completion time was 16.5 minutes, with 90% of children completing within 7 to 50 minutes.

The representativeness of participating schools and children relative to the respective state population was estimated using publicly accessible national school-level data on enrolment and socio-demographic indices. Table 2 compares the demographic characteristics of all NSW schools and MCS participating schools, firstly as distributions of unweighted data, and secondly as distributions after weighting by Year 6 enrolment and number of MCS participants per school. The 829 schools that participated in the MCS were comparable on a

¹ The reasons for Principal opt-outs were not assessed systematically, but among those who volunteered this information, these were predominantly that the school was too busy to participate or already committed to other research participation.

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range of demographic indices to the total population of NSW schools with a Year 6 enrolment; all figures reported for the MCS participating schools (both unweighted data and weighted estimates) lie within ~2% of NSW rates.

Item responses and scale distributions

Table 3 summarises the distribution of children's responses on all MCS items, grouped according to the constructs they measured. Similar data, reported separately for girls and boys, is provided in Supplementary Table 1-X. The total number of children reporting each item ranged from a minimum of 26 853 (3.4% missing) to 27 735 (0.3% missing). An unknown portion of these missing responses related to data server capacity issues encountered early in the MCS administration period and resolved promptly by the IT contractor.

For each MCS construct, Table 4 (and Supplementary Table 2-X) provides descriptive statistics (including number of children providing complete data on the scale, means, standard deviations, minima and maxima), internal consistency coefficients (Cronbach's α), and scores corresponding to a range of percentiles in the sample distribution (i.e., 10th, 25th, 50th, 75th, 90th). These percentiles were adapted from those reported for the AEDC⁶ (where scores in the lowest 10th percentile were described as "developmentally vulnerable", between the 10th and 25th percentiles as "developmentally at risk", and between the 25th-50th and >50th percentiles as two bands of "developmentally on track" scores), with the 90th percentile added to accommodate the bidirectional orientation of MCS scales.

The total number of children providing complete scale data ranged from a minimum of 26 853 (3.4% missing) to a maximum of 27 733 (0.3% missing). On average, children in the sample scored in the range reflecting healthier or more developmentally mature functioning on each construct, but the population distribution spanned the full range of possible scores on every scale. For most scales, each of the specified percentiles was associated with a unique score on the scale even at the extremes (10th and 90th percentiles), indicating a lack of ceiling/floor effects in measurement. The Cronbach's α coefficients (which provide a lower-bound estimate of the reliability of a psychometric test) ranged between *acceptable* to *excellent* for all scales, with the exception of two with *unacceptable* coefficients (Empathy, Attention). Preliminary psychometric analysis of MCS data indicated modified versions of these scales with improved internal consistency

coefficients²; these are also summarised in the Tables. Further structural analyses to refine the measurement of the MCS constructs are the subject of other manuscripts currently in preparation.

Profile of mental health and wellbeing in the MCS cohort

High mean total scores on Social Integration, Prosocial Behaviour, Empathy, Attention, Inhibitory Control, and Self-esteem were indicative of healthier functioning or developmentally more mature capacities for the majority of children in the sample. High mean scores also indicated most children's access to Supportive Relationships at Home, School, and in the Community, and engagement with the natural environment (Connection to Nature). Low mean total scores on Peer Relationship Problems, Emotional Symptoms, Conduct Problems, Aggression, Hyperactivity-Inattention, Total Difficulties (psychopathology) and Daytime Sleepiness were further indicative of healthy functioning among the majority of children in the MCS cohort. Nonetheless, on all scales, there were children who displayed less healthy or developed functioning or lacked access to supports (e.g., 13.2% of children reported a lack of any supportive relationship with an adult in their community or neighbourhood).

Other scales in the MCS measured unusual thoughts or perceptual experiences that, although more prevalent in children with neurodevelopmental disorders and those who later develop adult psychiatric illness, are nonetheless common in child populations²⁴: a majority of children (52.2%) responded "Certainly True" to at least one of the nine PLE items, and the high mean total scores on Perceptual Sensitivity indicated that most children also reported sensitivity to slight, low-intensity stimulation in the environment. With respect to personality dimensions, on average, children produced higher scores on Extraversion, Conscientiousness, Agreeableness, and Openness/Intellect scales (reflecting a tendency to avoid endorsement of the "Not True" response), and lower scores on Neuroticism, relative to the scale range of each construct.

Pearson's correlation coefficients indicating the pattern, direction, and strength of associations (small 0.1; medium 0.3; large 0.5)²⁵ between the MCS scales are provided in Supplementary Table 3-X. Almost all constructs related significantly in this large sample, with almost half (45%) of the associations of medium or large magnitude.

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² Exploratory and confirmatory factor analyses indicated that the Empathy construct was most reliably assessed by removing one of the four items comprising the scale, and that one of the seven Inhibitory Control items loaded more coherently with the three items measuring the Attention construct. These modifications are indicated by [‡] in Table 3 (and Supplementary Table 1-X), and detail on the revised scales included in Table 4 (and Supplementary Table 2-X).

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Comparison with published data: Direct comparison of MCS responses with published data on the SDQ and PLE scales from general population samples was afforded by use of the original items, response options, and scoring methods for these scales. Mean scores on Prosocial Behaviour and Conduct Problems aligned closely with Australian self-report SDQ norms published in 2005 by age and sex (based on a Victorian community sample of 553 children aged 11-17 years, including 292 children aged 11-13 years)²⁶; and were slightly greater in our sample for Total Difficulties, Emotional Symptoms, Peer Relationship Problems, and Hyperactivity-Inattention. This pattern of change in means over the decade between the 2005 study and ours appears consistent with the small, but significant, increases observed between 2007 and 2012 in the self-report subscale means for Total Difficulties, Emotional Symptoms, Peer Relationship Problems, and Hyperactivity-Inattention (but a decrease in Conduct Problems) in nationally-representative New Zealand samples of children aged 12-15 years²⁷, and with a similar increase in Emotional Symptoms and decrease in Conduct Problems between 2009 and 2014 in English community samples of children aged 11-13 years²⁸. The mean PLE score in the MCS sample aligned closely with that reported previously for a relatively deprived inner-city London, UK, community sample aged 9-12 years¹⁹ using these same nine items, though the overall prevalence of a "Certainly True" to at least one of the nine items in the MCS (52.2%) was lower than that obtained in the London sample (66.0%)⁸.

For the SDQ psychopathology scales, Table 5 (and Supplementary Table 4-X) indicates the proportions of children falling within the Normal (defined as ~80%), Borderline (~10%), and Abnormal (~10%) categories defined for the SDQ based on UK population norms, as well as the proportions of children scoring in each category of the more recent 4-level solution (Close to Average ~80%, Slightly Raised ~10%, High ~5%, Very High ~5%). Several departures from these figures are notable (e.g., 91% of children scored in the Normal range of the Prosocial Behaviour scale, and only 67% of children scored "Close to Average" on the Peer Relationship Problems scale); the application of the established scoring metrics derived on UK population samples may overestimate the prevalence of problems with peers and underestimate vulnerability on Prosocial Behaviour among Australian children aged approximately 11 years.

Capacity for direct comparison of MCS data with published data from similar large, general population samples was limited for the other scales owing to modification from the original response formats to a

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standard 3-choice format, adoption of a standard method of summed total scores for all scales, and by minor alterations to the wording of some items. Despite these modifications, consistencies with data from other developed nations were apparent: Children's reports of Social Integration at school were similar to those reported previously in primary school samples in Australia¹⁴ and Hong Kong^{29 30}; response patterns on the EATQ-R scales (Attention, Inhibitory Control, Perceptual Sensitivity, and Aggression) aligned with data from a community sample of 1,055 Dutch³¹ school students of similar age; and access to Supportive Relationships at Home, School, and in the Community was similar to that reported for a community sample of Canadian 4thgrade school children (~2 years younger than our sample)¹⁶. The pattern of responses on the Big5 personality constructs was also consistent with that reported for an Australian sample of 268 children aged 10-12 years³² using the full 65-item version of the BFQ-C²⁰.

Sex differences: Supplementary Table 2-X provides the item responses and scale distributions separately for girls and boys, and the eta squared (η^2) estimate of the effect size of sex differences for each scale. Statistically significant differences between the scores of girls and boys were apparent on all scales, though the magnitude of these differences was small (sex effects on all scales accounted for $\leq 2\%$ of total variance, except for the small-to-medium effects, explaining 4% of total variance, on Prosocial Behaviour and Aggression). Across the domains, girls' mean scores were greater than those of boys' on Social Integration, Prosocial Behaviour, Supportive Relationships at Home, School, and in the Community, Empathy, Emotional Symptoms, Attention and Inhibitory Control, Perceptual Sensitivity and Psychotic-Like Experiences, Neuroticism, Conscientiousness, Agreeableness, Self-esteem, and Connection to Nature. Conversely, boys' mean scores were greater on Peer Relationship Problems, Conduct Problems and Aggression, Hyperactivity-Inattention, Total Difficulties (psychopathology), Extraversion, Openness/Intellect, and Daytime Sleepiness.

STRENGTHS AND LIMITATIONS

The major strengths of the MCS are twofold. Firstly, the MCS provides a comprehensive assessment of psychosocial and behavioural constructs reflecting mental health and wellbeing in a large sample of 27 808 children aged approximately 11 years (representing 31.4% of eligible NSW students), which is representative of the NSW population on a range of demographic variables (Table 2). Secondly, the MCS incorporated measures of both personal competencies and vulnerabilities, and the scores on every scale spanned the entire range of

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possible scores, providing capacity to examine patterns of both strength and vulnerability in the population. This also facilitates the identification of determinants of average mental health in the population (rather than focusing on the extreme ends of the distribution), which will provide important information to guide the development and implementation of universal mental health promotion programs alongside targeted approaches for vulnerable children³³. Data were collected by self-report, providing access to the child's own perspective on their experiences, which may be particularly important for phenomena that are less readily judged by other informants. Finally, an important strength of the MCS lies in being embedded within planned record linkages of the NSW-CDS⁵, incorporating intergenerational records on health, education, child protection, and justice contacts, and with the AEDC⁶ assessment of early childhood development at age 5 years. This will allow responses on the MCS to be interpreted in the context of longitudinal data that is subject to minimal selection bias and will permit investigation of multiple factors associated with outcomes of low prevalence, and/or of relevance to cultural, geographic, socio-economic or other sub-groups within the population.

A number of limitations of the MCS must be acknowledged. Despite the large sample obtained being representative of the population from which it was drawn, failure to obtain data from all individuals will have the consequence of limiting data available to the current and future record linkages conducted within the NSW-CDS framework. The MCS is further limited by a lack of parent- and/or teacher-reports to supplement children's self-report. Only moderate agreement is typical between child, parent, and teacher ratings of children's mental health and wellbeing, indicating that the ratings of informants are not interchangeable³⁴. Further, the MCS was limited in coverage both in terms of domains assessed and the number of items assessing each domain; these were constrained by the limited time available within schools for survey administration, lack of parent- and/or teacher-reports on additional aspects of children's experiences, and by the sensitivities associated with assessing domains perceived as potentially distressing for the child. For example, information on potentially important constructs such as bullying/victimisation experiences or physical health (including participation in health/leisure activities and nutrition) was not obtained. And, while aspects of the cognitive control of emotions and behaviours were measured, no assessment of cognitive capacities was obtained; linkage of the MCS with education records on academic progress within the NSW-CDS will provide some index

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of these capacities. The lack of capacity to compare MCS data directly with published data from similar large, general population samples was limited for most scales owing to modification from the original response formats to a standard 3-choice format, adoption of a standard method of summed total scores for all scales, and by minor alterations to the wording of some items. On several scales, including the personality dimensions, the restriction of responses to three categories may have artificially reduced variability among participants, with <10% of children electing one of the three options on several items.

FUTURE PLANS

Further structural analysis of the MCS data is underway to derive the most psychometrically robust measures of each mental health and wellbeing domain. The multi-agency, intergenerational linkage of the MCS data with other health, education, child protection, justice, and AEDC records took place late in 2016. This will be used to elucidate patterns of risk and protection across early and middle child development, and also provide a foundation for future record linkages in the cohort that will track mental and physical health, social, and educational/occupational outcomes into adolescence and early adulthood. The record linkage will also incorporate data on the quality and extent of implementation of mental health promotion and early intervention programs in NSW schools, affording an opportunity to examine how delivery of such programs may modify individual pathways of social, emotional, and behavioural function between early and middle childhood. This work will assist in determining appropriate universal mental health promotion and targeted early intervention programs that can bolster strengths and mitigate risks in order to maximise healthy development.

COLLABORATION

Initial data analyses and publications on MCS and linked data will be generated primarily by the authors of this paper and other members of the Scientific Committee, named in the Acknowledgements section, who oversee the NSW Child Development Study (NSW-CDS). The research team is open to research collaborations with other scientists, within restrictions placed on the use of linked data according to strict privacy legislation; interested parties should contact the Lead Investigator of the NSW-CDS (Vaughan Carr: <u>v.carr@unsw.edu.au</u>) with their expressions of interest.

FURTHER DETAILS

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Contributorship Statement

In line with the ICMJE authorship guidelines, KRL, ST, KD, SAB, MB, RKL, MS, AH, KMR, RS, FH, VJC, and MJG made substantial contributions to the conception or design of the work. Authors KRL, ST, KD, FH, VJC, and MJG made substantial contributions to the acquisition, analysis, and interpretation of the data. KRL, ST, KD, SAB, MB, RKL, MS, AH, KMR, RS, FH, VJC, and MJG contributed to the drafting of the manuscript, and/or revising of the manuscript. KRL, ST, KD, SAB, MB, RKL, MS, AH, KMR, RS, KD, SAB, MB, RKL, MS, AH, KMR, RS, FH, VJC, and MJG contributed to the drafting of the manuscript, and/or revising of the manuscript. KRL, ST, KD, SAB, MB, RKL, MS, AH, KMR, RS, FH, VJC, and MJG have given final approval of the version to be published, and agree to its accuracy.

Competing Interests

None declared.

Ethics Approval

Ethical approval was obtained from the University of New South Wales Human Research Ethics Committee (UNSW HREC reference HC14307) and the NSW Department of Education State Education Research Applications Process (reference 2015082); the use of opt-out consent procedures (for parents and children) was guided by the Australian National Health and Medical Research Council National Statement of Ethical Conduct in Human Research (chapter 2.3)³⁵, which specifies conditions under which these procedures are appropriate. Access to publicly available school-level data on enrolment and demographic indices for the 2371 eligible NSW schools (used to estimate the representativeness of participating schools and children) was acquired from the Australian Curriculum, Assessment and Reporting Authority under UNSW HREC approval (reference HC14348).

Data Sharing Statement

Strict privacy legislation places restrictions on the use of linked data; scientists interested in using the data in collaboration with the NSW-CDS Investigators should contact the Lead Investigator of the NSW-CDS (Vaughan Carr: <u>v.carr@unsw.edu.au</u>) with their expressions of interest.

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Table 1. Summary of selected demographic characteristics self-reported by the 27 808 children completingthe Middle Childhood Survey (MCS)

Demographic item	Sample	Preva	alence
	(n)	%	(n)
Age of child	27 808		
10 years or younger		0.5	(135)
11 years		54.7	(15 198)
12 years		44.1	(12 259)
13 years or older		0.8	(216)
Sex of child	27 808		
Female		49.5	(13 754)
Male		50.5	(14 054)
Number of people living in child's home (main residence)	27 803		
3 or less		15.1	(4187)
4		35.8	(9948)
5		27.8	(7718)
6 or more		21.4	(5950)
Main language spoken at home	27 803		
English		87.3	(24 272)
Arabic		1.9	(525)
Vietnamese		1.3	(365)
Cantonese		1.1	(296)
Mandarin		1.0	(278)
Hindi		0.8	(211)
Tagalog		0.5	(141)
Spanish		0.4	(99)
Greek		0.2	(49)
Italian		0.1	(35)
Other		5.5	(1532)
Child made use of MCS audio recording	27 803	2.5	(695)
	27 802	5.0	(1398)



Table 2. Demographic characteristics of MCS participating schools relative to all NSW schools with a Year 6student enrolment (unweighted and weighted by enrolment)

		Unweigh	ted aver	ages		Weighted	laverage	s*
Demographic Measure	NSW	schools	MCS	schools	NSW	schools	MCS	schools
	(n=	23/1)	(n=	:829)	(we	ignted)	(wei	gntea)
	%	(n)	%	(n)	%	(n)	%	(n)
School sector:								
Government	67.9	(1609)	67.1	(556)	67.4		66.6	
Non-Government	32.1	(762)	32.9	(273)	32.6		33.4	
Geographical Location:								
Metropolitan	59.9	(1421)	62.4	(517)	76.3		76.2	
Rural	37.7	(894)	35.8	(297)	23.1		23.3	
Remote	1.8	(43)	1.4	(12)	0.4		0.5	
Very Remote	0.5	(13)	0.4	(3)	0.1		0.1	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
ICSEA score	1007.7	(93.5)	1002.8	(92.4)	1033.2	(87.1)	1026.5	(84.1)
Socio-educational quartiles								
based on ICSEA (%):								
Lowest	28.8	(22.3)	29.6	(22.3)	23.5	(20.3)	24.6	(20.5)
Lower-Middle	24.3	(9.3)	24.6	(8.4)	22.9	(9.3)	23.6	(8.7)
Higher-Middle	23.4	(8.8)	23.5	(8.7)	24.7	(7.8)	24.9	(7.8)
Highest	23.5	(21.7)	22.4	(20.5)	29.0	(23.4)	26.9	(21.7)
Proportion LBOTE (%)	23.3	(27.3)	23.7	(27.4)	31.1	(30.3)	30.2	(30.1)
Proportion Indigenous (%)	9.1	(13.7)	9.5	(13.4)	6.0	(9.2)	6.3	(9.1)
Proportion Female (%)	48.6	(9.3)	48.8	(7.1)	48.5	(10.3)	48.7	(7.0)

<u>Note</u>: *To estimate the proportions of children in NSW and MCS schools described by each demographic measure, weighting was applied based on the number of Year 6 students (NSW schools) and MCS participants in each school (MCS schools); ICSEA = Index of Community Socio-Educational Advantage 2014 (this score is derived from a number of variables, including parental school and non-school education and occupation, the school's geographical location, and proportion of Indigenous students³⁶); LBOTE = Language Background Other Than English.

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Table 3. Summary of items measuring each mental health and well-being domain assessed within the Middle Childhood Survey (MCS) and, for each item, the number of children providing data (of the 27 808 who commenced the survey) and the distributions of the three response options

MCS Domain (and	Item	Sample	No	ot True	Some	what True	Certa	inly True
source measure)		(n)	%	(n)	%	(n)	%	(n)
Social Integration	My school is a place where							
(QSL)	I learn to get along with other people	26 859	3.0	(806)	26.8	(7189)	70.2	(18 864)
	Other students accept me as I am	26 856	6.6	(1769)	32.6	(8760)	60.8	(16 327)
	People trust me	26 856	4.1	(1100)	34.0	(9136)	61.9	(16 620)
	I am popular with other students	26 856	17.0	(4574)	45.1	(12 123)	37.8	(10 159)
	I know people think a lot of me	26 856	20.1	(5393)	50.5	(13 566)	29.4	(7897)
	I get on well with the other students in my class	26 855	3.4	(920)	33.3	(8933)	63.3	(17 002)
	People can depend on me	26 854	5.1	(1380)	35.5	(9542)	59.3	(15 932)
	Other students are very friendly	26 854	4.8	(1281)	37.5	(10 075)	57.7	(15 498)
Prosocial	I try to be nice to other people. I care about their feelings	27 494	1.3	(359)	22.6	(6224)	76.1	(20 911)
Behaviours (SDQ)	I usually share with others (e.g., CDs, games, food)	27 486	7.9	(2180)	45.9	(12 609)	46.2	(12 697)
	I am helpful if someone is hurt, upset or feeling ill 💦 🚫 📐	27 482	2.6	(728)	29.7	(8174)	67.6	(18 580)
	I am kind to younger children	27 478	2.1	(583)	15.2	(4177)	82.7	(22 718)
	I often volunteer to help others (parents, teachers, children)	27 474	6.0	(1653)	44.0	(12 096)	50.0	(13 725)
Peer Relationship	I would rather be alone than with people of my age	27 484	71.6	(19 667)	20.6	(5650)	7.9	(2167)
Problems (SDQ)	I have one good friend or more (R)	27 480	2.0	(544)	7.6	(2077)	90.5	(24 859)
	Other people my age generally like me (R)	27 480	6.4	(1745)	42.1	(11 576)	51.5	(14 159)
	Other children or young people pick on me or bully me	27 477	66.9	(18 387)	23.7	(6517)	9.4	(2573)
	I get along better with adults than with people my own age	27 474	52.8	(14 518)	36.7	(10 075)	10.5	(2 881)
Supportive Home	In my <u>home</u> , there is a parent or another adult							
Relationships	who listens to me when I have something to say	26 924	4.4	(1181)	30.3	(8147)	65.4	(17 596)
(HKS/MDI)	who I can talk to about my problems	26 922	8.2	(2212)	24.3	(6553)	67.4	(18 157)
	who wants me to do my best	26 928	1.6	(435)	12.0	(3220)	86.4	(23 273)
	who believes that I will be a success	26 922	3.4	(906)	20.0	(5382)	76.6	(20 634)
Supportive School	At my <u>school</u> , there is a teacher or another adult							
Relationships	who really cares about me	26 918	7.1	(1920)	34.4	(9265)	58.4	(15 733)
(HKS/MDI)	who listens to me when I have something to say	26 916	5.7	(1528)	31.5	(8466)	62.9	(16 922)
	who believes that I will be a success	26 917	5.7	(1536)	32.8	(8831)	61.5	(16 550)

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	who tells me when I've done a good job	26 915	3.8	(1017)	23.0	(6177)	73.3	(19 721)
Supportive	In my <u>neighbourhood/community</u> (NOT from your school or family), there is an							
Community	adult							
Relationships	who really cares about me	26 910	19.0	(5101)	35.5	(9540)	45.6	(12 269)
(HKS/MDI)	who listens to me when I have something to say	26 910	20.5	(5522)	37.2	(10 005)	42.3	(11 383)
	who believes that I will be a success	26 909	20.4	(5477)	35.9	(9673)	43.7	(11 759)
	who tells me when I've done a good job	26 909	19.3	(5186)	30.9	(8308)	49.9	(13 415)
Empathy (FTI)	I want to help people who get treated badly	27 117	3.5	(957)	27.7	(7500)	68.8	(18 660)
	I often feel worried about people that are not as lucky as me, and feel sorry for them	27 113	5.3	(1425)	34.4	(9337)	60.3	(16 351)
	I sometimes try to understand my friends better by pretending I am them [‡]	27 111	40.6	(11 003)	39.1	(10 591)	20.3	(5517)
	I think people can have different opinions about the same thing	27 108	2.1	(567)	21.8	(5919)	76.1	(20 622)
Emotional	I get a lot of headaches, stomach-aches or sickness	27 489	56.6	(15 552)	33.0	(9075)	10.4	(2862)
Symptoms (SDQ)	I worry a lot	27 484	40.4	(11 097)	41.1	(11 304)	18.5	(5083)
	I am often unhappy, depressed or tearful	27 480	72.8	(20 017)	21.2	(5817)	6.0	(1646)
	I am nervous in new situations. I easily lose confidence	27 479	36.9	(10 128)	44.4	(12 191)	18.8	(5160)
	I have many fears, I am easily scared	27 473	56.5	(15 517)	32.0	(8803)	11.5	(3153)
Conduct Problems	I get very angry and often lose my temper	27 485	62.1	(17 079)	26.7	(7350)	11.1	(3056)
(SDQ)	I usually do as I am told (R)	27 484	3.1	(863)	43.7	(12 011)	53.2	(14 610)
	I fight a lot. I can make other people do what I want	27 480	83.3	(22 896)	14.0	(3846)	2.7	(738)
	I am often accused of lying or cheating	27 478	62.6	(17 207)	26.5	(7278)	10.9	(2993)
	I take things that are not mine from home, school or elsewhere	27 474	88.3	(24 267)	9.6	(2636)	2.1	(571)
Aggression (EATQ- R)	If I get mad at someone, I might hit them*	27 484	65.6	(18 020)	25.4	(6975)	9.1	(2489)
	When I am angry, I throw or break things	27 472	79.8	(21 916)	14.6	(4022)	5.6	(1534)
Attention (EATQ-R)	I pay close attention when someone asks me to do something*	27 165	4.2	(1133)	46.3	(12 588)	49.5	(13 444)
	It is easy for me to really concentrate on homework problems	27 144	18.3	(4969)	47.4	(12 854)	34.3	(9321)
	When trying to study, I have difficulty tuning out background noise and concentrating (R)	27 120	26.3	(7146)	45.2	(12 260)	28.4	(7714)
Inhibitory Control	When I am excited, it's hard for me to wait my turn to speak* (R)	27 162	25.7	(6970)	44.2	(11 993)	30.2	(8199)
(EATQ-R)	When someone tells me to stop doing something, it is easy for me to stop ^{‡‡}	27 157	9.4	(2540)	47.6	(12 926)	43.0	(11 691)
	I often say the first thing that comes to mind* (R)	27 155	24.3	(6586)	52.0	(14 118)	23.8	(6451)
	It's hard for me not to open presents before I'm supposed to (R)	27 149	43.6	(11 827)	30.6	(8302)	25.9	(7020)
	When I am having a good time I find it hard to go home* (R)	27 144	14.6	(3955)	33.5	(9086)	52.0	(14 103)

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	I often call out answers before the teacher calls my name* (R)	27 133	54.8	(14 873)	33.4	(9059)	11.8	(3201)
	The more I try to stop myself from doing something I shouldn't, the more likely I am to do it (R)	27 127	51.4	(13 938)	36.8	(9994)	11.8	(3195)
Hyperactivity /	I am restless, I cannot stay still for long	27 490	32.8	(9024)	41.2	(11 317)	26.0	(7149)
Inattention (SDQ)	I am constantly fidgeting or squirming	27 481	52.7	(14 478)	34.0	(9335)	13.3	(3668)
	I am easily distracted, I find it difficult to concentrate	27 479	39.5	(10 846)	42.5	(11 676)	18.0	(4957)
	I think before I do things (R)	27 474	7.6	(2087)	52.7	(14 466)	39.8	(10 921)
	I finish the work I'm doing. My attention is good (R)	27 472	5.9	(1610)	48.2	(13 232)	46.0	(12 630)
Perceptual	I am very aware of noises	27 157	11.0	(2988)	40.8	(11 071)	48.2	(13 098)
Sensitivity (EATQ- R)	I notice even little changes taking place around me, like lights getting brighter in a room	27 153	14.2	(3853)	39.4	(10 696)	46.4	(12 604)
	I tend to notice little changes that other people do not notice	27 140	13.0	(3533)	49.2	(13 360)	37.8	(10 247)
	I can tell if another person is angry by their expression	27 138	2.9	(774)	28.2	(7644)	69.0	(18 720)
Psychotic-Like	Have you ever							
Experiences	believed that other people could read your thoughts?*	27 000	54.2	(14 642)	33.5	(9048)	12.3	(3310)
(PLEQ-C)	believed that you were being sent special messages through the television?	26 993	69.5	(18 773)	22.0	(5947)	8.4	(2273)
	thought that you were being followed or spied upon?	26 992	43.0	(11 601)	34.2	(9229)	22.8	(6162)
	heard voices that other people could not hear?	26 990	42.9	(11 567)	30.5	(8227)	26.7	(7196)
	felt that you were under the control of some special power?	26 990	70.4	(19 012)	19.3	(5221)	10.2	(2757)
	known what another person was thinking even though that person wasn't speaking?	26 983	42.0	(11 345)	38.3	(10 330)	19.7	(5308)
	felt as though your body had been changed in some way that you could not understand?	26 976	55.2	(14 879)	30.7	(8290)	14.1	(3807)
	felt that you had special powers that other people don't have?*	26 976	62.0	(16 732)	23.4	(6314)	14.6	(3930)
	seen something or someone that other people could not see?	26 976	48.0	(12 949)	27.8	(7489)	24.2	(6538)
Agreeableness	I am friendly to others in my school*	27 735	0.7	(185)	22.5	(6238)	76.8	(21 312)
(BFQ-C)	I forgive others when they do something wrong*	27 734	3.2	(898)	38.3	(10 619)	58.5	(16 217)
	I am kind even to people I don't like*	27 422	10.4	(2853)	49.6	(13 615)	39.9	(10 954)
	I think other people are good and honest	27 416	4.9	(1354)	55.7	(15 269)	39.4	(10 793)
	I like to let other people use my things*	27 415	7.7	(2121)	49.7	(13 614)	42.6	(11 680)
Conscientiousness	I check my work to make sure it is right*	27 734	7.6	(2118)	48.3	(13 395)	44.1	(12 221)
(BFQ-C)	I like to be on time*	27 733	4.7	(1301)	29.0	(8051)	66.3	(18 381)
	I keep my room neat and tidy*	27 427	16.8	(4596)	49.1	(13 476)	34.1	(9355)
	I like to keep my things in order*	27 426	11.5	(3153)	40.7	(11 151)	47.8	(13 122)

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	l am messy* (R)	27 421	49.6	(13 591)	39.0	(10 687)	11.5	(3143)
Neuroticism	I get nervous about many things*	27 734	24.0	(6649)	53.7	(14 895)	22.3	(6190)
(BFQ-C)	I have bad moods*	27 734	24.0	(6662)	51.1	(14 177)	24.9	(6895)
	l get angry easily*	27 734	51.6	(14 314)	34.1	(9446)	14.3	(3974)
	l get upset easily*	27 733	54.6	(15 134)	34.2	(9473)	11.3	(3126)
	I cry a lot*	27 733	75.4	(20 901)	19.7	(5469)	4.9	(1363)
Extraversion	I am happy and active*	27 735	1.0	(289)	25.2	(6999)	73.7	(20 447)
(BFQ-C)	I like to be with other people*	27 734	2.0	(556)	20.8	(5772)	77.2	(21 406)
	I like to talk with others	27 428	1.6	(443)	19.5	(5358)	78.9	(21 627)
	I make friends easily*	27 419	8.5	(2325)	38.0	(10 426)	53.5	(14 668)
	I am a shy person* (R)	27 419	47.1	(12 928)	39.0	(10 696)	13.8	(3795)
Intellect/	I easily learn my school work*	27 735	4.2	(1171)	51.1	(14 177)	44.7	(12 387)
Openness	I know many things	27 735	3.3	(919)	46.2	(12 812)	50.5	(14 004)
(BFQ-C)	I know the answers to questions my teacher asks*	27 734	3.3	(907)	71.4	(19 808)	25.3	(7019)
	I understand my school work*	27 733	2.7	(762)	45.4	(12 588)	51.9	(14 383)
	I like learning new things	27 415	3.2	(865)	26.3	(7223)	70.5	(19 327)
Self-esteem	There are lots of things I can do well	27 174	2.3	(629)	32.1	(8726)	65.6	(17 819)
(MSLSS)	I like myself	27 171	6.0	(1622)	28.5	(7745)	65.5	(17 804)
	I am a nice person	27 169	1.4	(369)	29.6	(8033)	69.1	(18 767)
Daytime Sleepiness	I fall asleep or get drowsy during class*	27 106	59.5	(16 120)	30.4	(8248)	10.1	(2738)
(PDSS)	I am tired and grumpy during the day*	27 105	65.8	(17 833)	28.6	(7754)	5.6	(1518)
	I am usually alert most of the day* (R)	27 104	9.1	(2475)	45.3	(12 282)	45.6	(12 347)
Connection to	When I feel sad, I like to go outside and enjoy nature	27 103	19.8	(5361)	41.9	(11 345)	38.4	(10 397)
Nature	Being in nature makes me feel peaceful*	27 102	10.1	(2729)	38.1	(10 335)	51.8	(14 038)
(CTNI/CTNS)	I feel strongly connected with nature*	27 101	21.5	(5825)	45.0	(12 207)	33.5	(9069)
Note: (R) denotes ar	i item that was subsequently reversed in the computation of domain scores; *deno	tes item v	with mi	nor wordir	ig chai	nge from ori	ginal s	cale;

⁺denotes item removed from the modified Empathy scale (3 items) and ⁺⁺reassigned from the modified Inhibitory Control (6 items) to the modified Attention scale (4 items). QSL = Quality of School Life; SDQ = Strengths and Difficulties Questionnaire; HKS/MDI = Healthy Kids Scale/Middle Years Development Index; FTI = Feeling and Thinking Index; EATQ-R = Early Adolescent Temperament Questionnaire – Revised; PLEQ-C = Psychotic-Like Experiences Questionnaire for Children; BFQ-C = short form of the Big Five Questionnaire for Children; MSLSS = Multidimensional Students' Life Satisfaction Scale; PDSS= Pediatric Daytime Sleepiness Scale; CTNI/CTNS = Connection to Nature Index/Connectedness to Nature Scale.

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Table 4. Descriptive statistics (number of children providing complete data on the subscale, means, standard deviations, minima and maxima), internal consistency coefficients (Cronbach's α), and scores corresponding to a range of percentiles in the sample distribution for each mental health and wellbeing domain assessed within the Middle Childhood Survey (MCS)

MCS Domain (number of items in subscale)	Source	Sample	Mean	SD	Minima	Maxima	α	Scores corresponding to percentile			tiles:		
	Measure	(n)						10th	25th	50th	75th	90th	
Social Integration (8 items)	QSL	26 853	11.76	3.38	0	16	.85	7	9	12	14	16	-
Prosocial Behaviour (5 items)	SDQ	27 474	8.03	1.73	0	10	.64	6	7*	8	9	10	
Peer Relationship Problems (5 items)	SDQ	27 474	2.03	1.78	0	10	.55	0	1	2	3#	4	
Supportive Home Relationships (4 items)	hks/mdi	26 922	6.78	1.64	0	8	.76	4	6	8	8	8	
Supportive School Relationships (4 items)	HKS/MDI	26 915	6.34	1.92	0	8	.83	4	5	7	8	8	
Supportive Community Relationships (4 items)	HKS/MDI	26 909	5.02	2.76	0	8	.92	0	4	5	8	8	
Empathy (4 items)	FTI	27 108	5.74	1.48	0	8	.45	4	5	6	7	8	
Empathy (3 items)*	FTI	27 108	4.94	1.20	0	6	.57	3	4	5	6	6	
Emotional Symptoms (5 items)	SDQ	27 473	3.02	2.31	0	10	.70	0	1	3	4#	6	
Conduct Problems (5 items)	SDQ	27 474	1.80	1.80	0	10	.73	0	0	1	3#	4	
Aggression (2 items)	EATQ-R	27 472	0.69	1.04	0	4	.66	0	0	0	1	2	
Attention (3 items)	EATQ-R	27 120	3.59	1.42	0	6	.48	2	3	4	5	6	
Attention (4 items)*	EATQ-R	27 120	4.93	1.78	0	8	.58	3	4	5	6	7	
Inhibitory Control (7 items)	EATQ-R	27 127	7.93	2.94	0	14	.68	4	6	8	10	12	
Inhibitory Control (6 items)*	EATQ-R	27 127	6.59	2.68	0	12	.67	3	5	7	9	10	
Hyperactivity-Inattention (5 items)	SDQ	27 472	3.60	2.37	0	10	.62	0	2	3	5#	7	
Total Difficulties [Psychopathology] (20 items)	SDQ	27 472	10.45	6.07	0	40	.82	3	6	10	14#	19	
Perceptual Sensitivity (4 items)	EATQ-R	27 138	5.60	1.77	0	8	.62	3	4	6	7	8	
Psychotic-like experiences (9 items)	PLEQ-C	26 976	5.66	4.46	0	18	.85	0	2	5	9	12	
Extraversion (5 items)	BFQ-C	27 419	8.03	1.76	0	10	.62	6	7	8	9	10	
Neuroticism (5 items)	BFQ-C	27 733	3.48	2.28	0	10	.71	1	2	3	5	7	
Conscientiousness (5 items)	BFQ-C	27 421	6.90	2.20	0	10	.70	4	5	7	9	10	
Agreeableness (5 items)	BFQ-C	27 415	7.30	1.86	0	10	.66	5	6	7	9	10	
Intellect/Openness (5 items)	BFQ-C	27 415	7.27	1.91	0	10	.75	5	6	7	9	10	
Self-esteem (3 items)	MSLSS	27 169	4.91	1.19	0	6	.57	3	4	5	6	6	
Daytime Sleepiness (3 items)	PDSS	27 104	1.54	1.37	0	6	.53	0	0	1	2	3	
Connection to Nature (3 items)	CTNI/CTNS	27 101	3.72	1.81	0	6	.80	1	3	4	5	6	

Note: QSL = Quality of School Life; SDQ = Strengths and Difficulties Questionnaire; HKS/MDI = Healthy Kids Scale/Middle Years Development Index; FTI = Feeling and Thinking Index; EATQ-R = Early Adolescent Temperament Questionnaire – Revised; PLEQ-C = Psychotic-Like Experiences Questionnaire for Children; BFQ-C =

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.ddime. .cure Scale.* Inc. .es, scores correspondi. .problems = 3; Conduct Proble. .cale represents the sum of items on the .ention). short form of the Big Five Questionnaire for Children; MSLSS = Multidimensional Students' Life Satisfaction Scale; PDSS= Pediatric Daytime Sleepiness Scale; CTNI/CTNS = Connection to Nature Index/Connectedness to Nature Scale.* Indicates the revised version of the scale with modified number of items (see Footnote 1); [#]For the Strengths and Difficulties Questionnaire subscales, scores corresponding to the 80th percentile (i.e., equating to the cut-off describing a "Borderline" rating) were: Emotional Symptoms = 5; Peer Relationship Problems = 3; Conduct Problems = 3; Hyperactivity-Inattention = 6; Prosocial Behaviour (20th percentile) = 7; and Total Difficulties = 16. The Total Difficulties scale represents the sum of items on the four psychopathology scales (Emotional Symptoms, Peer Relationship Problems, Conduct Problems, Hyperactivity-Inattention).

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Table 5. Distribution of the Strengths and Difficulties Questionnaire (SDQ) categories on each subscale as defined by the traditional 3-level and more recent 4-level solutions

SDQ subscale	Sample	N	ormal	Bor	derline	Abnormal			
	(n)	%	(n)	%	(n)	%	(n)		
Emotional Symptoms	27 473	84.6	(23 233)	6.5	(1778)	9.0	(2462)		
Peer Relationship Problems	27 474	81.2	(22 318)	13.8	(3789)	5.0	(1367)		
Conduct Problems	27 474	83.2	(22 870)	7.7	(2125)	9.0	(2479)		
Hyperactivity-Inattention	27 472	78.0	(21 416)	9.5	(2613)	12.5	(3443)		
Prosocial Behaviour	27 474	90.7	(24 908)	5.6	(1543)	3.7	(1023)		
Total Difficulties	27 472	79.9	(21 943)	11.6	(3180)	8.6	(2349)		
SDQ subscale	Sample	Close	to Average	Slightly Raised		High		Very High	
					-				
	(n)	%	(n)	%	(n)	%	(n)	%	(n)
Emotional Symptoms	(n) 27 473	% 75.2	(n) (20 659)	% 9.4	(n) (2574)	% 6.5	(n) (1778)	% 9.0	(n) (2462)
Emotional Symptoms Peer Relationship Problems	(n) 27 473 27 474	% 75.2 66.9	(n) (20 659) (18 368)	% 9.4 14.4	(n) (2574) (3950)	% 6.5 8.9	(n) (1778) (2445)	% 9.0 9.9	(n) (2462) (2711)
Emotional Symptoms Peer Relationship Problems Conduct Problems	(n) 27 473 27 474 27 474	% 75.2 66.9 83.2	(n) (20 659) (18 368) (22 870)	% 9.4 14.4 7.7	(n) (2574) (3950) (2125)	% 6.5 8.9 4.6	(n) (1778) (2445) (1258)	% 9.0 9.9 4.4	(n) (2462) (2711) (1221)
Emotional Symptoms Peer Relationship Problems Conduct Problems Hyperactivity-Inattention	(n) 27 473 27 474 27 474 27 472	% 75.2 66.9 83.2 78.0	(n) (20 659) (18 368) (22 870) (21 416)	% 9.4 14.4 7.7 9.5	(n) (2574) (3950) (2125) (2613)	% 6.5 8.9 4.6 6.2	(n) (1778) (2445) (1258) (1713)	% 9.0 9.9 4.4 6.3	(n) (2462) (2711) (1221) (1730)
Emotional Symptoms Peer Relationship Problems Conduct Problems Hyperactivity-Inattention Prosocial Behaviour [#]	(n) 27 473 27 474 27 474 27 472 27 472	% 75.2 66.9 83.2 78.0 90.7	(n) (20 659) (18 368) (22 870) (21 416) (24 908)	% 9.4 14.4 7.7 9.5 5.6	(n) (2574) (3950) (2125) (2613) (1543)	% 6.5 8.9 4.6 6.2 2.3	(n) (1778) (2445) (1258) (1713) (633)	% 9.0 9.9 4.4 6.3 1.4	(n) (2462) (2711) (1221) (1730) (390)

Note: [#]For the Prosocial Behaviour subscale, the 4-level classification labels are instead "Close to Average",

"Slightly Lowered", "Low", and "Very Low".

Figure 1. Flow diagram illustrating derivation of the final sample of 829 schools, and 27,808 children, who participated in the Middle Childhood Survey 2015 (MCS)



Supplementary Online Materials

Supplementary Table 1-X: Prevalence of the three responses by girls and boys on the items measuring each domain assessed within the Middle Childhood Survey (MCS).

Supplementary Table 2-X. Descriptive statistics for girls and boys (number providing complete data on the subscale, means, standard deviations, minima and maxima), internal consistency coefficients (Cronbach's α), and scores corresponding to a range of percentiles in the sample distribution for each domain assessed within the Middle Childhood Survey (MCS).

Supplementary Table 3-X. Direction and magnitude of the bivariate associations between each domain assessed within the Middle Childhood Survey (small effects shaded in green; medium in orange; large in red; and non-significant associations in grey).

Supplementary Table 4-X. Prevalence of the Strengths and Difficulties Questionnaire (SDQ) categories on each subscale for girls and boys, as defined by the traditional 3-level and more recent 4-level solutions.

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Supplementary Table 1-X. Distributions of the three responses by girls and boys on the items measuring each domain assessed within the Middle Childhood Survey (MCS).

			Girls			Boys	
MCS Domain	Item	Not	Somewhat	Certainly	Not	Somewhat	Certainly
		True	True	True	True	True	True
		%	%	%	%	%	%
Social Integration	My school is a place where						
	I learn to get along with other people	2.5	24.9	72.5	3.5	28.6	67.9
	Other students accept me as I am	7.0	31.8	61.1	6.1	33.4	60.5
	People trust me	3.4	31.3	65.3	4.8	36.7	58.5
	I am popular with other students	19.2	46.4	34.4	14.9	43.9	41.2
	I know people think a lot of me	20.4	50.7	29.0	19.8	50.4	29.8
	I get on well with the other students in my class	3.2	31.9	65.0	3.7	34.6	61.7
	People can depend on me	4.1	31.7	64.2	6.1	39.4	54.5
	Other students are very friendly	4.8	37.7	57.5	4.8	37.4	57.9
Prosocial	I try to be nice to other people. I care about their feelings	0.8	15.4	83.8	1.8	29.7	68.5
Behaviours	I usually share with others (e.g., CDs, games, food) 🧹 🦳	6.1	44.7	49.2	9.8	47.0	43.2
	I am helpful if someone is hurt, upset or feeling ill	1.7	22.8	75.6	3.6	36.6	59.8
	I am kind to younger children	1.7	12.3	86.0	2.5	18.1	79.4
	I often volunteer to help others (parents, teachers, children)	4.0	39.0	56.9	8.0	48.9	43.1
Peer Relationship	I would rather be alone than with people of my age	72.6	20.0	7.4	70.5	21.2	8.3
Problems	I have one good friend or more (R)	1.9	8.1	90.1	2.1	7.1	90.9
	Other people my age generally like me (R)	6.2	41.8	52.0	6.5	42.4	51.1
	Other children or young people pick on me or bully me	65.9	24.7	9.4	67.9	22.7	9.3
	I get along better with adults than with people my own age	54.6	36.1	9.4	51.1	37.3	11.6
Supportive Home	In my <u>home</u> , there is a parent or another adult						
Relationships	who listens to me when I have something to say	4.4	29.3	66.3	4.4	31.2	64.4
	who I can talk to about my problems	8.0	23.0	69.0	8.5	25.6	65.9
	who wants me to do my best	1.1	10.2	88.7	2.2	13.7	84.2
	who believes that I will be a success	3.1	18.8	78.1	3.6	21.2	75.2
Supportive School	At my <u>school</u> , there is a teacher or another adult						
Relationships	who really cares about me	5.5	31.8	62.6	8.7	37.0	54.3
	who listens to me when I have something to say	3.0	20.2	76.8	6.5	34.0	59.6
	who believes that I will be a success	4.9	28.9	66.2	6.6	35.2	58.3
	who tells me when I've done a good job	3.0	20.2	76.8	4.6	25.7	69.8

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Supportive	In my <u>neighbourhood/community</u> (NOT from your school or family), there is						
Community	an adult						
Relationships	who really cares about me	17.6	33.8	48.6	20.3	37.1	42.6
	who listens to me when I have something to say	20.1	35.9	44.0	21.0	38.4	40.6
	who believes that I will be a success	20.0	34.4	45.5	20.7	37.4	41.9
	who tells me when I've done a good job	18.5	29.8	51.7	20.0	31.9	48.0
Empathy	I want to help people who get treated badly	2.4	22.0	75.6	4.6	33.2	62.2
	I often feel worried about people that are not as lucky as me, and feel sorry	3.4	30.5	66.1	7.1	38.3	54.6
	for them						
	I sometimes try to understand my friends better by pretending I am them [‡]	39.5	38.9	21.6	41.6	39.2	19.1
l	I think people can have different opinions about the same thing	1.3	18.4	80.3	2.9	25.2	71.9
Emotional	I get a lot of headaches, stomach-aches or sickness	53.5	34.8	11.6	59.6	31.2	9.2
Symptoms	I worry a lot	35.3	43.0	21.7	45.4	39.3	15.3
	I am often unhappy, depressed or tearful	71.0	22.3	6.7	74.6	20.0	5.3
	I am nervous in new situations. I easily lose confidence	32.1	45.7	22.1	41.5	43.0	15.5
	I have many fears, I am easily scared	49.4	36.1	14.5	63.4	28.1	8.5
Conduct Problems	I get very angry and often lose my temper	65.7	25.0	9.3	58.7	28.4	12.9
	I usually do as I am told (R)	2.5	38.8	58.7	3.8	48.6	47.7
	I fight a lot. I can make other people do what I want	85.2	12.5	2.3	81.4	15.5	3.1
	I am often accused of lying or cheating	69.7	22.3	8.0	55.6	30.6	13.8
	I take things that are not mine from home, school or elsewhere	90.7	7.7	1.6	86.0	11.4	2.5
Aggression	If I get mad at someone, I might hit them*	75.7	18.5	5.8	55.6	32.2	12.2
	When I am angry, I throw or break things	84.5	11.6	4.0	75.1	17.7	7.2
Attention	I pay close attention when someone asks me to do something*	3.6	43.6	52.8	4.7	49.1	46.2
	It is easy for me to really concentrate on homework problems	16.3	47.8	36.0	20.3	47.0	32.7
	When trying to study, I have difficulty tuning out background noise and	26.5	45.3	28.3	26.2	45.1	28.6
	concentrating (R)						
Inhibitory Control	When I am excited, it's hard for me to wait my turn to speak* (R)	26.6	43.5	29.9	24.7	44.8	30.4
	When someone tells me to stop doing something, it is easy for me to stop ^{‡‡}	8.2	44.7	47.2	10.5	50.5	39.0
	I often say the first thing that comes to mind* (R)	24.6	53.1	22.3	23.9	50.9	25.2
	It's hard for me not to open presents before I'm supposed to (R)	42.6	31.7	25.7	44.5	29.5	26.0
	When I am having a good time I find it hard to go home* (R)	12.5	33.3	54.2	16.6	33.6	49.8
	I often call out answers before the teacher calls my name* (R)	65.3	27.4	7.3	44.5	39.3	16.2
	The more I try to stop myself from doing something I shouldn't, the more likely I am to do it (R)	56.1	33.7	10.2	46.8	39.9	13.3

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Hyperactivity /	I am restless, I cannot stay still for long	35.5	40.7	23.8	30.2	41.6	28.2
Inattention	I am constantly fidgeting or squirming	54.7	33.2	12.1	50.7	34.7	14.6
	I am easily distracted, I find it difficult to concentrate	43.7	40.5	15.7	35.3	44.4	20.3
	I think before I do things (R)	5.6	50.1	44.3	9.6	55.2	35.3
	I finish the work I'm doing. My attention is good (R)	4.8	45.3	49.9	6.9	51.0	42.1
Perceptual	I am very aware of noises	10.5	42.8	46.7	11.5	38.8	49.8
Perceptual Sensitivity Psychotic-Like Experiences Agreeableness	I notice even little changes taking place around me, like lights getting brighter in a room	13.5	40.0	46.5	14.9	38.8	46.3
	I tend to notice little changes that other people do not notice	12.5	49.9	37.6	13.6	48.6	37.9
	I can tell if another person is angry by their expression	2.4	27.0	70.6	3.3	29.3	67.3
Psychotic-Like	Have you ever						
Experiences	believed that other people could read your thoughts?*	49.4	37.2	13.4	59.0	29.9	11.1
	believed that you were being sent special messages through the television?	70.8	21.3	7.9	68.3	22.7	9.0
	thought that you were being followed or spied upon?	39.7	34.9	25.4	46.3	33.5	20.2
	heard voices that other people could not hear?	41.9	30.8	27.3	43.8	30.2	26.0
	felt that you were under the control of some special power?	70.6	19.3	10.1	70.3	19.4	10.3
	known what another person was thinking even though that person wasn't speaking?	39.3	39.7	21.0	44.8	36.9	18.3
	felt as though your body had been changed in some way that you could not understand?	56.0	30.0	14.0	54.3	31.5	14.2
	felt that you had special powers that other people don't have?*	63.4	22.4	14.2	60.7	24.4	15.0
	seen something or someone that other people could not see?	47.9	27.8	24.3	48.1	27.8	24.1
Agreeableness	I am friendly to others in my school*	0.5	17.6	81.9	0.8	27.3	71.9
	I forgive others when they do something wrong*	2.2	35.4	62.5	4.3	41.2	54.5
	I am kind even to people I don't like*	7.0	44.4	48.6	13.7	54.8	31.4
	I think other people are good and honest	4.7	56.2	39.1	5.2	55.2	39.6
	I like to let other people use my things*	7.0	48.4	44.6	8.4	50.9	40.7
Conscientiousness	I check my work to make sure it is right*	5.4	44.7	50.0	9.9	51.8	38.3
	I like to be on time*	3.9	28.2	67.8	5.5	29.8	64.7
	I keep my room neat and tidy*	14.0	49.3	36.7	19.5	48.9	31.6
	I like to keep my things in order*	9.0	38.5	52.5	13.9	42.8	43.2
	I am messy* (R)	51.7	38.3	10.0	47.5	39.6	12.9

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Neuroticism	I get nervous about many things*	20.7	53.9	25.3	27.2	53.5	19.4
	I have bad moods*	24.7	51.2	24.1	23.4	51.0	25.6
	I get angry easily*	53.6	33.7	12.7	49.6	34.4	15.9
	l get upset easily*	49.9	37.1	13.0	59.1	31.2	9.6
	I cry a lot*	69.6	23.7	6.7	81.0	15.9	3.2
Extraversion	I am happy and active*	0.8	24.7	74.5	1.3	25.7	73.0
	I like to be with other people*	1.9	20.0	78.2	2.1	21.7	76.2
	I like to talk with others	1.4	18.5	80.1	1.8	20.6	77.6
	I make friends easily*	8.9	39.1	52.1	8.1	37.0	54.9
	I am a shy person* (R)	42.2	42.0	15.8	52.0	36.1	11.9
Intellect/Openness	I easily learn my school work*	3.6	50.3	46.1	4.8	51.9	43.3
	I know many things	3.1	50.6	46.3	3.5	41.9	54.6
	I know the answers to questions my teacher asks*	2.8	73.8	23.4	3.7	69.1	27.2
	I understand my school work*	2.4	47.0	50.6	3.1	43.8	53.1
	I like learning new things	2.7	26.6	70.7	3.6	26.1	70.3
Self-esteem	There are lots of things I can do well	2.4	35.5	62.1	2.2	28.8	69.0
	I like myself	6.9	30.9	62.2	5.0	26.1	68.8
	I am a nice person	1.0	25.8	73.2	1.7	33.3	65.0
Daytime Sleepiness	I fall asleep or get drowsy during class*	62.3	29.4	8.3	56.7	31.5	11.8
	I am tired and grumpy during the day*	67.4	27.7	4.9	64.2	29.5	6.3
	I am usually alert most of the day* (R)	9.0	46.9	44.1	9.2	43.8	47.0
Connection to	When I feel sad, I like to go outside and enjoy nature	17.1	42.1	40.7	22.4	41.6	36.0
Nature	Being in nature makes me feel peaceful*	7.7	36.0	56.3	12.4	40.2	47.4
	I feel strongly connected with nature*	19.4	45.1	35.5	23.6	45.0	31.4

Note: (R) denotes an item that was subsequently reversed in the computation of domain scores; *denotes item with minor wording change from original scale; ^{*}denotes item removed from the modified Empathy scale (3 items) and ^{**}reassigned from the modified Inhibitory Control (6 items) to the modified Attention scale (4 items).

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Supplementary Table 2-X. Descriptive statistics for girls and boys (number providing complete data on the subscale, means, standard deviations, minima and maxima), eta squared estimates of the effect size of sex differences, internal consistency coefficients (Cronbach's α), and scores corresponding to a range of percentiles in the sample distribution for each domain assessed within the Middle Childhood Survey (MCS).

MCS Domain (number of items in subscale)		Sample	Mean	SD	Minima	Maxima	η²	α	Scores o	orrespo	nding to	percenti	iles:
		(n)							10th	25th	50th	75th	90th
Social Integration (8 items)	Girls:	13 355	11.84	3.31	0	16	<0.01	.84	7	10	13	14	16
	Boys:	13 498	11.68	3.45	0	16		.85	7	9	12	15	16
Prosocial Behaviour (5 items)	Girls:	13 622	8.37	1.55	0	10	0.04	.60	6	8#	9	10	10
	Boys:	13 852	7.68	1.82	0	10		.64	5	7#	8	9	10
Peer Relationship Problems (5 items)	Girls:	13 622	1.99	1.79	0	10	<0.01	.56	0	1	2	3#	4
	Boys:	13 852	2.06	1.77	0	10		.53	0	1	2	3#	4
Supportive Home Relationships (4 items)	Girls:	13 380	6.86	1.58	0	8	< 0.01	.74	4	6	8	8	8
	Boys:	13 542	6.71	1.69	0	8		.77	4	6	7	8	8
Supportive School Relationships (4 items)	Girls:	13 374	6.52	1.83	0	8	<0.01	.83	4	5	7	8	8
	Boys:	13 541	6.16	1.98	0	8		.83	4	5	7	8	8
Supportive Community Relationships (4 items)	Girls:	13 370	5.14	2.76	0	8	<0.01	.93	0	4	6	8	8
	Boys:	13 539	4.91	2.74	0	8		.92	0	4	5	8	8
Empathy (4 items)	Girls:	13 466	5.97	1.38	0	8	0.02	.41	4	5	6	7	8
	Boys:	13 642	5.52	1.54	0	8		.46	4	4	6	7	7
Empathy (3 items)*	Girls:	13 466	5.15	1.07	0	6	0.03	.53	4	5	6	6	6
	Boys:	13 642	4.74	1.28	0	6		.58	3	4	5	6	6
Emotional Symptoms (5 items)	Girls:	13 621	3.35	2.39	0	10	0.02	.72	0	1	3	5#	7
	Boys:	13 852	2.69	2.18	0	10		.68	0	1	2	4#	6
Conduct Problems (5 items)	Girls:	13 622	1.54	1.68	0	10	0.02	.73	0	0	1	2#	4
	Boys:	13 852	2.07	1.87	0	10		.72	0	1	2	3#	5
Aggression (2 items)	Girls:	13 621	0.50	0.91	0	4	0.04	.65	0	0	0	1	2
	Boys:	13 851	0.89	1.13	0	4		.66	0	0	0	1	3
Attention (3 items)	Girls:	13 469	3.67	1.43	0	6	< 0.01	.51	2	3	4	5	6
	Boys:	13 651	3.51	1.41	0	6		.45	2	3	3	4	5
Attention (4 items)*	Girls:	13 469	5.06	1.77	0	8	< 0.01	.59	3	4	5	6	7
	Boys:	13 651	4.80	1.77	0	8		.56	3	4	5	6	7
Inhibitory Control (7 items)	Girls:	13 469	8.17	2.88	0	14	< 0.01	.69	4	6	8	10	12
	Boys:	13 658	7.69	2.98	0	14		.68	4	6	8	10	12
Inhibitory Control (6 items)*	Girls:	13 469	6.78	2.61	0	12	< 0.01	.67	3	5	7	9	10
	Boys:	13 658	6.40	2.74	0	12		.68	3	4	6	8	10
Hyperactivity-Inattention (5 items)	Girls:	13 621	3.34	2.34	0	10	0.01	.61	0	1	3	5#	7
	Boys:	13 851	3.86	2.37	0	10		.62	1	2	4	6#	7

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Total Difficulties (20 items)	Girls:	13 621	10.22	6.13	0	40	< 0.01	.83	3	6	9	14#	19
	Boys:	13 851	10.68	6.01	0	40		.82	3	6	10	15 [#]	19
Perceptual Sensitivity (4 items)	Girls:	13 475	5.63	1.74	0	8	<0.01	.61	3	4	6	7	8
	Boys:	13 663	5.58	1.80	0	8		.62	3	4	6	7	8
Psychotic-like experiences (9 items)	Girls:	13 404	5.79	4.43	0	18	<0.01	.84	0	2	5	9	12
	Boys:	13 572	5.53	4.49	0	18		.85	0	2	5	9	12
Extraversion (5 items)	Girls:	13 600	7.98	1.77	0	10	< 0.01	.63	5	7	8	9	10
	Boys:	13 819	8.09	1.75	0	10		.61	6	7	8	9	10
Neuroticism (5 items)	Girls:	13 720	3.63	2.37	0	10	< 0.01	.74	1	2	3	5	7
	Boys:	14 013	3.33	2.18	0	10		.68	1	2	3	5	6
Conscientiousness (5 items)	Girls:	13 601	7.16	2.13	0	10	0.01	.70	4	6	7	9	10
	Boys:	13 820	6.64	2.23	0	10		.69	4	5	7	8	9
Agreeableness (5 items)	Girls:	13 598	7.56	1.78	0	10	0.02	.65	5	6	8	9	10
	Boys:	13 817	7.06	1.90	0	10		.67	5	6	7	9	10
Intellect/Openness (5 items)	Girls:	13 598	7.23	1.88	0	10	< 0.01	.75	5	6	7	9	10
	Boys:	13 817	7.30	1.94	0	10		.75	5	6	7	9	10
Self-esteem (3 items)	Girls:	13 487	4.87	1.21	0	6	< 0.01	.58	3	4	5	6	6
	Boys:	13 682	4.94	1.17	0	6		.56	3	4	5	6	6
Daytime Sleepiness (3 items)	Girls:	13 464	1.49	1.35	0	6	<0.01	.55	0	0	1	2	3
	Boys:	13 640	1.59	1.40	0	6		.52	0	0	1	3	4
Connection to Nature (3 items)	Girls:	13 463	3.88	1.76	0	6	<0.01	.80	1	3	4	6	6
	Boys:	13 638	3.56	1.84	0	6		.80	1	2	4	5	6

Note: * Indicates the revised version of the scale with modified number of items (see Footnote 1); * For the Strengths and Difficulties Questionnaire subscales, scores corresponding to the 80th percentile (i.e., equating to the cut-off describing a "Borderline" rating) were, for girls and boys respectively: Emotional Symptoms = 5 and 4; Peer Relationship Problems = 3 and 3; Conduct Problems = 3 and 4; Hyperactivity-Inattention = 5 and 6; Prosocial Behaviour (20th percentile) = 7 and 6; and Total Difficulties = 15 and 16.

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Supplementary Table 3-X. Direction and magnitude of the bivariate associations between each domain assessed within the Middle Childhood Survey (small effects shaded in green; medium in orange; large in red; and non-significant associations in grey).

	SI	PB	PRP	SHR	SSR	SCR	Em3	ES	СР	Agg	At4	IC6	HI	TD	PS	PLE	Ex	Ν	С	Agr	10	SS	DS	CN
SI	1	.40	52	.44	.49	.36	.30	31	36	25	.38	.06	32	50	.09	10	.56	31	.29	.49	.35	.54	35	.20
PB	.40	1	19	.33	.34	.25	.50	04	36	29	.36	.08	30	29	.22	.02	.35	12	.36	.59	.33	.39	29	.30
PRP	52	19	1	28	23	15	15	.42	.38	.28	24	14	.25	.66	.05	.24	49	.38	12	28	22	36	.31	.01‡
SHR	.44	.33	28	1	.47	.31	.32	20	32	25	.31	.10	28	36	.10	10	.31	19	.25	.34	.33	.40	31	.17
SSR	.49	.34	23	.47	1	.38	.29	13	26	18	.29	.06	25	29	.08	05	.27	13	.24	.36	.28	.37	26	.19
SCR	.36	.25	15	.31	.38	1	.17	13	14	09	.20	01*	15	19	.05	.00 [‡]	.27	12	.19	.26	.16	.28	15	.20
Em3	.30	.50	15	.32	.29	.17	1	.01*	27	23	.27	.04	21	20	.28	.07	.21	05	.24	.42	.27	.28	24	.30
ES	31	04	.42	20	13	13	.01*	1	.37	.27	29	23	.35	.75	.14	.32	43	.63	11	14	24	31	.36	.04
СР	36	36	.38	32	26	14	27	.37	1	.64	49	42	.55	.76	.03	.28	26	.52	36	45	33	36	.47	10
Agg	25	29	.28	25	18	09	23	.27	.64	1	37	36	.42	.54	.02	.24	20	.40	26	37	24	25	.39	06
At4	.38	.36	24	.31	.29	.20	.27	29	49	37	1	.39	62	57	.08	19	.27	34	.47	.45	.47	.39	46	.18
IC6	.06	.08	14	.10	.06	01*	.04	23	42	36	.39	1	47	44	16	33	02	30	.21	.17	.15	.07	33	04
HI	32	30	.25	28	25	15	21	.35	.55	.42	62	47	1	.76	00 [‡]	.24	21	.41	47	36	45	34	.47	10
TD	50	29	.66	36	29	19	20	.75	.76	.54	57	44	.76	1	.07	.37	46	.66	37	41	43	46	.55	05
PS	.09	.22	.05	.10	.08	.05	.28	.14	.03	.02	.08	16	.00 [‡]	.07	1	.28	.06	.10	.14	.13	.20	.13	08	.21
PLE	10	.02	.24	10	05	.00 [‡]	.07	.32	.28	.24	19	33	.24	.37	.28	1	12	.28	07	07	06	09	.24	.18
Ex	.56	.35	49	.31	.27	.27	.21	43	26	20	.27	02	21	46	.06	12	1	35	.20	.36	.29	.47	31	.14
Ν	31	12	.38	19	13	12	05	.63	.52	.40	34	30	.41	.66	.10	.28	35	1	19	24	22	30	.38	02
С	.29	.36	12	.25	.24	.19	.24	11	36	26	.47	.21	47	37	.14	07	.20	19	1	.36	.37	.32	35	.22
Agr	.49	.59	28	.34	.36	.26	.42	14	45	37	.45	.17	36	41	.13	07	.36	24	.36	1	.32	.43	34	.28
ю	.35	.33	22	.33	.28	.16	.27	24	33	24	.47	.15	45	43	.20	06	.29	22	.37	.32	1	.42	39	.14
SS	.54	.39	36	.40	.37	.28	.28	31	36	25	.39	.07	34	46	.13	09	.47	30	.32	.43	.42	1	36	.20
DS	35	29	.31	31	26	15	24	.36	.47	.39	46	33	.47	.55	08	.24	31	.38	35	34	39	36	1	13
CN	.20	.30	.01‡	.17	.19	.20	.30	.04	10	06	.18	04	10	05	.21	.18	.14	02	.22	.28	.14	.20	13	1

Note: All correlations significant at the p<0.01 level (2-tailed), except where indicated by * (p<0.05, 2-tailed) or by ^{*} (non- significant); Pearson's r=0.1 designates small effects, r=0.3 medium effects, and r=0.5 large effects (as per Cohen, 1992); SI=Social Integration, PB=Prosocial Behaviour, PRP=Peer Relationship Problems, SHR/SSR/SCR=Supportive Home/School/Community Relationships, Em3=Empathy (3 item revised scale), ES=Emotional Symptoms, CP=Conduct Problems, Agg=Aggression, At4=Attention (4 item revised scale), IC6=Inhibitory Control (6 item revised scale), HI=Hyperactivity-Inattention, TD =Total Difficulties, PS =Perceptual Sensitivity, PLE= Psychotic-like experiences, E=Extraversion, N=Neuroticism, C=Conscientiousness, Agr=Agreeableness, IO=Intellect/Openness, SS=Self-Satisfaction, DS=Daytime Sleepiness, CN=Connection to Nature

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Supplementary Table 4-X. Distribution of the Strengths and Difficulties Questionnaire (SDQ) categories on each subscale for girls and boys, as defined by the traditional 3-level and more recent 4-level solutions.

		Gi	rls			Во	oys 🛛	
SDQ subscale	Normal (%)	Borderline (%)	Abnormal (%)		Normal (%)	Borderline (%)	Abnormal (%)	
Emotional Symptoms	80.7	7.6	11.7		88.4	5.3	6.3	
Peer Relationship Problems	81.9	13.0	5.1		80.6	14.6	4.8	
Conduct Problems	87.2	6.1	6.7		79.4	9.3	11.3	
Hyperactivity-Inattention	81.0	8.4	10.6		75.0	10.6	14.4	
Prosocial Behaviour	94.3	3.4	2.3		87.1	7.8	5.1	
Total Difficulties	80.8	10.9	8.3		79.0	12.2	8.8	
SDO subscale	Close to Average (%)	Slightly Raised (%)	High	Very High	Close to Average (%)	Slightly Raised (%)	High (%)	Very High (%)
Emotional Symptoms	70.2	10.6	76	11.7	80.2	8.2	53	63
Peer Relationshin Problems	67.9	14.0	7.0 8.3	9.8	65.8	14.8	95	9.9
Conduct Problems	87.2	61	35	3.2	79.4	93	5.5	5.5
Hyperactivity-Inattention	81.0	8.4	5.5	5.2	75.0	10.6	69	7.5
Prosocial Behaviour [#]	94.3	3.4	1.5	0.8	87.1	7.8	3.1	2.0
Total Difficulties	76.8	10.1	4.9	8.3	74.8	11.2	5.2	8.8

Note: [#]For the Prosocial Behaviour subscale, the 4-level classification labels are "Close to Average", "Slightly Lowered", "Low", and "Very Low".

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STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology* Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any pre-specified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	4-5 (and Figure 1)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-7
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	5-7 (and Figure 1)
		(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-10
Bias	9	Describe any efforts to address potential sources of bias	10-11
Study size	10	Explain how the study size was arrived at	10
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-11
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7-14
		(b) Describe any methods used to examine subgroups and interactions	7-14
		(c) Explain how missing data were addressed	7-14
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed	10-11

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Page 4	1 of	41
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		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Figure 1
		(b) Give reasons for non-participation at each stage	Figure 1
		(c) Consider use of a flow diagram	Figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Tables 1-5
		(b) Indicate number of participants with missing data for each variable of interest	Tables 3-5
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Cohort study—Report numbers of outcome events or summary measures over time Case-control study—Report numbers in each exposure category, or summary measures of exposure Cross-sectional study—Report numbers of outcome events or summary measures	Tables 1-5
Main results	16	(<i>a</i>) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Supplementary Tables
Discussion	ŀ		
Key results	18	Summarise key results with reference to study objectives	10-14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14-15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-16
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17-18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies. Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Cohort Profile. The 2015 Middle Childhood Survey (MCS) of mental health and wellbeing at age 11 years in an Australian population cohort

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Cohort Profile. The 2015 Middle Childhood Survey (MCS) of mental health and wellbeing at age 11 years in an Australian population cohort Kristin R. Laurens^{1,2,3}, Stacy Tzoumakis⁴, Kimberlie Dean^{1,2,5}, Sally A. Brinkman^{6,7}, Miles Bore⁸, Rhoshel K. Lenroot^{1,2}, Maxwell Smith⁹, Allyson Holbrook⁹, Kim M. Robinson⁹, Robert Stevens¹⁰, Felicity Harris^{1,2}, Vaughan J. Carr^{1,2,11}, Melissa J. Green^{1,2} ^{1.} School of Psychiatry, University of New South Wales, Sydney, Australia ². Neuroscience Research Australia, Sydney, Australia ^{3.} School of Psychology, Australian Catholic University, Brisbane, Australia ^{4.} School of Social Sciences, University of New South Wales, Sydney, Australia ^{5.} Justice Health & Forensic Mental Health Network, NSW, Australia ^{6.} Telethon Kids Institute, University of Western Australia, Perth, Australia ^{7.} School of Public Health, University of Adelaide, Adelaide, Australia ^{8.} School of Psychology, University of Newcastle, Newcastle, Australia ^{9.} School of Education, University of Newcastle, Newcastle, Australia ^{10.} New South Wales Department of Education, Sydney, Australia ^{11.} Department of Psychiatry, School of Clinical Sciences, Monash University, Melbourne, Australia *Contact information for corresponding author: Dr Kristin Laurens, UNSW Research Unit for Schizophrenia Epidemiology, O'Brien Centre Level 4, St Vincent's Hospital, 394-404 Victoria Street, Darlinghurst NSW 2010. Email: Kristin.Laurens@unsw.edu.au; Telephone: +61 (0)2 8382 1409; Facsimile: +61 (0)2 8382 1402 Word Count (Abstract): 279 Word Count (Text): 4861 Number of Tables: 5 Number of Figures: 1 Supplementary online material: 5 tables Keywords: social-emotional function; behaviour; psychopathology; personality; child development; record

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ABSTRACT

Purpose: The Middle Childhood Survey (MCS) was designed as a computerised self-report assessment of children's mental health and wellbeing at approximately 11 years of age, conducted with a population cohort of 87 026 children being studied longitudinally within the New South Wales (NSW) Child Development Study. Participants: School Principals provided written consent for teachers to administer the MCS in class to Year 6 students at 829 NSW schools (35.0% of eligible schools). Parent or child opt-outs from participation were received for 4.3% of children, and MCS data obtained from 27 808 children (mean age 11.5 years, SD 0.5; 49.5% female), representing 85.9% of students at participating schools.

Findings to date: Demographic characteristics of participating schools and children are representative of the NSW population. Children completed items measuring Social Integration, Prosocial Behaviour, Peer Relationship Problems, Supportive Relationships (at Home, School, and in the Community), Empathy, Emotional Symptoms, Conduct Problems, Aggression, Attention, Inhibitory Control, Hyperactivity-Inattention, Total Difficulties (internalising and externalising psychopathology), Perceptual Sensitivity, Psychotic-Like Experiences, Personality, Self-esteem, Daytime Sleepiness, and Connection to Nature. Distributions of responses on each item and construct demarcate competencies and vulnerabilities within the population: most children report mental health and wellbeing, but on every construct there are children who report the most extreme level of developmental vulnerability.

Future plans: Multiagency, intergenerational linkage of the MCS data with health, education, child protection, justice, and early childhood development records took place late in 2016. Linked data will be used to elucidate patterns of risk and protection across early and middle child development, and provide a foundation for future record linkages in the cohort that will track mental and physical health, social, and educational/occupational outcomes into adolescence and early adulthood.

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STRENGTHS AND LIMITATIONS

- The MCS assessed psychosocial and behavioural constructs reflecting mental health and wellbeing by selfreport in a large sample of 27 808 children aged approximately 11 years (31.4% of eligible children), which is representative of the New South Wales population.
- Constructs were assessed using items selected from measures with established reliability and validity for assessment of children aged 11 years, but item reduction and modifications made to item wording, response options, and scale scoring limits direct comparison with published data on some measures.
- The depth of information obtained was constrained by the time available within schools for survey
 administration, lack of accompanying parent- and/or teacher-reports, and sensitivities associated with
 assessing psychosocial and behavioural constructs in children by self-report.
- The MCS measured the full spectrum of personal competencies and vulnerabilities in the population, providing capacity to guide the development and implementation of universal mental health promotion programs alongside targeted approaches for vulnerable children.
- The MCS is embedded within an intergenerational, multi-agency record linkage study, the New South Wales Child Development Study (NSW-CDS), that permits MCS data to be interpreted in the context of longitudinal data that is subject to minimal selection and participation bias.

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INTRODUCTION

Middle childhood (age 6-12 years) is a critical period in which to establish social, emotional-behavioural, cognitive, and physical competencies that support successful transition to adolescence¹². Children are increasingly exposed to influences beyond the home, and encounter various new challenges, particularly at school. During this time, mental health problems emerge for some children, causing impairments in functioning and increasing risk for future adverse health, social, and educational outcomes³⁴. Thus, middle childhood represents an important period for establishing strong psychosocial foundations to support future mental health and wellbeing. Here we introduce the 2015 Middle Childhood Survey (MCS), designed as a self-report measure of children's psychosocial experiences in middle childhood (at approximately 11 years of age) administered online during the final year of primary (elementary) school for a population cohort of children being studied longitudinally within the New South Wales Child Development Study⁵ (NSW-CDS; <u>http://nsw-cds.com.au/</u>).

The NSW-CDS is a multi-generational record linkage study that combines administrative health, education, child protection, and justice records for an Australian state-based population cohort of children (n=87 026) and their parents. The cohort was defined as those children who entered their first year of full-time schooling (Kindergarten) in NSW in 2009 at approximately 5 years of age and for whom class teachers completed the Australian Early Development Census⁶ (AEDC) on each child (99.7% coverage). The AEDC data on early childhood social, emotional-behavioural, cognitive, communication, and physical development were linked with child and parent administrative records in a first record linkage conducted in 2013³; a second record linkage to include MCS data and update administrative records to the age of 12 years was undertaken in late 2016.

Reflecting the primary interest of the NSW-CDS in identifying childhood predictors of later mental health and related outcomes⁵, the MCS items focussed on the assessment of social and emotional-behavioural competencies that are typically attained during middle childhood^{1 2} and which have been demonstrated as predictive of various adolescent and adulthood health and social outcomes^{3 4 7}. These competencies include establishing and maintaining positive social relationships, understanding and appreciating the perspectives of others, recognising and managing emotions and behaviours, and the development of personality and self-

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esteem. Other aspects of childhood mental health and wellbeing that are associated with health, social, and educational outcomes, such as psychotic-like experiences⁷⁸, daytime sleepiness⁹, and engagement with the natural environment¹⁰ were also included. Like the AEDC, the MCS was designed as a population measurement tool rather than a diagnostic instrument for the identification of children presenting needs that require specialist support services or therapeutic intervention¹¹. Thus, the MCS measured both successful attainment of these competencies as well as vulnerabilities or immaturity of these skills relative to age peers. This paper describes the content and administration of the MCS, and presents the mental health and wellbeing profiles of children in the MCS sample.

COHORT DESCRIPTION

Eligible sample

The target sample for the study included all Year 6 students enrolled at government (public) and nongovernment (private) schools in the Australian state of New South Wales (NSW) during 2015 (88 572 children enrolled in 2371 schools), in order to capture the same cohort of children assessed within the AEDC in 2009. A two-stage recruitment procedure was used (Figure 1) to ensure that students remained anonymous to researchers for future record linkage purposes: Principals (Head Teachers) provided active consent for their school to participate; subsequent child recruitment within participating schools was managed by school personnel using an opt-out consent procedure for parents and/or children.

Procedures

<u>Pilot testing</u>: Commencing in October 2012, school sector representatives and stakeholders representing various education and parent and communities groups (see Acknowledgements) were consulted regarding the method of MCS administration in schools. During 2014, the feasibility of administration procedures (and acceptability of the MCS items) was tested with Year 6 students (n=645) enrolled at 11 schools spanning the government and non-government sectors, and metropolitan and rural regions of NSW. Minor adaptations to administration procedures and MCS items were made on the basis of feedback received from participating schools, and on psychometric analysis of the pilot data (including factor and item response theory analyses).

<u>Data management</u>: The MCS data collection was managed by a third party information technology (IT) contractor that delivered the online student survey and the automated email correspondence with schools on

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behalf of the researchers. The IT contractor was provided with all Principal/school email addresses by the school sector representatives, and received all NSW Year 6 students' identifying information (e.g., name, date of birth), based on 2014 (Year 5) enrolment records, directly from the *NSW Board of Studies, Teaching and Educational Standards*, under a confidential data usage agreement. Identifying information for these eligible students was pre-populated into an online administration portal that was accessible only to school teachers assisting with MCS administration. To account for new enrolments in 2015, teachers were able to update the personal identifiers to include new students. A unique access code was generated by the IT contractor for each child to ensure that the survey responses were associated with the correct personal identifiers for later linkage processes.

<u>School recruitment</u>: From March 2015, the school sector representatives and study stakeholders used their established avenues for communicating with school personnel and/or parents to seek their support and participation in the study. In April 2015, Principals of NSW schools with an enrolment of Year 6 students were sent an electronic study information leaflet by email, inviting the school to participate in the study. Principals (or an authorised representative) provided written informed consent for their school to participate, or declined participation, using a unique web-link for each school. Where no responses were received from schools during a four-month school recruitment period, telephone contact was made by researchers and supplemented by automated reminder emails. Principals of participating schools were able to nominate a preferred two-week window during July-September 2015 to administer the MCS, and a dedicated coordinator (i.e., teacher or support person) to supervise MCS administration at their school.

<u>Child recruitment</u>: Both printed and electronic copies of study information leaflets were sent to participating schools for distribution to parents/carers of Year 6 students at least a fortnight prior to the scheduled MCS administration. Electronic copies of these leaflets were also available on the study website in English and the ten most common languages spoken by families of children enrolled in NSW schools; an audio version in English was also available at this site. Parents/carers could opt-out their child from participation using online forms, or by written or verbal instruction to class teachers. Children could opt-out either online or by verbal instruction to class teachers. Teachers recorded online any written or verbal opt-outs received from parents or children prior to administration of the MCS. Opting out of the study was also possible after MCS

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administration; capacity to withdraw MCS data remained available until the closure of the survey portal to data collection on 16 October 2015. MCS data were then de-identified by the IT contractor for provision to the researchers, at which point removal of a specific child's responses was no longer possible.

Survey administration: The MCS was administered within participating schools during class time over a three-month period commencing July 2015. Classroom teachers supervised the survey administration according to instructions provided in an online administration guide. Schools determined the setting of survey administration depending on availability of computing resources, while maintaining confidentiality for participants. Children could complete the survey over multiple sessions, using the unique access code provided to the child by their teacher. Children with special needs could complete the survey with the assistance of their normal classroom support (e.g., adult helper) and/or an audio-recording of the survey. Researchers monitored the administration of MCS in schools via an online portal (which held school-level information only), and arranged alternative administration times for any school that had not administered the survey within their nominated 2-week window.

<u>Data provision</u>: During the administration process, participating students' personal identifiers were stored by the IT contractor separately from MCS responses. Only de-identified survey data (coded by unique identification number) was provided to the researchers in December 2015. A separate dataset containing only the minimum identifying information for the cohort of participating students (i.e., without the survey response data) was provided to a third party linkage provider – the *Centre for Health and Record Linkage* (CHeReL; <u>http://www.cherel.org.au/</u>) - to be retained under a confidential data usage agreement that enables linkage of MCS data with administrative data collections in the NSW-CDS; at no time during the study execution were personal identifiers available to researchers.

Measures

The content of the MCS was established via consensus among a working group comprising NSW-CDS Scientific Committee members who are co-authors on this manuscript. Members represented expertise in child development, developmental psychopathology, education, psychology, psychiatry, and population health. The group reviewed measures with established reliability and validity for assessment of children aged 11 years, and incorporated measures both of competencies and vulnerabilities in social and emotional-behavioural

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development. Each construct of interest was assessed by multiple items; in some instances only a subset of the items from the original scales was included due to constraints on the number of items that could be administered to children during class time. In such cases, the subset of items demonstrated in previous studies as providing the most coherent but comprehensive assessment of the construct was selected. Minor wording changes were made to several MCS items to increase their acceptability to Australian children (modified items are indicated by * in Table 3 and Supplementary Table 1-X). Further, to avoid children having to adapt their responses to the different response formats used in the original scales, a standardised response format was adopted for all items, modelled on the 3-choice format of the *Strengths and Difficulties Questionnaire* (SDQ)¹² ¹³, namely: Not True (scored 0); Somewhat True (1); and Certainly True (2). A standard approach of summing items on all scales (after reverse scoring of some items, as indicated in Table 3 and Supplementary Table 1-X) to compute total scale scores was also adopted.

In total, the MCS comprised 116 items with specific forced-choice response options. The first eight items assessed demographic information: age, sex, month of birth, residential postcode, number of people living in the child's usual residence, main language spoken at home, and whether the child used the audio-recording or received assistance from an adult to complete the survey (Table 1). The remaining 108 items assessed a range of child mental health and wellbeing constructs, including: Social Integration, Prosocial Behaviour, Peer Relationship Problems, Supportive Relationships (at Home, School, and in the Community), Empathy, Emotional Symptoms, Conduct Problems, Aggression, Attention, Inhibitory Control, Hyperactivity-Inattention, Total Difficulties (internalising and externalising psychopathology), Perceptual Sensitivity, Psychotic-Like Experiences, Personality, Self-esteem, Daytime Sleepiness, and Connection to Nature (engagement with natural environment). The source measure for each of these constructs is described following; for brevity, these are presented according to their questionnaire of derivation:

- a. Social Integration at school was assessed using the full, unmodified 8-item Social Integration subscale of the Quality of School Life questionnaire¹⁴. Response options were reduced from the original 4-choice to the standard 3-choice response format, and the total sum of items derived in place of an average of items used in previous research.
- b. Prosocial Behaviour and Psychopathology were assessed using the 25-item SDQ¹²¹³, which comprises four

psychopathology subscales (*Emotional Symptoms, Peer Relationship Problems, Conduct Problems, Hyperactivity-Inattention*), and a *Prosocial Behaviour* subscale. Items and response options were unmodified from the original scale, and the standard scoring metric applied: five items assessed each of the subscales, and *Total Difficulties* was computed by summing the 20 items from the four psychopathology subscales.

- c. Supportive Relationships at Home, at School, and in the Neighbourhood/Community were assessed using
 12 items (four per subscale) selected from the Healthy Kids Survey¹⁵. These items included those (three per subscale) used in the Middle Years Development Index¹⁶ [MDI] plus an additional item for each subscale.
 Item wordings were unmodified from the MDI, but the 4-choice rating scale and averaged total score were replaced.
- d. Sixteen items from four subscales in the Early Adolescent Temperament Questionnaire Revised (EATQ-R)¹⁷ assessed Attention (four items; selected from seven), Inhibitory Control (seven items; selected from 11), Perceptual Sensitivity (four items; selected from six), and Aggression (two items; selected from 11). The first three of these subscales comprise part of a measure of Effortful Control within the EATQ-R. Minor modifications to the wording of several items were made, and the original 5-point rating response scale and averaged total score replaced.
- e. **Empathy** was assessed using four items from the 12-item *Feeling and Thinking Instrument*¹⁸; item wording was unmodified, but the original 5-point rating response scale replaced.
- f. **Psychotic-like experiences** were assessed with nine items from the *Psychotic-Like Experiences Questionnaire for Children*^{8 19} (two with minor rewording from the original), with the original 3-choice response format retained.
- g. Dimensions of personality (*Extraversion, Neuroticism, Conscientiousness, Agreeableness, and Intellect/Openness*) were assessed using 25 items (five per dimension) modified from an unpublished 30item short-form of the 65-item *Big Five Questionnaire for Children* [BFQ-C²⁰] supplied by the author
 (Barbaranelli, personal communication). Items were reworded to simplify the translation from Italian to
 English. Following pilot testing in 2014, five of the 25 items were replaced with other candidates, adapted
 from the full BFQ-C, to improve psychometric properties. The original 5-point rating response scale was

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replaced.

- h. Self-esteem was measured with three unmodified items from the 7-item Self-Satisfaction subscale of the *Multidimensional Students' Life Satisfaction Scale*²¹. The original 4-choice response scale and averaged total score were replaced.
- i. **Daytime Sleepiness** was assessed with three items selected from the 8-item *Pediatric Daytime Sleepiness Scale*⁹, with minor rewording of items and replacement of the original 5-point response scale.
- j. Connection to Nature (or, children's engagement with the natural environment) was measured with three items; two were modified from the 7-item Enjoyment of Nature subscale of the Connection to Nature Index²² and one modified from the 14-item Connectedness to Nature Scale²³. The original 5-point rating scales of both measures were replaced.

FINDINGS TO DATE

Sample characteristics

A flow diagram summarising the stages of school and child recruitment is provided in Figure 1; this also details the reasons for non-participation of schools¹ and/or children in the MCS. Of the 2371 NSW schools with an eligible Year 6 student enrolment, 829 (35.0%) administered the MCS. These schools provided a total enrolment of 32 389 children who were invited to complete the MCS (representing 36.6% of Year 6 enrolments in NSW schools). Among these, 27 808 participated in the MCS (85.9% of invited children). Parent and child opt-outs totalled 4.3% of eligible children (the remaining 9.9% did not participate for other reasons detailed in Figure 1). The mean age of participating children was 11.5 years (SD 0.5); other demographic information on participants is summarised in Table 1. Average survey completion time was 16.5 minutes, with 90% of children completing within 7 to 50 minutes.

The representativeness of participating schools and children relative to the respective state population was estimated using publicly accessible national school-level data on enrolment and socio-demographic indices. Table 2 compares the demographic characteristics of all NSW schools and MCS participating schools, firstly as distributions of unweighted data, and secondly as distributions after weighting by Year 6 enrolment and number of MCS participants per school. The 829 schools that participated in the MCS were comparable on a

¹ The reasons for Principal opt-outs were not assessed systematically, but among those who volunteered this information, these were predominantly that the school was too busy to participate or already committed to other research participation.

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range of demographic indices to the total population of NSW schools with a Year 6 enrolment; all figures reported for the MCS participating schools (both unweighted data and weighted estimates) lie within ~2% of NSW rates.

Item responses and scale distributions

Table 3 summarises the distribution of children's responses on all MCS items, grouped according to the constructs they measured. Similar data, reported separately for girls and boys, is provided in Supplementary Table 1-X. The total number of children reporting each item ranged from a minimum of 26 853 (3.4% missing) to 27 735 (0.3% missing). An unknown portion of these missing responses related to data server capacity issues encountered early in the MCS administration period and resolved promptly by the IT contractor.

For each MCS construct, Table 4 (and Supplementary Table 2-X) provides descriptive statistics (including number of children providing complete data on the scale, means, standard deviations, minima and maxima), internal consistency coefficients (ordinal α coefficients²⁴), and scores corresponding to a range of percentiles in the sample distribution (i.e., 10th, 25th, 50th, 75th, 90th). These percentiles were adapted from those reported for the AEDC⁶ (where scores in the lowest 10th percentile were described as "developmentally vulnerable", between the 10th and 25th percentiles as "developmentally at risk", and between the 25th-50th and >50th percentiles as two bands of "developmentally on track" scores), with the 90th percentile added to accommodate the bi-directional orientation of MCS scales.

The total number of children providing complete scale data ranged from a minimum of 26 853 (3.4% missing) to a maximum of 27 733 (0.3% missing). On average, children in the sample scored in the range reflecting healthier or more developmentally mature functioning on each construct, but the population distribution spanned the full range of possible scores on every scale. For most scales, each of the specified percentiles was associated with a unique score on the scale even at the extremes (10th and 90th percentiles), indicating a lack of ceiling/floor effects in measurement. The ordinal α coefficients indicated adequate reliability for all MCS domains; for the two scales with the lowest α coefficients (Attention and Empathy), minor modifications to these scales² improved the coefficients, and these revised scales are also summarised in the

² For the Empathy construct, the 'alpha if item removed' value indicated improvement of the alpha coefficient following removal of one of the four items. For the Attention construct, alpha was improved by relocating an item from the Inhibitory Control scale that has been previously demonstrated to load with the Attention items in published factor

Tables.

Profile of mental health and wellbeing in the MCS cohort

High mean total scores on Social Integration, Prosocial Behaviour, Empathy, Attention, Inhibitory Control, and Self-esteem were indicative of healthier functioning or developmentally more mature capacities for the majority of children in the sample. High mean scores also indicated most children's access to Supportive Relationships at Home, School, and in the Community, and engagement with the natural environment (Connection to Nature). Low mean total scores on Peer Relationship Problems, Emotional Symptoms, Conduct Problems, Aggression, Hyperactivity-Inattention, Total Difficulties (psychopathology) and Daytime Sleepiness were further indicative of healthy functioning among the majority of children in the MCS cohort. Nonetheless, on all scales, there were children who displayed less healthy or developed functioning or lacked access to supports (e.g., 13.2% of children reported a lack of any supportive relationship with an adult in their community or neighbourhood).

Other scales in the MCS measured unusual thoughts or perceptual experiences that, although more prevalent in children with neurodevelopmental disorders and those who later develop adult psychiatric illness, are nonetheless common in child populations²⁵: a majority of children (52.2%) responded "Certainly True" to at least one of the nine PLE items, and the high mean total scores on Perceptual Sensitivity indicated that most children also reported sensitivity to slight, low-intensity stimulation in the environment. With respect to personality dimensions, on average, children produced higher scores on Extraversion, Conscientiousness, Agreeableness, and Openness/Intellect scales (reflecting a tendency to avoid endorsement of the "Not True" response), and lower scores on Neuroticism, relative to the scale range of each construct.

Pearson's correlation coefficients indicating the pattern, direction, and strength of associations (small 0.1; medium 0.3; large 0.5)²⁶ between the MCS scales are provided in Supplementary Table 3-X (with associations for girls and boys provided in Supplementary Table 4-X). Almost all constructs related significantly in this large sample, with almost half (45%) of the associations of medium or large magnitude.

<u>Comparison with published data</u>: Direct comparison of MCS responses with published data on the SDQ and PLE scales from general population samples was afforded by use of the original items, response options, and

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analysis of the full scale³². These modifications are indicated by ‡ in Table 3 (and Supplementary Table 1-X), and detail on the revised scales included in Table 4 (and Supplementary Table 2-X).

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scoring methods for these scales. Mean scores on Prosocial Behaviour and Conduct Problems aligned closely with Australian self-report SDQ norms published in 2005 by age and sex (based on a Victorian community sample of 553 children aged 11-17 years, including 292 children aged 11-13 years)²⁷; and were slightly greater in our sample for Total Difficulties, Emotional Symptoms, Peer Relationship Problems, and Hyperactivity-Inattention. This pattern of change in means over the decade between the 2005 study and ours appears consistent with the small, but significant, increases observed between 2007 and 2012 in the self-report subscale means for Total Difficulties, Emotional Symptoms, Peer Relationship Problems, and Hyperactivity-Inattention (but a decrease in Conduct Problems) in nationally-representative New Zealand samples of children aged 12-15 years²⁸, and with a similar increase in Emotional Symptoms and decrease in Conduct Problems between 2009 and 2014 in English community samples of children aged 11-13 years²⁹. The mean PLE score in the MCS sample aligned closely with that reported previously for a relatively deprived inner-city London, UK, community sample aged 9-12 years¹⁹ using these same nine items, though the overall prevalence of a "Certainly True" to at least one of the nine items in the MCS (52.2%) was lower than that obtained in the London sample (66.0%)⁸.

For the SDQ psychopathology scales, Table 5 (and Supplementary Table 5-X) indicates the proportions of children falling within the Normal (defined as ~80%), Borderline (~10%), and Abnormal (~10%) categories defined for the SDQ based on UK population norms, as well as the proportions of children scoring in each category of the more recent 4-level solution (Close to Average ~80%, Slightly Raised ~10%, High ~5%, Very High ~5%). Several departures from these figures are notable (e.g., 91% of children scored in the Normal range of the Prosocial Behaviour scale, and only 67% of children scored "Close to Average" on the Peer Relationship Problems scale); the application of the established scoring metrics derived on UK population samples may overestimate the prevalence of problems with peers and underestimate vulnerability on Prosocial Behaviour among Australian children aged approximately 11 years.

Capacity for direct comparison of MCS data with published data from similar large, general population samples was limited for the other scales owing to modification from the original response formats to a standard 3-choice format, adoption of a standard method of summed total scores for all scales, and by minor alterations to the wording of some items. Despite these modifications, consistencies with data from other

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developed nations were apparent: Children's reports of Social Integration at school were similar to those reported previously in primary school samples in Australia¹⁴ and Hong Kong^{30 31}; response patterns on the EATQ-R scales (Attention, Inhibitory Control, Perceptual Sensitivity, and Aggression) aligned with data from a community sample of 1,055 Dutch³² school students of similar age; and access to Supportive Relationships at Home, School, and in the Community was similar to that reported for a community sample of Canadian 4th-grade school children (~2 years younger than our sample)¹⁶. The pattern of responses on the Big5 personality constructs was also consistent with that reported for an Australian sample of 268 children aged 10-12 years³³ using the full 65-item version of the BFQ-C²⁰.

Sex differences: Supplementary Table 2-X provides the item responses and scale distributions separately for girls and boys, and the eta squared (η^2) estimate of the effect size of sex differences for each scale. Statistically significant differences between the scores of girls and boys were apparent on all scales, though the magnitude of these differences was small (sex effects on all scales accounted for $\leq 2\%$ of total variance, except for the small-to-medium effects, explaining 4% of total variance, on Prosocial Behaviour and Aggression). Across the domains, girls' mean scores were greater than those of boys' on Social Integration, Prosocial Behaviour, Supportive Relationships at Home, School, and in the Community, Empathy, Emotional Symptoms, Attention and Inhibitory Control, Perceptual Sensitivity and Psychotic-Like Experiences, Neuroticism, Conscientiousness, Agreeableness, Self-esteem, and Connection to Nature. Conversely, boys' mean scores were greater on Peer Relationship Problems, Conduct Problems and Aggression, Hyperactivity-Inattention, Total Difficulties (psychopathology), Extraversion, Openness/Intellect, and Daytime Sleepiness.

STRENGTHS AND LIMITATIONS

The major strengths of the MCS are twofold. Firstly, the MCS provides a comprehensive assessment of psychosocial and behavioural constructs reflecting mental health and wellbeing in a large sample of 27 808 children aged approximately 11 years (representing 31.4% of eligible NSW students), which is representative of the NSW population on a range of demographic variables (Table 2). Secondly, the MCS incorporated measures of both personal competencies and vulnerabilities, and the scores on every scale spanned the entire range of possible scores, providing capacity to examine patterns of both strength and vulnerability in the population. This also facilitates the identification of determinants of average mental health in the population (rather than

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focusing on the extreme ends of the distribution), which will provide important information to guide the development and implementation of universal mental health promotion programs alongside targeted approaches for vulnerable children³⁴. Data were collected by self-report, providing access to the child's own perspective on their experiences, which may be particularly important for phenomena that are less readily judged by other informants. Finally, an important strength of the MCS lies in being embedded within planned record linkages of the NSW-CDS⁵, incorporating intergenerational records on health, education, child protection, and justice contacts, and with the AEDC⁶ assessment of early childhood development at age 5 years. This will allow responses on the MCS to be interpreted in the context of longitudinal data that is subject to minimal selection bias and will permit investigation of multiple factors associated with outcomes of low prevalence, and/or of relevance to cultural, geographic, socio-economic or other sub-groups within the population.

A number of limitations of the MCS must be acknowledged. Despite the large sample obtained being representative of the population from which it was drawn, failure to obtain data from all individuals will have the consequence of limiting data available to the current and future record linkages conducted within the NSW-CDS framework. The MCS is further limited by a lack of parent- and/or teacher-reports to supplement children's self-report. Only moderate agreement is typical between child, parent, and teacher ratings of children's mental health and wellbeing, indicating that the ratings of informants are not interchangeable³⁵. Further, the MCS was limited in coverage both in terms of domains assessed and the number of items assessing each domain; these were constrained by the limited time available within schools for survey administration, lack of parent- and/or teacher-reports on additional aspects of children's experiences, and by the sensitivities associated with assessing domains perceived as potentially distressing for the child. For example, information on potentially important constructs such as bullying/victimisation experiences or physical health (including participation in health/leisure activities and nutrition) was not obtained. Similarly, our assessment of Aggression was limited to only two items, which do not capture the full complexity and multidimensional nature of this construct. And, while aspects of the cognitive control of emotions and behaviours were measured, no assessment of cognitive capacities was obtained; linkage of the MCS with education records on academic progress within the NSW-CDS will provide some index of these capacities. The lack of capacity to

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compare MCS data directly with published data from similar large, general population samples was limited for most scales owing to modification from the original response formats to a standard 3-choice format, adoption of a standard method of summed total scores for all scales, and by minor alterations to the wording of some items. On several scales, including the personality dimensions, the restriction of responses to three categories may have artificially reduced variability among participants, with <10% of children electing one of the three options on several items. Prior to MCS administration, psychometric testing of our English translation of the short-form Italian BFQ-C²⁰ measure of personality dimensions was conducted using the data obtained from 645 children during pilot testing of the survey in 2014, with subsequent revision of 5 of the 25 items assessing these dimensions in the MCS. A manuscript reporting the validity and reliability of this revised measure is currently being drafted for publication.

FUTURE PLANS

Further structural analysis of the MCS data is underway to derive the most psychometrically robust measures of each mental health and wellbeing domain. The multi-agency, intergenerational linkage of the MCS data with other health, education, child protection, justice, and AEDC records took place late in 2016. This will be used to elucidate patterns of risk and protection across early and middle child development, and also provide a foundation for future record linkages in the cohort that will track mental and physical health, social, and educational/occupational outcomes into adolescence and early adulthood. The record linkage will also incorporate data on the quality and extent of implementation of mental health promotion and early intervention programs in NSW schools, affording an opportunity to examine how delivery of such programs may modify individual pathways of social, emotional, and behavioural function between early and middle childhood. This work will assist in determining appropriate universal mental health promotion and targeted early intervention programs that can bolster strengths and mitigate risks in order to maximise healthy development.

COLLABORATION

Initial data analyses and publications on MCS and linked data will be generated primarily by the authors of this paper and other members of the Scientific Committee, named in the Acknowledgements section, who oversee the NSW Child Development Study (NSW-CDS). The research team is open to research collaborations

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with other scientists, within restrictions placed on the use of linked data according to strict privacy legislation; interested parties should contact the Lead Investigator of the NSW-CDS (Vaughan Carr: v.carr@unsw.edu.au) with their expressions of interest.

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FURTHER DETAILS

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Contributorship Statement

In line with the ICMJE authorship guidelines, KRL, ST, KD, SAB, MB, RKL, MS, AH, KMR, RS, FH, VJC, and MJG made substantial contributions to the conception or design of the work. Authors KRL, ST, KD, FH, VJC, and MJG made substantial contributions to the acquisition, analysis, and interpretation of the data. KRL, ST, KD, SAB, MB, RKL, MS, AH, KMR, RS, FH, VJC, and MJG contributed to the drafting of the manuscript, and/or revising of the manuscript. KRL, ST, KD, SAB, MB, RKL, MS, AH, KMR, RS, KD, SAB, MB, RKL, MS, AH, KMR, RS, FH, VJC, and MJG contributed to the drafting of the manuscript, and/or revising of the manuscript. KRL, ST, KD, SAB, MB, RKL, MS, AH, KMR, RS, FH, VJC, and MJG have given final approval of the version to be published, and agree to its accuracy.

Competing Interests

None declared.

Ethics Approval

Ethical approval was obtained from the University of New South Wales Human Research Ethics Committee (UNSW HREC reference HC14307) and the NSW Department of Education State Education Research Applications Process (reference 2015082); the use of opt-out consent procedures (for parents and children) was guided by the Australian National Health and Medical Research Council National Statement of Ethical Conduct in Human Research (chapter 2.3)³⁶, which specifies conditions under which these procedures are appropriate. Access to publicly available school-level data on enrolment and demographic indices for the 2371 eligible NSW schools (used to estimate the representativeness of participating schools and children) was acquired from the Australian Curriculum, Assessment and Reporting Authority under UNSW HREC approval (reference HC14348).

Data Sharing Statement

Strict privacy legislation places restrictions on the use of linked data; scientists interested in using the data in collaboration with the NSW-CDS Investigators should contact the Lead Investigator of the NSW-CDS (Vaughan Carr: <u>v.carr@unsw.edu.au</u>) with their expressions of interest.

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Table 1. Summary of selected demographic characteristics self-reported by the 27 808 children completing the Middle Childhood Survey (MCS)

/alence
(n)
(135)
(15 198)
(12 259)
(216)
(13 754)
(14 054)
(4187)
(9948)
(7718)
(5950)
(24 272)
(525)
(365)
(296)
(278)
(211)
(141)
(99)
(49)
(35)
(1532)
(695)
(1398)



Table 2. Demographic characteristics of MCS participating schools relative to all NSW schools with a Year 6student enrolment (unweighted and weighted by enrolment)

		Unweigh	nted aver	ages		Weighted	laverage	s*
Demographic Measure	NSW	schools	MCS	schools	NSW	schools	MCS	schools
	(n=	2371)	(n=	:829)	(wei	ighted)	(wei	ghted)
	%	(n)	%	(n)	%	(n)	%	(n)
School sector:								
Government	67.9	(1609)	67.1	(556)	67.4		66.6	
Non-Government	32.1	(762)	32.9	(273)	32.6		33.4	
Geographical Location:								
Metropolitan 🛛 🔪	59.9	(1421)	62.4	(517)	76.3		76.2	
Rural	37.7	(894)	35.8	(297)	23.1		23.3	
Remote	1.8	(43)	1.4	(12)	0.4		0.5	
Very Remote	0.5	(13)	0.4	(3)	0.1		0.1	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
ICSEA score	1007.7	(93.5)	1002.8	(92.4)	1033.2	(87.1)	1026.5	(84.1)
Socio-educational quartiles								
based on ICSEA (%):								
Lowest	28.8	(22.3)	29.6	(22.3)	23.5	(20.3)	24.6	(20.5)
Lower-Middle	24.3	(9.3)	24.6	(8.4)	22.9	(9.3)	23.6	(8.7)
Higher-Middle	23.4	(8.8)	23.5	(8.7)	24.7	(7.8)	24.9	(7.8)
Highest	23.5	(21.7)	22.4	(20.5)	29.0	(23.4)	26.9	(21.7)
Proportion LBOTE (%)	23.3	(27.3)	23.7	(27.4)	31.1	(30.3)	30.2	(30.1)
Proportion Indigenous (%)	9.1	(13.7) 🧹	9.5	(13.4)	6.0	(9.2)	6.3	(9.1)
Proportion Female (%)	48.6	(9.3)	48.8	(7.1)	48.5	(10.3)	48.7	(7.0)

<u>Note</u>: *To estimate the proportions of children in NSW and MCS schools described by each demographic measure, weighting was applied based on the number of Year 6 students (NSW schools) and MCS participants in each school (MCS schools); ICSEA = Index of Community Socio-Educational Advantage 2014 (this score is derived from a number of variables, including parental school and non-school education and occupation, the school's geographical location, and proportion of Indigenous students³⁷); LBOTE = Language Background Other Than English.

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Table 3. Summary of items measuring each mental health and well-being domain assessed within the Middle Childhood Survey (MCS) and, for each item, the number of children providing data (of the 27 808 who commenced the survey) and the distributions of the three response options

MCS Domain (and	Item	Sample	No	ot True	Some	what True	Certa	inly True
source measure)		(n)	%	(n)	%	(n)	%	(n)
Social Integration	My school is a place where							
(QSL)	I learn to get along with other people	26 859	3.0	(806)	26.8	(7189)	70.2	(18 864)
	Other students accept me as I am	26 856	6.6	(1769)	32.6	(8760)	60.8	(16 327)
	People trust me	26 856	4.1	(1100)	34.0	(9136)	61.9	(16 620)
	I am popular with other students	26 856	17.0	(4574)	45.1	(12 123)	37.8	(10 159)
	I know people think a lot of me	26 856	20.1	(5393)	50.5	(13 566)	29.4	(7897)
	I get on well with the other students in my class	26 855	3.4	(920)	33.3	(8933)	63.3	(17 002)
	People can depend on me	26 854	5.1	(1380)	35.5	(9542)	59.3	(15 932)
	Other students are very friendly	26 854	4.8	(1281)	37.5	(10 075)	57.7	(15 498)
Prosocial	I try to be nice to other people. I care about their feelings	27 494	1.3	(359)	22.6	(6224)	76.1	(20 911)
Behaviours (SDQ)	I usually share with others (e.g., CDs, games, food)	27 486	7.9	(2180)	45.9	(12 609)	46.2	(12 697)
	I am helpful if someone is hurt, upset or feeling ill 💦 🚫 📐	27 482	2.6	(728)	29.7	(8174)	67.6	(18 580)
	I am kind to younger children	27 478	2.1	(583)	15.2	(4177)	82.7	(22 718)
	I often volunteer to help others (parents, teachers, children)	27 474	6.0	(1653)	44.0	(12 096)	50.0	(13 725)
Peer Relationship	I would rather be alone than with people of my age	27 484	71.6	(19 667)	20.6	(5650)	7.9	(2167)
Problems (SDQ)	I have one good friend or more (R)	27 480	2.0	(544)	7.6	(2077)	90.5	(24 859)
	Other people my age generally like me (R)	27 480	6.4	(1745)	42.1	(11 576)	51.5	(14 159)
	Other children or young people pick on me or bully me	27 477	66.9	(18 387)	23.7	(6517)	9.4	(2573)
	I get along better with adults than with people my own age	27 474	52.8	(14 518)	36.7	(10 075)	10.5	(2 881)
Supportive Home	In my <u>home</u> , there is a parent or another adult							
Relationships	who listens to me when I have something to say	26 924	4.4	(1181)	30.3	(8147)	65.4	(17 596)
(HKS/MDI)	who I can talk to about my problems	26 922	8.2	(2212)	24.3	(6553)	67.4	(18 157)
	who wants me to do my best	26 928	1.6	(435)	12.0	(3220)	86.4	(23 273)
	who believes that I will be a success	26 922	3.4	(906)	20.0	(5382)	76.6	(20 634)
Supportive School	At my <u>school</u> , there is a teacher or another adult							
Relationships	who really cares about me	26 918	7.1	(1920)	34.4	(9265)	58.4	(15 733)
(HKS/MDI)	who listens to me when I have something to say	26 916	5.7	(1528)	31.5	(8466)	62.9	(16 922)
	who believes that I will be a success	26 917	5.7	(1536)	32.8	(8831)	61.5	(16 550)

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	who tells me when I've done a good job	26 915	3.8	(1017)	23.0	(6177)	73.3	(19 721)
Supportive	In my <u>neighbourhood/community</u> (NOT from your school or family), there is an							
Community	adult							
Relationships	who really cares about me	26 910	19.0	(5101)	35.5	(9540)	45.6	(12 269)
(HKS/MDI)	who listens to me when I have something to say	26 910	20.5	(5522)	37.2	(10 005)	42.3	(11 383)
	who believes that I will be a success	26 909	20.4	(5477)	35.9	(9673)	43.7	(11 759)
	who tells me when I've done a good job	26 909	19.3	(5186)	30.9	(8308)	49.9	(13 415)
Empathy (FTI)	I want to help people who get treated badly	27 117	3.5	(957)	27.7	(7500)	68.8	(18 660)
	I often feel worried about people that are not as lucky as me, and feel sorry for them	27 113	5.3	(1425)	34.4	(9337)	60.3	(16 351)
	I sometimes try to understand my friends better by pretending I am them [‡]	27 111	40.6	(11 003)	39.1	(10 591)	20.3	(5517)
	I think people can have different opinions about the same thing	27 108	2.1	(567)	21.8	(5919)	76.1	(20 622)
Emotional	I get a lot of headaches, stomach-aches or sickness	27 489	56.6	(15 552)	33.0	(9075)	10.4	(2862)
Symptoms (SDQ)	I worry a lot	27 484	40.4	(11 097)	41.1	(11 304)	18.5	(5083)
	I am often unhappy, depressed or tearful	27 480	72.8	(20 017)	21.2	(5817)	6.0	(1646)
	I am nervous in new situations. I easily lose confidence	27 479	36.9	(10 128)	44.4	(12 191)	18.8	(5160)
	I have many fears, I am easily scared	27 473	56.5	(15 517)	32.0	(8803)	11.5	(3153)
Conduct Problems	I get very angry and often lose my temper	27 485	62.1	(17 079)	26.7	(7350)	11.1	(3056)
(SDQ)	I usually do as I am told (R)	27 484	3.1	(863)	43.7	(12 011)	53.2	(14 610)
	I fight a lot. I can make other people do what I want	27 480	83.3	(22 896)	14.0	(3846)	2.7	(738)
	I am often accused of lying or cheating	27 478	62.6	(17 207)	26.5	(7278)	10.9	(2993)
	I take things that are not mine from home, school or elsewhere	27 474	88.3	(24 267)	9.6	(2636)	2.1	(571)
Aggression (EATQ-	If I get mad at someone, I might hit them*	27 484	65.6	(18 020)	25.4	(6975)	9.1	(2489)
R)			6					
	When I am angry, I throw or break things	27 472	79.8	(21 916)	14.6	(4022)	5.6	(1534)
Attention (EATQ-R)	I pay close attention when someone asks me to do something*	27 165	4.2	(1133)	46.3	(12 588)	49.5	(13 444)
	It is easy for me to really concentrate on homework problems	27 144	18.3	(4969)	47.4	(12 854)	34.3	(9321)
	When trying to study, I have difficulty tuning out background noise and concentrating (R)	27 120	26.3	(7146)	45.2	(12 260)	28.4	(7714)
Inhibitory Control	When I am excited, it's hard for me to wait my turn to speak* (R)	27 162	25.7	(6970)	44.2	(11 993)	30.2	(8199)
(EATQ-R)	When someone tells me to stop doing something, it is easy for me to stop ^{‡‡}	27 157	9.4	(2540)	47.6	(12 926)	43.0	(11 691)
	I often say the first thing that comes to mind* (R)	27 155	24.3	(6586)	52.0	(14 118)	23.8	(6451)
	It's hard for me not to open presents before I'm supposed to (R)	27 149	43.6	(11 827)	30.6	(8302)	25.9	(7020)
	When I am having a good time I find it hard to go home* (R)	27 144	14.6	(3955)	33.5	(9086)	52.0	(14 103)

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	I often call out answers before the teacher calls my name* (R)	27 133	54.8	(14 873)	33.4	(9059)	11.8	(3201)
	The more I try to stop myself from doing something I shouldn't, the more likely I am to do it (R)	27 127	51.4	(13 938)	36.8	(9994)	11.8	(3195)
Hyperactivity /	I am restless, I cannot stay still for long	27 490	32.8	(9024)	41.2	(11 317)	26.0	(7149)
Inattention (SDQ)	I am constantly fidgeting or squirming	27 481	52.7	(14 478)	34.0	(9335)	13.3	(3668)
	I am easily distracted, I find it difficult to concentrate	27 479	39.5	(10 846)	42.5	(11 676)	18.0	(4957)
	I think before I do things (R)	27 474	7.6	(2087)	52.7	(14 466)	39.8	(10 921)
	I finish the work I'm doing. My attention is good (R)	27 472	5.9	(1610)	48.2	(13 232)	46.0	(12 630)
Perceptual	I am very aware of noises	27 157	11.0	(2988)	40.8	(11 071)	48.2	(13 098)
Sensitivity (EATQ-	I notice even little changes taking place around me, like lights getting brighter in a	27 153	14.2	(3853)	39.4	(10 696)	46.4	(12 604)
R)	room							
	I tend to notice little changes that other people do not notice	27 140	13.0	(3533)	49.2	(13 360)	37.8	(10 247)
	I can tell if another person is angry by their expression	27 138	2.9	(774)	28.2	(7644)	69.0	(18 720)
Psychotic-Like	Have you ever							
Experiences	believed that other people could read your thoughts?*	27 000	54.2	(14 642)	33.5	(9048)	12.3	(3310)
(PLEQ-C)	believed that you were being sent special messages through the television?	26 993	69.5	(18 773)	22.0	(5947)	8.4	(2273)
	thought that you were being followed or spied upon?	26 992	43.0	(11 601)	34.2	(9229)	22.8	(6162)
	heard voices that other people could not hear?	26 990	42.9	(11 567)	30.5	(8227)	26.7	(7196)
	felt that you were under the control of some special power?	26 990	70.4	(19 012)	19.3	(5221)	10.2	(2757)
	known what another person was thinking even though that person wasn't speaking?	26 983	42.0	(11 345)	38.3	(10 330)	19.7	(5308)
	felt as though your body had been changed in some way that you could not understand?	26 976	55.2	(14 879)	30.7	(8290)	14.1	(3807)
	felt that you had special powers that other people don't have?*	26 976	62.0	(16 732)	23.4	(6314)	14.6	(3930)
	seen something or someone that other people could not see?	26 976	48.0	(12 949)	27.8	(7489)	24.2	(6538)
Agreeableness	I am friendly to others in my school*	27 735	0.7	(185)	22.5	(6238)	76.8	(21 312)
(BFQ-C)	I forgive others when they do something wrong*	27 734	3.2	(898)	38.3	(10 619)	58.5	(16 217)
	I am kind even to people I don't like*	27 422	10.4	(2853)	49.6	(13 615)	39.9	(10 954)
	I think other people are good and honest	27 416	4.9	(1354)	55.7	(15 269)	39.4	(10 793)
	I like to let other people use my things*	27 415	7.7	(2121)	49.7	(13 614)	42.6	(11 680)
Conscientiousness	I check my work to make sure it is right*	27 734	7.6	(2118)	48.3	(13 395)	44.1	(12 221)
(BFQ-C)	I like to be on time*	27 733	4.7	(1301)	29.0	(8051)	66.3	(18 381)
	I keep my room neat and tidy*	27 427	16.8	(4596)	49.1	(13 476)	34.1	(9355)
	I like to keep my things in order*	27 426	11.5	(3153)	40.7	(11 151)	47.8	(13 122)

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	I am messy* (R)	27 421	49.6	(13 591)	39.0	(10 687)	11.5	(3143)
Neuroticism	I get nervous about many things*	27 734	24.0	(6649)	53.7	(14 895)	22.3	(6190)
(BFQ-C)	I have bad moods*	27 734	24.0	(6662)	51.1	(14 177)	24.9	(6895)
	I get angry easily*	27 734	51.6	(14 314)	34.1	(9446)	14.3	(3974)
	I get upset easily*	27 733	54.6	(15 134)	34.2	(9473)	11.3	(3126)
	I cry a lot*	27 733	75.4	(20 901)	19.7	(5469)	4.9	(1363)
Extraversion	I am happy and active*	27 735	1.0	(289)	25.2	(6999)	73.7	(20 447)
(BFQ-C)	I like to be with other people*	27 734	2.0	(556)	20.8	(5772)	77.2	(21 406)
	I like to talk with others	27 428	1.6	(443)	19.5	(5358)	78.9	(21 627)
	I make friends easily*	27 419	8.5	(2325)	38.0	(10 426)	53.5	(14 668)
	I am a shy person* (R)	27 419	47.1	(12 928)	39.0	(10 696)	13.8	(3795)
Intellect/	I easily learn my school work*	27 735	4.2	(1171)	51.1	(14 177)	44.7	(12 387)
Openness	I know many things	27 735	3.3	(919)	46.2	(12 812)	50.5	(14 004)
(BFQ-C)	I know the answers to questions my teacher asks*	27 734	3.3	(907)	71.4	(19 808)	25.3	(7019)
	I understand my school work*	27 733	2.7	(762)	45.4	(12 588)	51.9	(14 383)
	I like learning new things	27 415	3.2	(865)	26.3	(7223)	70.5	(19 327)
Self-esteem	There are lots of things I can do well	27 174	2.3	(629)	32.1	(8726)	65.6	(17 819)
(MSLSS)	I like myself	27 171	6.0	(1622)	28.5	(7745)	65.5	(17 804)
	I am a nice person	27 169	1.4	(369)	29.6	(8033)	69.1	(18 767)
Daytime Sleepiness	I fall asleep or get drowsy during class*	27 106	59.5	(16 120)	30.4	(8248)	10.1	(2738)
(PDSS)	I am tired and grumpy during the day*	27 105	65.8	(17 833)	28.6	(7754)	5.6	(1518)
	I am usually alert most of the day* (R)	27 104	9.1	(2475)	45.3	(12 282)	45.6	(12 347)
Connection to	When I feel sad, I like to go outside and enjoy nature	27 103	19.8	(5361)	41.9	(11 345)	38.4	(10 397)
Nature	Being in nature makes me feel peaceful*	27 102	10.1	(2729)	38.1	(10 335)	51.8	(14 038)
(CTNI/CTNS)	I feel strongly connected with nature*	27 101	21.5	(5825)	45.0	(12 207)	33.5	(9069)

Note: (R) denotes an item that was subsequently reversed in the computation of domain scores; *denotes item with minor wording change from original scale; ^{*}denotes item removed from the modified Empathy scale (3 items) and ^{**}reassigned from the modified Inhibitory Control (6 items) to the modified Attention scale (4 items). QSL = Quality of School Life; SDQ = Strengths and Difficulties Questionnaire; HKS/MDI = Healthy Kids Scale/Middle Years Development Index; FTI = Feeling and Thinking Index; EATQ-R = Early Adolescent Temperament Questionnaire – Revised; PLEQ-C = Psychotic-Like Experiences Questionnaire for Children; BFQ-C = short form of the Big Five Questionnaire for Children; MSLSS = Multidimensional Students' Life Satisfaction Scale; PDSS= Pediatric Daytime Sleepiness Scale; CTNI/CTNS = Connection to Nature Index/Connectedness to Nature Scale.

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Table 4. Descriptive statistics (number of children providing complete data on the subscale, means, standard deviations, minima and maxima), internal consistency coefficients (ordinal α), and scores corresponding to a range of percentiles in the sample distribution for each mental health and wellbeing domain assessed within the Middle Childhood Survey (MCS)

MCS Domain (number of items in subscale)	Source	Sample	Mean	SD	Minima	Maxima	Ordinal	al Scores corresponding to percen					
	Measure	(n)					α	10th	25th	50th	75th	90th	
Social Integration (8 items)	QSL	26 853	11.76	3.38	0	16	.91	7	9	12	14	16	
Prosocial Behaviour (5 items)	SDQ	27 474	8.03	1.73	0	10	.78	6	7#	8	9	10	
Peer Relationship Problems (5 items)	SDQ	27 474	2.03	1.78	0	10	.69	0	1	2	3#	4	
Supportive Home Relationships (4 items)	hks/mdi	26 922	6.78	1.64	0	8	.88	4	6	8	8	8	
Supportive School Relationships (4 items)	HKS/MDI	26 915	6.34	1.92	0	8	.91	4	5	7	8	8	
Supportive Community Relationships (4 items)	HKS/MDI	26 909	5.02	2.76	0	8	.96	0	4	5	8	8	
Empathy (4 items)	FTI	27 108	5.74	1.48	0	8	.60	4	5	6	7	8	
Empathy (3 items)*	FTI	27 108	4.94	1.20	0	6	.70	3	4	5	6	6	
Emotional Symptoms (5 items)	SDQ	27 473	3.02	2.31	0	10	.79	0	1	3	4#	6	
Conduct Problems (5 items)	SDQ	27 474	1.80	1.80	0	10	.80	0	0	1	3#	4	
Aggression (2 items)	EATQ-R	27 472	0.69	1.04	0	4	.81	0	0	0	1	2	
Attention (3 items)	EATQ-R	27 120	3.59	1.42	0	6	.57	2	3	4	5	6	
Attention (4 items)*	EATQ-R	27 120	4.93	1.78	0	8	.67	3	4	5	6	7	
Inhibitory Control (7 items)	EATQ-R	27 127	7.93	2.94	0	14	.76	4	6	8	10	12	
Inhibitory Control (6 items)*	EATQ-R	27 127	6.59	2.68	0	12	.75	3	5	7	9	10	
Hyperactivity-Inattention (5 items)	SDQ	27 472	3.60	2.37	0	10	.77	0	2	3	5#	7	
Total Difficulties [Psychopathology] (20 items)	SDQ	27 472	10.45	6.07	0	40	.88	3	6	10	14#	19	
Perceptual Sensitivity (4 items)	EATQ-R	27 138	5.60	1.77	0	8	.71	3	4	6	7	8	
Psychotic-like experiences (9 items)	PLEQ-C	26 976	5.66	4.46	0	18	.90	0	2	5	9	12	
Extraversion (5 items)	BFQ-C	27 419	8.03	1.76	0	10	.76	6	7	8	9	10	
Neuroticism (5 items)	BFQ-C	27 733	3.48	2.28	0	10	.80	1	2	3	5	7	
Conscientiousness (5 items)	BFQ-C	27 421	6.90	2.20	0	10	.78	4	5	7	9	10	
Agreeableness (5 items)	BFQ-C	27 415	7.30	1.86	0	10	.77	5	6	7	9	10	
Intellect/Openness (5 items)	BFQ-C	27 415	7.27	1.91	0	10	.85	5	6	7	9	10	
Self-esteem (3 items)	MSLSS	27 169	4.91	1.19	0	6	.70	3	4	5	6	6	
Daytime Sleepiness (3 items)	PDSS	27 104	1.54	1.37	0	6	.64	0	0	1	2	3	
Connection to Nature (3 items)	CTNI/CTNS	27 101	3.72	1.81	0	6	.88	1	3	4	5	6	

Note: QSL = Quality of School Life; SDQ = Strengths and Difficulties Questionnaire; HKS/MDI = Healthy Kids Scale/Middle Years Development Index; FTI = Feeling and Thinking Index; EATQ-R = Early Adolescent Temperament Questionnaire – Revised; PLEQ-C = Psychotic-Like Experiences Questionnaire for Children; BFQ-C =

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.dimen. .cure Scale.* Ino. .es, scores corresponding. .cale represents the sum of items on the . .ention). short form of the Big Five Questionnaire for Children; MSLSS = Multidimensional Students' Life Satisfaction Scale; PDSS= Pediatric Daytime Sleepiness Scale; CTNI/CTNS = Connection to Nature Index/Connectedness to Nature Scale.* Indicates the revised version of the scale with modified number of items (see Footnote 1); [#]For the Strengths and Difficulties Questionnaire subscales, scores corresponding to the 80th percentile (i.e., equating to the cut-off describing a "Borderline" rating) were: Emotional Symptoms = 5; Peer Relationship Problems = 3; Conduct Problems = 3; Hyperactivity-Inattention = 6; Prosocial Behaviour (20th percentile) = 7; and Total Difficulties = 16. The Total Difficulties scale represents the sum of items on the four psychopathology scales (Emotional Symptoms, Peer Relationship Problems, Conduct Problems, Hyperactivity-Inattention).

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Table 5. Distribution of the Strengths and Difficulties Questionnaire (SDQ) categories on each subscale as defined by the traditional 3-level and more recent 4-level solutions

SDQ subscale	Sample	N	ormal	Bor	derline	Abn	ormal		
	(n)	%	(n)	%	(n)	%	(n)		
Emotional Symptoms	27 473	84.6	(23 233)	6.5	(1778)	9.0	(2462)		
Peer Relationship Problems	27 474	81.2	(22 318)	13.8	(3789)	5.0	(1367)		
Conduct Problems	27 474	83.2	(22 870)	7.7	(2125)	9.0	(2479)		
Hyperactivity-Inattention	27 472	78.0	(21 416)	9.5	(2613)	12.5	(3443)		
Prosocial Behaviour	27 474	90.7	(24 908)	5.6	(1543)	3.7	(1023)		
Total Difficulties	27 472	79.9	(21 943)	11.6	(3180)	8.6	(2349)		
SDO subscale	Sample	Close	to Average	Slight	ly Raised	н	iσh	Vor	/ High
	o a mpi c	CIUSE	to Average	Singin	iy naisea		BII	ver	
	(n)	%	(n)	%	(n)	%	(n)	%	(n)
Emotional Symptoms	(n) 27 473	% 75.2	(n) (20 659)	9.4	(n) (2574)	% 6.5	(n) (1778)	% 9.0	(n) (2462)
Emotional Symptoms Peer Relationship Problems	(n) 27 473 27 474	75.2 66.9	(n) (20 659) (18 368)	9.4 14.4	(n) (2574) (3950)	% 6.5 8.9	(n) (1778) (2445)	% 9.0 9.9	(n) (2462) (2711)
Emotional Symptoms Peer Relationship Problems Conduct Problems	(n) 27 473 27 474 27 474	75.2 66.9 83.2	(n) (20 659) (18 368) (22 870)	9.4 14.4 7.7	(n) (2574) (3950) (2125)	% 6.5 8.9 4.6	(n) (1778) (2445) (1258)	% 9.0 9.9 4.4	(n) (2462) (2711) (1221)
Emotional Symptoms Peer Relationship Problems Conduct Problems Hyperactivity-Inattention	(n) 27 473 27 474 27 474 27 472	% 75.2 66.9 83.2 78.0	(n) (20 659) (18 368) (22 870) (21 416)	9.4 9.4 14.4 7.7 9.5	(n) (2574) (3950) (2125) (2613)	% 6.5 8.9 4.6 6.2	(1778) (2445) (1258) (1713)	% 9.0 9.9 4.4 6.3	(n) (2462) (2711) (1221) (1730)
Emotional Symptoms Peer Relationship Problems Conduct Problems Hyperactivity-Inattention Prosocial Behaviour [#]	(n) 27 473 27 474 27 474 27 472 27 472 27 474	% 75.2 66.9 83.2 78.0 90.7	(n) (20 659) (18 368) (22 870) (21 416) (24 908)	9.4 9.4 14.4 7.7 9.5 5.6	(n) (2574) (3950) (2125) (2613) (1543)	% 6.5 8.9 4.6 6.2 2.3	(1778) (2445) (1258) (1713) (633)	% 9.0 9.9 4.4 6.3 1.4	(n) (2462) (2711) (1221) (1730) (390)

Note: [#]For the Prosocial Behaviour subscale, the 4-level classification labels are instead "Close to Average",

"Slightly Lowered", "Low", and "Very Low".

NSW schools with Year 6 student enrolment in 2015 (n=2371; representing 88 572 children) SCHOOL RECRUITMENT Non-participating schools (n=1482; 62.5%) - Principal opted out (n=792; 33.4%) - No response received (n=682; 28.8%) Invitation not sent (n=8; 0.3%) Principal accepted invitation for school to participate (n=889; 37.5%) School did not complete MCS administration (n=60; 2.5%) School administered MCS (n=829, 35.0%; representing 32 389 children, 36.6%) CHILD RECRUITMENT Child did not participate in MCS (n=4581: 14.1% of invited children): Parent opt-out received (n=573; 1.8%) - Child opt-out received (n=816; 2.5%) - Other reasons (e.g., absence from or left school; survey access failure due to data server capacity limitations; n=3192; 9.9%) Children participated in MCS (n=27 808, 85.9% of invited children commenced survey [31.4% of Year 6 children in NSW schools]; complete data available from n=26 854 children, 82.9%)



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Supplementary Table 1-X: Prevalence of the three responses by girls and boys on the items measuring each domain assessed within the Middle Childhood Survey (MCS).

Supplementary Table 2-X. Descriptive statistics for girls and boys (number providing complete data on the subscale, means, standard deviations, minima and maxima), internal consistency coefficients (ordinal α), and scores corresponding to a range of percentiles in the sample distribution for each domain assessed within the Middle Childhood Survey (MCS).

Supplementary Table 3-X. Direction and magnitude of the bivariate associations between each domain assessed within the Middle Childhood Survey (small effects shaded in green; medium in orange; large in red; and non-significant associations in grey).

Supplementary Table 4-X. Direction and magnitude of the bivariate associations between each domain assessed within the Middle Childhood Survey for girls (upper diagonal) and boys (lower diagonal; small effects shaded in green; medium in orange; large in red; and non-significant associations in grey).

Supplementary Table 5-X. Prevalence of the Strengths and Difficulties Questionnaire (SDQ) categories on each subscale for girls and boys, as defined by the traditional 3-level and more recent 4-level solutions.



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S	Supplementary Table 1-X. Distributions of the three responses by girls and boys on the items measuring each don	าลเลื่อ	as Sessed within the Middle Childhood
c	Survey (MCS)	Ţ,	7
-		, E	01

			Girts			Boys	
MCS Domain	Item	Not	Somew at 9	Certainly	Not	Somewhat	Certainly
		True	Trueថ្មី ໄ	3 True	True	True	True
		%	% и по	%	%	%	%
Social Integration	My school is a place where		ne nse es i				
	I learn to get along with other people	2.5	24.8 g	72.5	3.5	28.6	67.9
	Other students accept me as I am	7.0	31.6	61.1	6.1	33.4	60.5
	People trust me	3.4	31.5 n	65.3	4.8	36.7	58.5
	I am popular with other students	19.2	46. X	34.4	14.9	43.9	41.2
	I know people think a lot of me	20.4	50.82 eria	29.0	19.8	50.4	29.8
	I get on well with the other students in my class	3.2	31. g e r	65.0	3.7	34.6	61.7
	People can depend on me	4.1	31. a (200	64.2	6.1	39.4	54.5
	Other students are very friendly	4.8	37.	57.5	4.8	37.4	57.9
Prosocial	I try to be nice to other people. I care about their feelings	0.8	15 1 5	83.8	1.8	29.7	68.5
Behaviours	I usually share with others (e.g., CDs, games, food) 🧹 🦲	6.1	44. ž	49.2	9.8	47.0	43.2
	I am helpful if someone is hurt, upset or feeling ill	1.7	22.5	75.6	3.6	36.6	59.8
	I am kind to younger children	1.7	12. 3 .	86.0	2.5	18.1	79.4
	I often volunteer to help others (parents, teachers, children)	4.0	39.9	56.9	8.0	48.9	43.1
Peer Relationship	I would rather be alone than with people of my age	72.6	20.	7.4	70.5	21.2	8.3
Problems	I have one good friend or more (R)	1.9	8. 31	90.1	2.1	7.1	90.9
	Other people my age generally like me (R)	6.2	41.5	52.0	6.5	42.4	51.1
	Other children or young people pick on me or bully me	65.9	24.7	9.4	67.9	22.7	9.3
	I get along better with adults than with people my own age	54.6	36.	9.4	51.1	37.3	11.6
Supportive Home	In my <u>home</u> , there is a parent or another adult			3			
Relationships	who listens to me when I have something to say	4.4	29.8	66.3	4.4	31.2	64.4
	who I can talk to about my problems	8.0	23.0	69.0	8.5	25.6	65.9
	who wants me to do my best	1.1	10.2 G	88.7	2.2	13.7	84.2
	who believes that I will be a success	3.1	18.8	78.1	3.6	21.2	75.2
Supportive School	At my school, there is a teacher or another adult			-			
Relationships	who really cares about me	5.5	31.8	62.6	8.7	37.0	54.3
	who listens to me when I have something to say	3.0	20.2	76.8	6.5	34.0	59.6
	who believes that I will be a success	4.9	28.9	66.2	6.6	35.2	58.3
	who tells me when I've done a good job	3.0	20.2	76.8	4.6	25.7	69.8
			9	-			

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Supportive	In my neighbourhood/community (NOT from your school or family), there is		rigt				
Community	an adult		7-0 1t, i				
, Relationships	who really cares about me	17.6	33.0 52	48.6	20.3	37.1	42.6
	who listens to me when I have something to say	20.1	35.44	44.0	21.0	38.4	40.6
	who believes that I will be a success	20.0	34. 4 N	45.5	20.7	37.4	41.9
	who tells me when I've done a good job	18.5	29.82 ²³	51.7	20.0	31.9	48.0
Empathy	I want to help people who get treated badly	2.4	22.00 m	75.6	4.6	33.2	62.2
	I often feel worried about people that are not as lucky as me, and feel sorry for them	3.4	30.eignei 30.eignei	66.1	7.1	38.3	54.6
	I sometimes try to understand my friends better by pretending I am them [‡]	39.5	38. gr er D	21.6	41.6	39.2	19.1
	I think people can have different opinions about the same thing	1.3	18. # s	80.3	2.9	25.2	71.9
Emotional	I get a lot of headaches, stomach-aches or sickness	53.5	34.83 pe	11.6	59.6	31.2	9.2
Symptoms	I worry a lot	35.3	43.00 High	21.7	45.4	39.3	15.3
	I am often unhappy, depressed or tearful	71.0	22.mat.	6.7	74.6	20.0	5.3
	I am nervous in new situations. I easily lose confidence	32.1		22.1	41.5	43.0	15.5
	I have many fears, I am easily scared	49.4	36.	14.5	63.4	28.1	8.5
Conduct Problems	I get very angry and often lose my temper	65.7	25.0	9.3	58.7	28.4	12.9
	I usually do as I am told (R)	2.5	38. 🛓 🂆	58.7	3.8	48.6	47.7
	I fight a lot. I can make other people do what I want	85.2	12.5 P	2.3	81.4	15.5	3.1
	I am often accused of lying or cheating	69.7	22 🙇 🛓	8.0	55.6	30.6	13.8
	I take things that are not mine from home, school or elsewhere	90.7	7. g	1.6	86.0	11.4	2.5
Aggression	If I get mad at someone, I might hit them*	75.7	18.5	5.8	55.6	32.2	12.2
	When I am angry, I throw or break things	84.5	11. 8 . 9	4.0	75.1	17.7	7.2
Attention	I pay close attention when someone asks me to do something*	3.6	43.00 Lu	52.8	4.7	49.1	46.2
	It is easy for me to really concentrate on homework problems	16.3	47.8 e	36.0	20.3	47.0	32.7
	When trying to study, I have difficulty tuning out background noise and concentrating (R)	26.5	45. og i 45.logi	28.3	26.2	45.1	28.6
Inhibitory Control	When I am excited, it's hard for me to wait my turn to speak* (R)	26.6	43. 9 ຊ	29.9	24.7	44.8	30.4
	When someone tells me to stop doing something, it is easy for me to stop ^{‡‡}	8.2	44.7 🎍	47.2	10.5	50.5	39.0
	I often say the first thing that comes to mind* (R)	24.6	53.1 S	22.3	23.9	50.9	25.2
	It's hard for me not to open presents before I'm supposed to (R)	42.6	31.7 👼	25.7	44.5	29.5	26.0
	When I am having a good time I find it hard to go home* (R)	12.5	33.3	54.2	16.6	33.6	49.8
	I often call out answers before the teacher calls my name* (R)	65.3	27.4 ဋິ	7.3	44.5	39.3	16.2
	The more I try to stop myself from doing something I shouldn't, the more likely I am to do it (R)	56.1	33.7 ^{ap} hiq	10.2	46.8	39.9	13.3

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Hyperactivity /	I am restless, I cannot stay still for long	35.5	40.9	23.8	30.2	41.6	28.2
Inattention	I am constantly fidgeting or squirming	54.7	33. 2 . 0	12.1	50.7	34.7	14.6
	I am easily distracted, I find it difficult to concentrate	43.7	40. 5	15.7	35.3	44.4	20.3
	I think before I do things (R)	5.6	50.5	44.3	9.6	55.2	35.3
	I finish the work I'm doing. My attention is good (R)	4.8	45.3	49.9	6.9	51.0	42.1
Perceptual	I am very aware of noises	10.5	42.8	46.7	11.5	38.8	49.8
Sensitivity	I notice even little changes taking place around me, like lights getting brighter in a room	13.5	40.53 rel 40.53 rel	46.5	14.9	38.8	46.3
	I tend to notice little changes that other people do not notice	12.5	49.99 ner 7.	37.6	13.6	48.6	37.9
	I can tell if another person is angry by their expression	2.4		70.6	3.3	29.3	67.3
Psychotic-Like	Have you ever		tey fe				
Experiences	believed that other people could read your thoughts?*	49.4	37.au bad	13.4	59.0	29.9	11.1
	believed that you were being sent special messages through the television?	70.8	ed from 21.data	7.9	68.3	22.7	9.0
	thought that you were being followed or spied upon?	39.7	34.9	25.4	46.3	33.5	20.2
	heard voices that other people could not hear?	41.9	30.3	27.3	43.8	30.2	26.0
	felt that you were under the control of some special power?	70.6	19.5	10.1	70.3	19.4	10.3
	known what another person was thinking even though that person wasn't speaking?	39.3	39.4 njopen	21.0	44.8	36.9	18.3
	felt as though your body had been changed in some way that you could not understand?	56.0	30 gg, an io	14.0	54.3	31.5	14.2
	felt that you had special powers that other people don't have?*	63.4	22. a	14.2	60.7	24.4	15.0
	seen something or someone that other people could not see?	47.9	27. 🗿 🤤	24.3	48.1	27.8	24.1
Agreeableness	I am friendly to others in my school*	0.5	17.8 C	81.9	0.8	27.3	71.9
	I forgive others when they do something wrong*	2.2	35. g P	62.5	4.3	41.2	54.5
	I am kind even to people I don't like*	7.0	44.10 ,1	48.6	13.7	54.8	31.4
	I think other people are good and honest	4.7	56.00 20	39.1	5.2	55.2	39.6
	I like to let other people use my things*	7.0	48. 8 a	44.6	8.4	50.9	40.7
Conscientiousness	I check my work to make sure it is right*	5.4	44.7	50.0	9.9	51.8	38.3
	I like to be on time*	3.9	28.2 B	67.8	5.5	29.8	64.7
	I keep my room neat and tidy*	14.0	49.3 <mark>e</mark>	36.7	19.5	48.9	31.6
	I like to keep my things in order*	9.0	38.5 b	52.5	13.9	42.8	43.2
	Lam messy* (R)	51.7	383 🦉	10.0	47 5	39.6	12.9

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			<u> </u>				
Neuroticism	I get nervous about many things*	20.7	53: 9	25.3	27.2	53.5	19.4
	I have bad moods*	24.7	51.2 .	24.1	23.4	51.0	25.6
	I get angry easily*	53.6	33. 🗗 🕺	12.7	49.6	34.4	15.9
	I get upset easily*	49.9	37.5	13.0	59.1	31.2	9.6
	l cry a lot*	69.6	23.5 ×	6.7	81.0	15.9	3.2
Extraversion	I am happy and active*	0.8	<u>عامیہ</u> 24.	74.5	1.3	25.7	73.0
	I like to be with other people*	1.9	20.9 Sing	78.2	2.1	21.7	76.2
	I like to talk with others	1.4	18. 5 6 8	80.1	1.8	20.6	77.6
	I make friends easily*	8.9	39. a nen 17	52.1	8.1	37.0	54.9
	I am a shy person* (R)	42.2	42.8 9 9	15.8	52.0	36.1	11.9
Intellect/Openness	I easily learn my school work*	3.6	50.6 S	46.1	4.8	51.9	43.3
	I know many things	3.1	50. ឆ្នាំ ចុ រស្ត័	46.3	3.5	41.9	54.6
	I know the answers to questions my teacher asks*	2.8	73.8 E	23.4	3.7	69.1	27.2
	I understand my school work*	2.4	47.8 G	50.6	3.1	43.8	53.1
	I like learning new things	2.7	26. <u>8</u> 8	70.7	3.6	26.1	70.3
Self-esteem	There are lots of things I can do well	2.4	35.30	62.1	2.2	28.8	69.0
	I like myself	6.9	30.9	62.2	5.0	26.1	68.8
	I am a nice person	1.0	25.8	73.2	1.7	33.3	65.0
Daytime Sleepiness	I fall asleep or get drowsy during class*	62.3	29.3	8.3	56.7	31.5	11.8
	I am tired and grumpy during the day*	67.4	27 🧔 🟅	4.9	64.2	29.5	6.3
	I am usually alert most of the day* (R)	9.0	46.9	44.1	9.2	43.8	47.0
Connection to	When I feel sad, I like to go outside and enjoy nature	17.1	42.	40.7	22.4	41.6	36.0
Nature	Being in nature makes me feel peaceful*	7.7	36.	56.3	12.4	40.2	47.4
	I feel strongly connected with nature*	19.4	45.4	35.5	23.6	45.0	31.4

Note: (R) denotes an item that was subsequently reversed in the computation of domain scores; *denotes item with miner wording change from original scale; Note: (R) denotes an item that was subsequently reversed in the computation of domain scores; *denotes item with fining, wording change from original scale; [†]denotes item removed from the modified Empathy scale (3 items) and ^{‡†}reassigned from the modified Inhibitory Control (6 items) to the modified Attention scale (4 items).

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Supplementary Table 2-X. Descriptive statistics for girls and boys (number providing complete data on the subscale, \dot{g} in \dot{g} in \dot{g} is \dot{g} , standard deviations, minima and maxima), eta squared estimates of the effect size of sex differences, internal consistency coefficients (ordinal α), and score score sponding to a range of percentiles in the sample distribution for each domain assessed within the Middle Childhood Survey (MCS).

MCS Domain (number of items in subscale)		Sample	Mean	SD	Minima	Maxima	η²	Ordinal	Sacores	correspo	nding to	percent	iles:
		(n)					-	αÖr	a 0th	25th	50th	75th	90th
Social Integration (8 items)	Girls:	13 355	11.84	3.31	0	16	<0.01	.90 se	Jun 7	10	13	14	16
	Boys:	13 498	11.68	3.45	0	16		.91 🖌	0 0 0 7	9	12	15	16
Prosocial Behaviour (5 items)	Girls:	13 622	8.37	1.55	0	10	0.04	.77 a	6	8#	9	10	10
	Boys:	13 852	7.68	1.82	0	10		.77 🗳	<u>5</u>	7#	8	9	10
Peer Relationship Problems (5 items)	Girls:	13 622	1.99	1.79	0	10	<0.01	.71 🧧		1	2	3#	4
	Boys:	13 852	2.06	1.77	0	10		.68 🗙		1	2	3#	4
Supportive Home Relationships (4 items)	Girls:	13 380	6.86	1.58	0	8	<0.01	.87 🗿	a 4	6	8	8	8
	Boys:	13 542	6.71	1.69	0	8		.88 0	± 1 = 4	6	7	8	8
Supportive School Relationships (4 items)	Girls:	13 374	6.52	1.83	0	8	<0.01	.91 ត		5	7	8	8
	Boys:	13 541	6.16	1.98	0	8		.90 ⊒ .¦		5	7	8	8
Supportive Community Relationships (4 items)	Girls:	13 370	5.14	2.76	0	8	<0.01	.96		4	6	8	8
	Boys:	13 539	4.91	2.74	0	8		.96	0	4	5	8	8
Empathy (4 items)	Girls:	13 466	5.97	1.38	0	8	0.02	.58 =	j 4	5	6	7	8
	Boys:	13 642	5.52	1.54	0	8		.59 ä .	8 4	4	6	7	7
Empathy (3 items)*	Girls:	13 466	5.15	1.07	0	6	0.03	.68 n	4	5	6	6	6
	Boys:	13 642	4.74	1.28	0	6		.70 <u>a</u>	; 3	4	5	6	6
Emotional Symptoms (5 items)	Girls:	13 621	3.35	2.39	0	10	0.02	.80 đ	9 0	1	3	5#	7
	Boys:	13 852	2.69	2.18	0	10		.77 🛱	9 0	1	2	4#	6
Conduct Problems (5 items)	Girls:	13 622	1.54	1.68	0	10	0.02	.80 a	<u>د</u> 0	0	1	2#	4
	Boys:	13 852	2.07	1.87	0	10		.79 6	ne 0	1	2	3#	5
Aggression (2 items)	Girls:	13 621	0.50	0.91	0	4	0.04	.81 3	<u>,</u>	0	0	1	2
	Boys:	13 851	0.89	1.13	0	4		.80 8	80	0	0	1	3
Attention (3 items)	Girls:	13 469	3.67	1.43	0	6	< 0.01	.60 <mark>g</mark>	25 2	3	4	5	6
	Boys:	13 651	3.51	1.41	0	6		.54 °	at 2	3	3	4	5
Attention (4 items)*	Girls:	13 469	5.06	1.77	0	8	<0.01	.69	ge 3	4	5	6	7
	Boys:	13 651	4.80	1.77	0	8		.65	nce 3	4	5	6	7
Inhibitory Control (7 items)	Girls:	13 469	8.17	2.88	0	14	<0.01	.76	<u>B</u> .4	6	8	10	12
	Boys:	13 658	7.69	2.98	0	14		.75	blic 4	6	8	10	12
Inhibitory Control (6 items)*	Girls:	13 469	6.78	2.61	0	12	<0.01	.75	gra 3	5	7	9	10
	Boys:	13 658	6.40	2.74	0	12		.75	hdε β	4	6	8	10
Hyperactivity-Inattention (5 items)	Girls:	13 621	3.34	2.34	0	10	0.01	.77	iq 0	1	3	5#	7
	Boys:	13 851	3.86	2.37	0	10		.76	a 1	2	4	6#	7

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Total Difficulties (20 items)	Girls:	13 621	10.22	6.13	0	40	<0.01	.89 igi	01 3	6	9	14#	19	
	Boys:	13 851	10.68	6.01	0	40		.87 .	5 3	6	10	15#	19	
Perceptual Sensitivity (4 items)	Girls:	13 475	5.63	1.74	0	8	<0.01	.70 ट्र	62 3	4	6	7	8	
	Boys:	13 663	5.58	1.80	0	8		.71 વૈ	4 ₃	4	6	7	8	
Psychotic-like experiences (9 items)	Girls:	13 404	5.79	4.43	0	18	< 0.01	.90 ₫	9 0	2	5	9	12	
	Boys:	13 572	5.53	4.49	0	18		.91 9	\mathcal{L}_{0}	2	5	9	12	
Extraversion (5 items)	Girls:	13 600	7.98	1.77	0	10	<0.01	.78 🖁		7	8	9	10	
	Boys:	13 819	8.09	1.75	0	10		.75 2	<u>6</u> <u>6</u> <u>8</u> <u>8</u> <u>8</u>	7	8	9	10	
Neuroticism (5 items)	Girls:	13 720	3.63	2.37	0	10	< 0.01	.82 at		2	3	5	7	
	Boys:	14 013	3.33	2.18	0	10		.78 🗳	1	2	3	5	6	
Conscientiousness (5 items)	Girls:	13 601	7.16	2.13	0	10	0.01	.78	4 4	6	7	9	10	
	Boys:	13 820	6.64	2.23	0	10		.77 X		5	7	8	9	
Agreeableness (5 items)	Girls:	13 598	7.56	1.78	0	10	0.02	.77 ang	de 5	6	8	9	10	
	Boys:	13 817	7.06	1.90	0	10		.76 <u>e</u>	a <u>a</u> _5	6	7	9	10	
Intellect/Openness (5 items)	Girls:	13 598	7.23	1.88	0	10	< 0.01	.85 at 5		6	7	9	10	
	Boys:	13 817	7.30	1.94	0	10		.84 E .		6	7	9	10	
Self-esteem (3 items)	Girls:	13 487	4.87	1.21	0	6	< 0.01	.72 j	2 <mark>6</mark> 3	4	5	6	6	
	Boys:	13 682	4.94	1.17	0	6		.70	3	4	5	6	6	
Daytime Sleepiness (3 items)	Girls:	13 464	1.49	1.35	0	6	< 0.01	.67 🚽	o i i i i i i i i i i i i i i i i i i i	0	1	2	3	
	Boys:	13 640	1.59	1.40	0	6		.63 a i	9 O	0	1	3	4	
Connection to Nature (3 items)	Girls:	13 463	3.88	1.76	0	6	< 0.01	.88 in g	5 1	3	4	6	6	
	Boys:	13 638	3.56	1.84	0	6		.87 🚆	7 1	2	4	5	6	

Note: * Indicates the revised version of the scale with modified number of items (see Footnote 1); For the Strength and Difficulties Questionnaire subscales, scores corresponding to the 80th percentile (i.e., equating to the cut-off describing a "Borderline" rating) were, for gies and boys respectively: Emotional Symptoms = 5 and 4; Peer Relationship Problems = 3 and 3; Conduct Problems = 3 and 4; Hyperactivity-Inattention = 3 arg 6; Prosocial Behaviour (20th percentile) For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml = 7 and 6; and Total Difficulties = 15 and 16.

Page 3	9 01 43											ы	vij Op	en		
1 2 3	Suppl shade	ement d in gr	ary Ta l een; m	ble 3-X iedium	. Direc in orai	tion ar nge; la	nd mag rge in I	nitude red; an	of the d non-	bivaria signific	ate ass ant ass	ociatio sociatio	ns bet ons in {	ween e grey).	each do)n
4 5		SI	PB	PRP	SHR	SSR	SCR	Em3	ES	СР	Agg	At4	IC6	н	TD	I
6	SI	1	40	52	11	40	26	20	21	26	25	20	06	22	50	

main assessed within the Middle Childhood Survey (small effects

DMI Ower

	SI	РВ	PRP	SHR	SSR	SCR	Em3	ES	СР	Agg	At4	IC6	HI	TD	PS	PLE	Ex		С	Agr	ю	SS	DS	CN
SI	1	.40	52	.44	.49	.36	.30	31	36	25	.38	.06	32	50	.09	10	.56 6	1.1	.29	.49	.35	.54	35	.20
РВ	.40	1	19	.33	.34	.25	.50	04	36	29	.36	.08	30	29	.22	.02	.35 r	π₽	.36	.59	.33	.39	29	.30
PRP	52	19	1	28	23	15	15	.42	.38	.28	24	14	.25	.66	.05	.24	49 es	n%2	12	28	22	36	.31	.01 [‡]
SHR	.44	.33	28	1	.47	.31	.32	20	32	25	.31	.10	28	36	.10	10	.31 elat		.25	.34	.33	.40	31	.17
SSR	.49	.34	23	.47	1	.38	.29	13	26	18	.29	.06	25	29	.08	05	.27 đ		.24	.36	.28	.37	26	.19
SCR	.36	.25	15	.31	.38	1	.17	13	14	09	.20	01*	15	19	.05	.00‡	.27 te		.19	.26	.16	.28	15	.20
Em3	.30	.50	15	.32	.29	.17	1	.01*	27	23	.27	.04	21	20	.28	.07	.21 ar	iadr BBo	.24	.42	.27	.28	24	.30
ES	31	04	.42	20	13	13	.01*	1	.37	.27	29	23	.35	.75	.14	.32	43 d	ieui 198e	11	14	24	31	.36	.04
СР	36	36	.38	32	26	14	27	.37	1	.64	49	42	.55	.76	.03	.28	26 ata	[2] [2] [2] [2] [2] [2] [2] [2] [2] [2]	36	45	33	36	.47	10
Agg	25	29	.28	25	18	09	23	.27	.64	1	37	36	.42	.54	.02	.24	20 min	BES	26	37	24	25	.39	06
At4	.38	.36	24	.31	.29	.20	.27	29	49	37	1	.39	62	57	.08	19	.27 g	3	.47	.45	.47	.39	46	.18
IC6	.06	.08	14	.10	.06	01*	.04	23	42	36	.39	1	47	44	16	33	02 A	3	.21	.17	.15	.07	33	04
н	32	30	.25	28	25	15	21	.35	.55	.42	62	47	1	.76	00 [‡]	.24	21 n		47	36	45	34	.47	10
TD	50	29	.66	36	29	19	20	.75	.76	.54	57	44	.76	1	.07	.37	46 .	.65	37	41	43	46	.55	05
PS	.09	.22	.05	.10	.08	.05	.28	.14	.03	.02	.08	16	$.00^{+}$.07	1	.28	.06 ano	.10	.14	.13	.20	.13	08	.21
PLE	10	.02	.24	10	05	.00 [‡]	.07	.32	.28	.24	19	33	.24	.37	.28	1	12 Sn		07	07	06	09	.24	.18
Ex	.56	.35	49	.31	.27	.27	.21	43	26	20	.27	02	21	46	.06	12	1 Ilar	12	.20	.36	.29	.47	31	.14
Ν	31	12	.38	19	13	12	05	.63	.52	.40	34	30	.41	.66	.10	.28	35 te	aer	19	24	22	30	.38	02
С	.29	.36	12	.25	.24	.19	.24	11	36	26	.47	.21	47	37	.14	07	.20 hno	19	1	.36	.37	.32	35	.22
Agr	.49	.59	28	.34	.36	.26	.42	14	45	37	.45	.17	36	41	.13	07	.36 0	2025	.36	1	.32	.43	34	.28
ю	.35	.33	22	.33	.28	.16	.27	24	33	24	.47	.15	45	43	.20	06	.29 es	242	.37	.32	1	.42	39	.14
SS	.54	.39	36	.40	.37	.28	.28	31	36	25	.39	.07	34	46	.13	09	.47	B	.32	.43	.42	1	36	.20
DS	35	29	.31	31	26	15	24	.36	.47	.39	46	33	.47	.55	08	.24	31	a% agen	35	34	39	36	1	13
CN	.20	.30	.01 [‡]	.17	.19	.20	.30	.04	10	06	.18	04	10	05	.21	.18	.14	🔁	.22	.28	.14	.20	13	1

Note: All correlations significant at the p<0.01 level (2-tailed), except where indicated by * (p<0.05, 2-tailed) or by $\frac{1}{2}$ (non- significant) Pearson's r=0.1 designates small effects, r=0.3 medium effects, and r=0.5 large effects (as per Cohen, 1992); SI=Social Integration, PB=Prosocial Behaviour, PRP=Peer Relation in Problems, SHR/SSR/SCR=Supportive Home/School/Community Relationships, Em3=Empathy (3-item revised scale), ES=Emotional Symptoms, CP=Conduct Problems, Agg Aggression, At4=Attention (4-item revised scale), IC6=Inhibitory Control (6-item revised scale), HI=Hyperactivity-Inattention, TD =Total Difficulties, PS =Perceptual Sensitivity, PE = Psychotic-like experiences, E=Extraversion, N=Neuroticism, C=Conscientiousness, Agr=Agreeableness, IO=Intellect/Openness, SS=Self-Satisfaction, DS=Daytime Sleepiness, CN=Connection to Nature

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Supplementary Table 4-X. Direction and magnitude of the bivariate associations between each domain assessed with Mee Middle Childhood Survey for girls (upper diagonal) and boys (lower diagonal; small effects shaded in green; medium in orange; large in red; and non-significant associations in grey).

	SI	PB	PRP	SHR	SSR	SCR	Em3	ES	СР	Agg	At4	IC6	н	TD	PS	PLE	Ex 🗐 🕅	С	Agr	10	SS	DS	CN
SI	1	.38	- 55	.44	49	35	.26	- 34	- 38	- 26	38	.08	- 33	- 53	.07	- 13	56 = - 34	.28	.48	36	.55	- 36	.16
PB	43	1	- 20	30	31	23	44	- 10	- 34	- 28	36	.00	- 30	- 31	19	.15	35 = - 16	33	57	33	39	- 29	26
PRP	- 50	- 18	1	- 30	- 26	- 18	- 15	.10	40	29	- 25	- 14	.30	67	.15	24		- 15	- 30	- 25	- 39	33	01 [‡]
SHR	.50	35	- 26	1	.20	32	26	- 24	- 34	.25	32	12	- 20	- 38	.00	- 13		25	33	30	.55	.33	1/
SSR	.45	.55	20	18	.40	.52	.20	24	- 26	25	.52	.15	25	30	.00	15	270 D 15	.25	24	.30	.42	31	.14
SCR	.45	.55	20	.40	20	.37	.24	10	20	17	.29	.07	20	51	.03	08		.23	.54	.29	.30	27	.13
Em2	.50	.20	15	.29	.59	10	.14	10	10	11	.20	.02	10	22	.04	05		.17	.20	.17	.20	17	.17
EC	.33	.51	15	.35	.30	.19	01‡	01	23	20	.24	.04	19	19	.20	.00		.22	.37	.20	.25	21	.20
	29	04	.42	18	12	11	01	1	.42	.32	33	24	.38	.78	.15	.33		15	19	27	35	.40	.01
	35	33	.36	31	25	12	26	.39	1	.61	49	43	.55	.76	.03	.29		37	45	33	38	.48	09
Agg	24	25	.27	24	16	07	21	.30	.65	1	36	33	.39	.53	.03	.25	23	25	35	24	26	.39	04
At4	.38	.36	22	.31	.29	.20	.27	28	48	38	1	.42	62	57	.06	22	.27 ឆ្នាំ35	.48	.45	.48	.40	47	.17
IC6	.03	.05	14	.07	.03	05	.01*	26	41	36	.35	1	48	44	15	34	02 43	.23	.20	.17	.09	34	.00*
HI	31	27	.23	26	23	13	20	.36	.53	.43	61	46	1	.76	.00 ⁺	.26	22 a42	47	37	46	37	.49	10
TD	48	28	.65	34	27	16	21	.75	.77	.56	55	44	.76	1	.09	.38	48 ය .🚭	38	43	45	50	.57	05
PS	.11	.24	.05	.14	.11	.07	.31	.12	.02	.01*	.09	17	01 [‡]	.06	1	.29	.04 and .12	.12	.09	.17	.10	06	.20
PLE	08	.03	.24	08	03	.03	.07	.32	.29	.25	17	33	.22	.36	.27	1	11 🛀	11	10	07	12	.25	.17
Ex	.56	.37	48	.32	.28	.27	.23	41	26	19	.27	02*	21	46	.07	11	1 a	.21	.36	.29	.48	32	.11
Ν	28	11	.36	15	11	10	06	.60	.53	.44	33	30	.41	.65	.09	.26	33 🤂	22	28	24	34	.40	04
С	.29	.35	09	.24	.23	.19	.24	11	34	24	.46	.18	45	35	.15	04	.20 nno18	1	.35	.36	.33	37	.19
Agr	.50	.60	27	.34	.36	.27	.45	13	43	36	.44	.13	34	39	.15	04	.3782	.35	1	.32	.44	35	.26
10	.35	.34	20	.35	.28	.15	.29	22	33	26	.47	.14	45	42	.22	04	.29	.37	.33	1	.42	40	.14
SS	.54	.41	33	.39	.37	.27	.32	27	35	26	.39	.05	33	43	.17	06	.4726	.32	.44	.42	1	37	.19
DS	33	29	.30	30	25	14	26	.35	.46	.39	45	31	.45	.53	10	.23	30 .36	34	32	38	34	1	13
CN	.23	.32	.00 [‡]	.19	.21	.23	.32	.03	08	05	.17	08	09	05	.22	.19	.18 🛱 ‡	.23	.28	.15	.21	12	1

Note: All correlations significant at the p<0.01 level (2-tailed), except where indicated by * (p<0.05, 2-tailed) or by [‡] (non- significant) Pearson's r=0.1 designates small effects, r=0.3 medium effects, and r=0.5 large effects (as per Cohen, 1992); SI=Social Integration, PB=Prosocial Behaviour, PRP=Peer Relation in problems, SHR/SSR/SCR=Supportive Home/School/Community Relationships, Em3=Empathy (3-item revised scale), ES=Emotional Symptoms, CP=Conduct Problems, Agg Aggression, At4=Attention (4-item revised scale), IC6=Inhibitory Control (6-item revised scale), HI=Hyperactivity-Inattention, TD =Total Difficulties, PS =Perceptual Sensitivity, PE= Psychotic-like experiences, E=Extraversion, N=Neuroticism, C=Conscientiousness, Agr=Agreeableness, IO=Intellect/Openness, SS=Self-Satisfaction, DS=Daytime Sleepiness, CN=Connection to Nature

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Supplementary Table 5-X. Distribution of the Strengths and Difficulties Questionnaire (SDQ) categories on each sub traditional 3-level and more recent 4-level solutions. -016; , incl

	Girls				Boys di 4			
SDQ subscale	Normal (%)	Borderline (%)	Abnormal (%)		Normal (%)	Borderline (%)	Abngormal	
Emotional Symptoms	80.7	7.6	11.7		88.4	5.3	nse esq	
Peer Relationship Problems	81.9	13.0	5.1		80.6	14.6		
Conduct Problems	87.2	6.1	6.7		79.4	9.3		
Hyperactivity-Inattention	81.0	8.4	10.6		75.0	10.6	1 ⊈ .≇ §	
Prosocial Behaviour	94.3	3.4	2.3		87.1	7.8	ie Sin Io	
Total Difficulties	80.8	10.9	8.3		79.0	12.2	ade am	
	Close to Average	Slightly Raised	High	Very High	Close to Average	Slightly Raised	d from h eu鈨(AB d 强ta m	Very High
SDQ subscale	(%)	(%)	(%)	(%)	(%)	(%)	₽ U	(%)
Emotional Symptoms	70.2	10.6	7.6	11.7	80.2	8.2	.3	6.3
Peer Relationship Problems	67.9	14.0	8.3	9.8	65.8	14.8	Å 9.5 <mark>5</mark>	9.9
Conduct Problems	87.2	6.1	3.5	3.2	79.4	9.3	an.7 <mark>9</mark>	5.6
Hyperactivity-Inattention	81.0	8.4	5.6	5.1	75.0	10.6	j 6.9 <mark>9</mark>	7.5
Prosocial Behaviour [#]	94.3	3.4	1.5	0.8	87.1	7.8	ي 1.1	2.0
Total Difficulties	76.8	10.1	4.9	8.3	74.8	11.2	ق ج.2 <mark>9</mark>	8.8
							June 11, 2025 at A lar technologies.	
							vgence Bibliographique	
	Fo	or peer review	/ only - http:/	/bmjopen.bm	nj.com/site/a	bout/guidelir	es.xhtm⊢	

Section/Topic	Topic Item # Recommendation		Reported on page #	
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1	
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2	
ntroduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported		
Objectives	3	State specific objectives, including any pre-specified hypotheses	5	
Methods				
Study design	4	Present key elements of study design early in the paper	4-5 (and Figure 1)	
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-7	
Participants 6		 (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants 	5-7 (and Figure 1)	
		(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case	N/A	
/ariables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-10	
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-10	
Bias	9	Describe any efforts to address potential sources of bias	10-11	
Study size	10	Explain how the study size was arrived at	10	
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-11	
Statistical methods 1		(a) Describe all statistical methods, including those used to control for confounding	7-14	
		(b) Describe any methods used to examine subgroups and interactions	7-14	
		(c) Explain how missing data were addressed	7-14	
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed	10-11	

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*

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		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Figure 1
		(b) Give reasons for non-participation at each stage	Figure 1
		(c) Consider use of a flow diagram	Figure 1
Descriptive data 1		(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Tables 1-5
		(b) Indicate number of participants with missing data for each variable of interest	Tables 3-5
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Cohort study—Report numbers of outcome events or summary measures over time Case-control study—Report numbers in each exposure category, or summary measures of exposure Cross-sectional study—Report numbers of outcome events or summary measures	Tables 1-5
Main results 16		(<i>a</i>) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Supplementary Tables
Discussion	ŀ		
Key results	18	Summarise key results with reference to study objectives	10-14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14-15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-16
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17-18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies. Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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