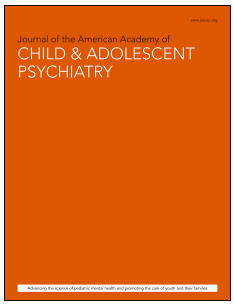

Population Prevalence of the Posttraumatic Stress Disorder Subtype for Young Children in Nationwide Surveys of the British General Population and of Children-In-Care

Caitlin Hitchcock, PhD, Benjamin Goodall, DClinPsy, Olivia Sharples, PhD, Richard Meiser-Stedman, PhD, Peter Watson, PhD, Tamsin Ford, PhD, Tim Dalgleish, PhD

PII: S0890-8567(21)00139-8

DOI: https://doi.org/10.1016/j.jaac.2020.12.036

Reference: JAAC 3373

To appear in: *Journal of the American Academy of Child & Adolescent Psychiatry*

Received Date: 7 September 2020

Revised Date: 12 December 2020

Accepted Date: 28 December 2020

Please cite this article as: Hitchcock C, Goodall, DClinPsy B, Sharples O, Meiser-Stedman R, Watson P, Ford T, Dalgleish T, Population Prevalence of the Posttraumatic Stress Disorder Subtype for Young Children in Nationwide Surveys of the British General Population and of Children-In-Care, *Journal of the American Academy of Child & Adolescent Psychiatry* (2021), doi: https://doi.org/10.1016/j.jaac.2020.12.036.

Population Prevalence of the Posttraumatic Stress Disorder Subtype for Young Children in Nationwide Surveys of the British General Population and of Children-In-Care

RH = Population Prevalence of Preschool PTSD

Caitlin Hitchcock, PhD, Benjamin Goodall, DClinPsy, Olivia Sharples, PhD, Richard Meiser-Stedman, PhD, Peter Watson, PhD, Tamsin Ford, PhD, Tim Dalgleish, PhD

Editorial
Supplemental Material
Clinical Guidance

Accepted February 24, 2021

Drs. Hitchcock, Goodall, Watson, and Dalgleish are with the Medical Research Council Cognition and Brain Sciences Unit, University of Cambridge, United Kingdom. Drs. Hitchcock, Goodall, Dalgleish, and Prof. Ford are with Cambridgeshire and Peterborough NHS Foundation Trust, Cambridge, United Kingdom. Drs. Sharples and Prof. Ford are with the University of Cambridge, United Kingdom. Prof. Meiser-Stedman is with the University of East Anglia, Norwich, United Kingdom.

This paper presents independent research funded primarily by the UK National Institute for Health Research (NIHR) under its Research for Patient Benefit (RfPB) Programme (Grant Reference Number PB-PG-0211-24045). The views expressed are those of the authors and not necessarily those of the UK National Health Service, the NIHR, or the Department of Health and Social Care. This work was also supported by the National Institute for Health Research Cambridge Biomedical Research Centre (247730) and the UK Medical Research Council (Grant Reference: SUAG/043 G101400). These sources of funding are directly related to the work reported in the manuscript.

Dr. Watson served as the statistical expert for this research.

Author Contributions
Conceptualization: Hitchcock, Goodall, Meiser-Stedman, Ford, Dalgleish
Data curation: Hitchcock, Goodall, Sharples, Ford, Dalgleish
Formal analysis: Hitchcock, Watson, Ford
Funding acquisition: Meiser-Stedman, Dalgleish
Investigation: Hitchcock, Goodall, Sharples, Watson, Dalgleish
Methodology: Hitchcock, Meiser-Stedman, Watson, Ford, Dalgleish
Project administration: Hitchcock, Goodall, Dalgleish
Resources: Ford, Dalgleish
Supervision: Hitchcock, Meiser-Stedman, Ford, Dalgleish
Writing – original draft: Hitchcock, Goodall, Dalgleish
Writing – review and editing: Sharples, Meiser-Stedman, Watson, Ford

ORCID
Caitlin Hitchcock, PhD: https://orcid.org/0000-0002-2435-0713
Benjamin Goodall, DClinPsy:
Olivia Sharples, PhD: https://orcid.org/0000-0001-7443-4459
Richard Meiser-Stedman, PhD: https://orcid.org/0000-0002-0262-623X
Peter Watson, PhD:
Tamsin Ford, PhD: https://orcid.org/0000-0001-5295-4904
Tim Dalgleish, PhD: https://orcid.org/0000-0002-7304-2231

Disclosure: Dr. Hitchcock has reported holding a grant from the Economic and Social Research Council (ESRC; ES/R010781/1). Prof. Meiser-Stedman has reported holding grants from the NIHR and the UK Medical Research Council (MR/P017355/1). Prof. Ford has reported holding grants from Wellcome (107496/Z/15/Z). Prof. Dalgleish has reported holding grants from the UK Medical Research Council (MR/P017355/1, MC_PC_17213), Wellcome (107496/Z/15/Z), and the ESRC (ES/R010781/1). Drs. Goodall, Sharples, and Watson have reported no biomedical financial interests or potential conflicts of interest.

Correspondence to Caitlin Hitchcock, PhD, University of Cambridge, Medical Research Council, 15 Chaucer Road, Cambridge, CB2 7EF, United Kingdom; e-mail: caitlin.hitchcock@mrc-cbu.cam.ac.uk

Abstract

Objective: Posttraumatic stress disorder (PTSD) is a debilitating condition which when left untreated, can have severe life-long consequences for an individual's psychological, social and occupational functioning. Initial conceptualizations of PTSD were centered on adult presentations. However, the instantiation of developmentally appropriate PTSD for Young Children (PTSD-YC) criteria, tailored to preschool (aged 6 years old and under) children, represents an important step towards identifying more young children experiencing distress. Here we explore population-level prevalence of PTSD-YC, indexed via the Alternative Algorithm for PTSD (AA-PTSD).

Method: We utilize population-representative data to test whether application of AA-PTSD criteria, relative to the DSM-IV PTSD algorithm, increases identification of 5-6 year old children with clinical needs, in both the general population (N=3202), and among looked-after-children (i.e., children-in-care; N=137) where the risk of mental health issues is greater.

Results: Notably, no 5-6 year old children in the general population sample were diagnosed with PTSD using adult-based DSM-IV criteria. In contrast, AA-PTSD prevalence was 0.4% overall, rising to 5.4% in trauma-exposed children. In looked-after-children, overall PTSD prevalence rose from 1.2% when applying adult-led DSM-IV criteria to 14% when using AA-PTSD. Of trauma-exposed looked-after-children, 2.7% met criteria for DSM-IV PTSD, compared to 57.0% when applying AA-PTSD. In both samples, use of the Alternative Algorithm to index PTSD-YC criteria markedly increased identification of children experiencing functional impairment due to symptoms.

Conclusion: Results demonstrate the utility of the PTSD-YC diagnosis beyond at-risk and treatment-seeking samples. Use of PTSD-YC criteria very substantially improves identification of 5-6 year old children burdened by PTSD at the population-level.

Introduction

Historically, the conceptualization of Posttraumatic Stress Disorder (PTSD) has been driven by its clinical presentation in adults. [1] However, the establishment of Scheeringa and colleagues' developmentally-appropriate 'Alternative Algorithm' (AA) for DSM-IV PTSD [2] meant that, for the first time, we could identify and begin to understand the syndrome within young children under six years old. [2-3] This early work led the DSM-5 [4] to introduce a sub-diagnosis of PTSD for young children aged 6 years and younger (PTSD-YC), comprising a developmentally-tailored symptom profile derived closely from the Alternative Algorithm [2] (see Table S1, available online for full diagnostic criteria). Most notably, the young children sub-diagnosis only requires the presence of one, rather than three, Criterion C avoidance symptoms.

Representative national surveys have estimated that as many as two thirds of children experience traumatic events by age 16. [5] Despite this, population-based prevalence studies applying adult-based PTSD criteria suggested that only very small proportions of young people meet the threshold for PTSD, with estimates of current diagnosis ranging from 0.6% [6] to 4.4% in the UK [7] and US.[8] A key rationale for the development of the AA and for the introduction of the developmentally-appropriate diagnostic criteria for PTSD-YC both in the DSM-5 and in the Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood (DC:05)[9], was to address concerns that PTSD in very young children was being significantly under-diagnosed. These new criteria propose a different diagnostic algorithm that, while also requiring fewer symptoms (see Table S1, available online, for full criteria), nevertheless preserves the requirement for functional impairment.

A recent literature review [3] summarizing smaller-scale and non-population-representative prevalence studies in young children validated these concerns. The review indicated that in trauma-exposed samples, use of developmentally appropriate

PTSD-YC criteria did indeed increase PTSD prevalence estimates in preschool children (and in children up to 8 years of age; [10]), and that the size of the increase ranged from 10-50% in studies which compared AA or PTSD-YC diagnosis against DSM-IV or DSM-5 (adult-based) criteria. However, the reviewed studies comprised help-seeking or at-risk populations, and there have been no prior examinations of diagnostic prevalence in large population-representative samples.

Accurate estimation of PTSD-YC population prevalence is vital for the appropriate commission and management of services for young trauma victims, and for reducing the economic impact of untreated PTSD. This study therefore reports the first population-based estimates of PTSD-YC, indexed using the Alternative Algorithm for DSM-IV PTSD (AA-PTSD; which only requires one avoidance symptom), in children aged 5-6 years. The AA-PTSD and DSM-5 criteria for PTSD-YC are conceptually comparable as the DSM-5 criteria were directly derived from the AA prototype. We used British data from both a general population sample and from a survey of children who had been removed from unsafe family homes and placed in foster care, and who are more vulnerable and deemed at higher risk of mental health issues, particularly PTSD. [11-12] In Britain, these children are called 'looked-after-children' (LAC) but are more commonly referred to as children-in-care, and from here on, we use the term LAC to refer to this group. We report the correlates of AA-PTSD with regard to demographics and comorbid diagnoses to explore whether there are any individual-level characteristics that may be over- or under-represented when using the different diagnostic criteria.

Prior research has suggested that the AA-PTSD diagnosis may be appropriate beyond the pre-school range for children up to 8 years of age, [10] this slightly older age range has been applied in some treatment studies for PTSD-YC.[13-14] The present study provides an opportunity to explore AA-PTSD prevalence in children up to age 8 in population samples for the first time to inform future nosological decisions about the

boundaries of the diagnosis. We therefore also report data on PTSD-YC in these slightly older children. Finally, we present exploratory data on AA-PTSD and DSM-IV prevalence estimates across the entire age range of the samples (up to age 18) to provide the relevant context for these decisions.

Method

General population data comprised two surveys: 'The mental health of children and adolescents in Great Britain' (1999) [15] and 'Mental health of children and young people in Great Britain, 2004' [16] (combined *N*=18,415 aged 5-16). The at-risk population data comprised a survey of LAC who had been removed from unsafe family homes and placed in state (ie, foster) care; Mental Health of Young People Looked After by Local Authorities in Great Britain, 2001-2003 [17] (*N*=1543). Sampling for both general population and LAC are presented in Figure 1. All survey data are available from the UK Data Service, https://ukdataservice.ac.uk/. These datasets were chosen as they provided the youngest age range within British national surveys to have measured PTSD. It is important to note that the youngest age was 5 years, and we were unable to obtain population-level data for children aged under 5 years, to whom the PTSD-YC diagnosis is also applicable.

General population samples

The mental health of children and adolescents in Great Britain, 1999. The UK Child Benefit Register (CBR), was used as a sampling frame to select children aged 5 – 15 years throughout England, Scotland and Wales. The records had postal codes for 90% of the population with no evidence of difference between records with or without a postcode. There were two levels of stratification, first by Regional Health Authority and secondly, by socio-demographic groupings. Four hundred and seventy-five postal sectors were randomly selected with a probability proportional to the number of children in each country. Within these postal sectors 30 children were randomly selected by the

CBR, with letters sent out on behalf of the Office of National Statistics. Weights were introduced due to oversampling in Scotland and Wales, for response variation by region and non-response bias by age and gender. See [18] for further details. The obtained sample size of 5-6 year olds was *n*=3202.

Mental health of children and young people in Great Britain, 2004. The sample design and organization was as described above, however the children selected were aged 5–16 years. There was no overlap in samples across the two surveys. The CBR register had postcodes attached to records for 98% of the population. The two levels of stratification were first by Government Office Region, then by socio-economic group. Four hundred and twenty-six postal sectors were randomly selected, with 29 children from each postal sector invited to take part in the survey. Five postal sectors did not have 29 children within the age range sampled; therefore, all children within the age range from the postal sector were invited. Weights were calculated to adjust for delay in sampling, then for national balance of age, sex and region structure. See [16] for further details.

LAC sample

Mental health of young people looked after by local authorities in Great Britain, 2001-2003. Within Britain, local authorities make annual reports to the governmental Department of Health which provide anonymized details of 1 in 3 of all looked-after-children. These data were used to select a sample of 2,500 children (approximately 1 in 18 of all LAC aged 5–17) from each local authority who were 'looked after' on 31st March 2001. The number of participants was proportional to the number of children 'looked after' in each authority. As children may actually be living in another part of the country from the local authority responsible for their care (e.g., a child 'looked after' by an authority in England may be living with relatives or fostered in Wales), allocations were made on the basis of where the survey assessment would take place.

The sample was selected to ensure equal proportion of children in each age band between 5 and 17 years. See [17] for further details. The obtained sample size of 5-6 year olds was *n*=137.

Diagnostic measure

All surveys indexed mental health difficulties using the Development and Wellbeing Assessment (DAWBA;[19]). The DAWBA is a multi-informant measure of structured questions relating directly to DSM diagnostic criteria, delivered by trained interviewers to caregivers and teachers (when caregivers consented). The DAWBA combines highly structured questions that relate directly to diagnostic criteria in the DSM and the International Classification of Diseases with qualitative information about the nature of any problems. A team of experienced child psychiatrists independently reviewed all data from all informants to assign diagnoses according to DSM-IV. In situations where the information was inconsistent between multiple informants, clinicians reviewed interview transcripts and the interviewer's comments to decide whose account to prioritise. The raters applied clinical judgement as would be the case in a clinical assessment rather than a rule based system of accepting x informant over y. The κ statistic for chance-corrected agreement between two clinical raters who independently rated 500 children in the 1999 survey was 0.86 for any disorder (SE 0.04), 0.57 for internalizing disorders (SE 0.11), and 0.98 for externalizing disorders (SE 0.02). Disagreements were discussed until consensus was reached between the clinicians.

As DSM-5 criteria for PTSD-YC were unpublished at the time of the included surveys, we applied the Alternative Algorithm (AA; [2]) which was derived to index the necessary PTSD-YC symptoms from DSM-IV-based interview items. AA and DSM-5 criteria for PTSD-YC are conceptually comparable as the DSM-5 criteria were directly derived from the AA prototype [3](see Table S1, available online, for detailed mapping across the criteria). The only symptom indexed by the *DSM-5* criteria that cannot be

detected by AA is increased frequency of negative emotional states, although a restricted range of (particularly positive) affect is assessed as are all other aspects of Criterion C. PTSD-YC diagnosis does not significantly differ between use of AA or DSM-5,[2] validating use of the AA to index PTSD-YC. For AA-PTSD diagnoses, the first author wrote an automated scoring syntax which used the survey's clinician-reported rating of the presence or absence of each PTSD symptom (see Table S1, available online, for necessary symptoms) to determine if each individual met the AA criteria.

Analytic Approach

Data were weighted by demographics to ensure population-representativeness. All prevalence estimates were calculated by a statistician using the weighted sample, adjusting for stratification and clustering in postal sectors, assuming a Binomial distribution (α=.05; 95%CIs). As the only difference between the DSM-IV PTSD and AA-PTSD criterion is the application of one Criterion C (avoidance) symptom instead of three, differences in prevalence rates reflect increased endorsement of Criterion C under AA-PTSD.

Results

General population sample

Table 1 presents sample characteristics (by diagnostic status) for children aged 5-6 years (*n*=3202). Prevalence of trauma exposure was 7.0% [95%CIs: 5.8, 8.3]. Remarkably, no children were diagnosed with PTSD using adult-based DSM-IV criteria. In contrast, AA-PTSD prevalence was 0.4% [0.2,0.8] overall, rising to 5.4% [2.5,11.1] in the trauma-exposed children. Critically, of all those children who endorsed functional impairment as a result of PTSD symptoms, 41% met criteria for a full diagnosis using AA-PTSD, compared to none using DSM-IV, validating the concerns that adult-derived DSM criteria miss very significant numbers young children with clinical needs.

To elucidate why the different algorithms led to differential rates of identification of PTSD, we examined the numbers of 5-6 years olds in the general population sample who endorsed at least one symptom (AA) of Criterion C relative to those who endorsed three symptoms (DSM-IV). 0.94% 5-6 year olds endorsed at least one symptom of whom only 0.22% endorsed at least three symptoms.

Looked-After-Children (LAC)

For LAC aged 5-6 years (*n*=137), overall, 1.2% [0.3,5.3] met adult-based DSM-IV PTSD criteria. This rose markedly to 14% [8.0,22.0] when applying AA-PTSD criteria. All children identified by adult-based DSM-IV criteria were also identified by AA-PTSD. Trauma exposure affected almost half (48% [39.0,56.0]) of 5-6 year old LAC. Of these trauma-exposed LAC, 2.7% [0.6,11.0] met criteria for DSM-IV PTSD, but prevalence dramatically increased to 57.0% [34.0,75.0] when applying AA-PTSD. Of all 5-6 year old LACs who endorsed functional impairment due to PTSD symptoms, 63.2% were diagnosed using AA-PTSD, compared to only 10.5% using DSM-IV.

As for the general population sample, to elucidate why the different algorithms led to differential rates of identification of PTSD, we examined the numbers of 5-6 years olds in the LAC sample who endorsed at least one symptom (AA) of Criterion C relative to those who endorsed three symptoms (DSM-IV). 13.14% of 5-6 year olds endorsed at least one symptom of whom only 5.11% endorsed at least three symptoms.

Key differences between cases identified with AA-PTSD and DSM-IV

In the general population sample, no children were diagnosed using DSM-IV, preventing comparison of the two diagnostic criteria. For LAC, there was no significant difference in demographics or comorbidity rates between those LAC diagnosed using DSM-IV versus AA-PTSD, *p*s > .11. All LAC identified by adult-based DSM-IV criteria were necessarily also identified by AA-PTSD and so the DSM-IV prevalence estimates equate to estimates of those children who satisfy criteria for both diagnostic algorithms.

Key differences between no-PTSD and PTSD individuals

Demographics. There were no gender differences between AA-PTSD and no-PTSD cases in either the general population or LAC sample. In the general population sample, relative to the no-PTSD group, there was a greater number of AA-PTSD cases with lone parents, low-income families, and residency in rented accommodation (see Table 1). Regarding ethnicity, individuals classified by the survey as 'Black, Asian or other minority ethnicity' (BAME) were over-represented in the general population AA-PTSD group. However, in the LAC sample, ethnicity did not differ significantly between those with AA-PTSD and no PTSD diagnosis.

Comorbidity. Different patterns of results were also observed between the two samples for comorbid diagnoses. In the general population sample, AA-PTSD was associated with higher rates of separation anxiety and conduct/oppositional disorder relative to no-PTSD, while there was no significant increase in comorbidity in LAC with AA-PTSD relative to LAC with no PTSD diagnosis. It is worth noting that prevalence of other diagnoses was slightly higher in LAC than in the general population, with this difference being most pronounced for ADHD and conduct/oppositional disorder (see Table 1).

AA-PTSD in children aged up to 8 years

Although the PTSD-YC diagnosis was developed for children six years and younger, as note din the Introduction our previous work suggested that the PTSD-YC diagnosis may be valid for children up to the age of eight and even beyond. [10] We therefore, *a priori*, decided to extend the age range for our analyses up to 8 years (see below). However, interestingly, in both survey samples the AA-PTSD algorithm in fact identified far greater numbers of children across the entire younger age range than the DSM algorithm (see Figure 2), as has been suggested in prior studies with at-risk samples,[3,10] and captured up to nine times as many of the youth with functional

impairments (see Supplement 1, Results section, available online, for further details). Indeed, in the general population the DSM algorithm failed to identify any children with PTSD under the age of 10 years.

General population sample. In children up to 8 years old (*n*=6461; see Table 2) DSM-IV again did not diagnose any cases. Prevalence rose to 0.4% [0.2,0.6] using AA-PTSD. Trauma exposure affected 7.9% [7.1,8.9] of children, of whom 5.0% [2.5,11.3] met the AA-PTSD criteria. Of those who endorsed functional impairment, 44.4% were diagnosed using AA-PTSD, compared to none using DSM-IV.

Looked-After Children (LAC). Extending the age range up to 8 years, overall 1.4% [0.6,3.6] of LAC met DSM-IV PTSD criteria, rising to 18% [13.0,23.0] using AA-PTSD. Fifty-three percent of 5-8 year old LAC [47.0,58.0] were trauma-exposed. Of these, 2.8% [1.1,7.0]) met DSM-IV PTSD criteria and 54% [42.0,66.0] met AA-PTSD criteria – a twenty-fold increase from estimates yielded using the adult-based DSM-IV PTSD criteria. Of all 5-8 year olds who endorsed functional impairment, 63.2% were diagnosed using AA-PTSD, compared to 3.5% using DSM-IV.

Key differences between those identified with AA-PTSD and DSM-IV. Again, no children in the general population sample were diagnosed using DSM-IV, preventing comparison of the two diagnostic criteria. Although there was no significant difference in demographics between those LAC diagnosed using DSM-IV versus AA-PTSD (*p*s>.32), rates of comorbid separation anxiety disorder were lower for AA-PTSD, *p*=.043.

Key differences between no-PTSD and PTSD individuals. For children up to 8 years (see Table 2), there were no significant differences in gender or ethnicity between AA-PTSD cases and those with no-PTSD diagnosis for either the general population or LAC. As observed in the general population sample aged 6 years and younger, AA-PTSD cases remained more prevalent in lone-parent and low-income families, and families residing in rental accommodation. Psychiatric comorbidity rates in the general

population sample were higher for AA-PTSD cases relative to no-PTSD individuals. Most notably, AA-PTSD was associated with higher rates of separation anxiety and conduct/oppositional disorder, as also seen in children aged 6 years and younger. This pattern was also evident in LAC aged 8 years and younger.

Discussion

Our findings reveal that prevalence estimates of PTSD in representative British general population and (fostered) looked-after-child (LAC) samples of children aged 5-6 years, generated using the developmentally appropriate Alternative Algorithm for DSM-IV (AA-PTSD) to index PTSD-YC criteria, are markedly higher than estimates using the adult-derived DSM criteria. Critically, this leads to increased identification of up to four times as many 5-6 year old children who demonstrate functional impairment, with associated clinical needs, due to their PTSD symptoms, relative to the adult-derived DSM criteria. Our observed AA-PTSD prevalence levels in these very young children were comparable in magnitude to prior population-based surveys with older school-age children in the UK [7] and US. [8]

Notably, in the general population, the DSM-IV criteria did not identify any children aged 5-6 years as experiencing PTSD, which prevented us from exploring demographic differences in those diagnosed with adult vs young child-led criteria. There were however key demographic differences in the general population sample between those with an AA-PTSD diagnosis and those with no PTSD diagnosis. Children aged 5-6 years with AA-PTSD were more likely to be from single parent, low-income families residing in rental accommodation. This replicates a recent population prevalence survey in British young people which reported that disadvantaged socioeconomic conditions was a risk factor for PTSD. [7] Children in the general population aged 5-6 years with AA-PTSD were also more likely to be of minority ethnicity (indexed as Black, Asian, or other

minority ethnicity), although the categorical manner in which the survey data were collected prohibited us from examining individual minority ethnicities. Though we only observed a small number of cases, this contrasts with data from older children and youth, where minority ethnicity does not appear to increase risk of PTSD. [7] Direct examination of risk factors for PTSD-YC in children aged 6 years and younger, including whether particular trauma types (e.g., interpersonal trauma) increase risk, will be an important next step for research.

In LAC, those cases diagnosed by both adult-led DSM-IV and child-led AA-PTSD criteria were comparable to children with no PTSD diagnosis in terms of ethnicity and gender, and rates of comorbid diagnoses in those with AA-PTSD did not significantly differ from those with no PTSD diagnosis. The only observed difference between diagnosis using DSM-IV and AA-PTSD was a higher rate of comorbid separation anxiety disorder in 5-8 year olds diagnosed using DSM-IV. Overall, unlike that observed in the general population sample, increased risk of PTSD was not seen in LAC from minority ethnicity backgrounds. We were unable to explore the relationships between diagnosis and household income and tenancy status due to a lack of data, although this data would likely have likely been inappropriate due the frequent placement changes and placement in residential homes experienced by many LAC. [11] Although our sample of LAC was relatively small for a prevalence study, it is important to note that LAC represent a small subgroup of the child and adolescent population and our sample surveyed 1 in 18 of LAC in the population. Nevertheless, further evaluations of prevalence should ideally aim to recruit a larger sample size. Although LAC status itself would appear to increase risk of AA-PTSD in younger children, understanding of the predictors of PTSD in older LAC is advancing (e.g., 10-18 year olds; [20]) and further exploration of specific risk factors for PTSD-YC in this younger population is needed.

Interestingly, our findings suggest that PTSD-YC criteria may not only increase identification of functionally impaired children aged 5-6 years, but that the diagnosis may also have clinical utility in children aged up to 8 years, and potentially beyond, in line with previous studies [e.g., [10]]. This was particularly pronounced in LAC but even in the general population the DSM algorithm failed to identify any children with PTSD under 10 years of age. Trials of psychological intervention for PTSD-YC have commonly included children aged up to 8 years, [14,21] and our findings suggest that this practice is warranted. In preparing future editions of diagnostic criteria, re-evaluation of the upper age limit for the PTSD-YC subtype may be advisable and the present data should inform these decisions.

Limitations of this study are that our samples did not include children under 5 years. We have therefore been unable to establish population PTSD-YC prevalence in 3-4 year olds. To our knowledge, population-wide representative data that would allow accurate assessment of PTSD-YC in such a young sample are not available. Similarly, we were necessarily reliant on caregiver and teacher report (as is standard in assessments for this age range), as self-report measures of PTSD-YC in young children have not been established.[21] This likely contributes to the lack of population data in children under 5 years. Finally, analysis of existing data necessitated use of the AA to index PTSD-YC criteria as interviews indexing DSM-5 criteria had not yet been developed at the time of survey completion. Use of three separate survey samples minimizes the impact of cohort effects, although it is important to consider that because these surveys are now relatively old, the use of more methodologically sophisticated data collection techniques in line with advances in technology may mean that the same surveys now would return slightly different results. Addressing each of these issues would facilitate future population-level assessment of PTSD-YC in children under 5 years.

In sum, findings indicate clearly that use of PTSD-YC criteria markedly improves the identification of 5-6 year old children experiencing diagnosable clinical distress following a traumatic event, especially in vulnerable populations. Increasing use of such criteria will thereby have important implications for ensuring that all distressed children are identified. In particular, 5-6 year old children in care should be routinely assessed for PTSD-YC, and provided with appropriate evidence-based support. Evidence-based treatments for PTSD-YC are available (e.g., trauma-focused cognitive behavioral therapy; [19, 20, 22]) and our results emphasize the importance of making these treatments readily available to 5-6 year olds. Planning and regulation of mental health services now needs to be updated to reflect the true population prevalence of PTSD in younger children.

References

1. Smith P, Dalgleish T, Meiser-Stedman R. Practitioner Review: Posttraumatic stress disorder and its treatment in children and adolescents. *Journal of Child Psychology and Psychiatry* 2018;60(5):500-15. doi: 10.1111/jcpp.12983
2. Scheeringa MS, Myers L, Putnam FW, et al. Diagnosing PTSD in early childhood: An empirical assessment of four approaches. *J Trauma Stress* 2012;25(4):359-67. doi: 10.1002/jts.21723
3. De Young AC, Landolt MA. PTSD in Children Below the Age of 6 Years. *Current Psychiatry Reports* 2018;20(11):97. doi: 10.1007/s11920-018-0966-z
4. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: Author 2013.
5. Copeland WE, Keeler G, Angold A, et al. Traumatic events and posttraumatic stress in childhood. *Archives of general psychiatry* 2007;64(5):577-84.
6. Vizard T, Pearce N, Davis J, et al. Mental health of children and young people in England, 2017: Emotional disorders: Health and Social Care Information Centre; 2018 [Available from: https://files.digital.nhs.uk/14/0E2282/MHCYP%202017%20Emotional%20Disorders.pdf.
7. Lewis SJ, Arseneault L, Caspi A, et al. The epidemiology of trauma and post-traumatic stress disorder in a representative cohort of young people in England and Wales. *The Lancet Psychiatry* 2019;6(3):247-56. doi: https://doi.org/10.1016/S2215-0366(19)30031-8
8. Merikangas KR, He J-p, Burstein M, et al. Lifetime prevalence of mental disorders in US adolescents: results from the National Comorbidity Survey Replication–Adolescent Supplement (NCS-A). *Journal of the American Academy of Child & Adolescent Psychiatry* 2010;49(10):980-89.
9. Zero to Three. Diagnostic classification of mental health and developmental disorders of infancy and early childhood: Revised edition (DC:0–5). Washington, DC: Author 2016.
10. Meiser-Stedman R, Smith P, Glucksman E, et al. The posttraumatic stress disorder diagnosis in preschool-and elementary school-age children exposed to motor vehicle accidents. *American Journal of Psychiatry* 2008;165(10):1326-37.
11. Ford T, Vostanis P, Meltzer H, et al. Psychiatric disorder among British children looked after by local authorities: comparison with children living in private households. *The British Journal of Psychiatry* 2007;190(4):319-25.
12. Morris L, Salkovskis P, Adams J, et al. Screening for post-traumatic stress symptoms in looked after children. *Journal of Children's Services* 2015;10(4):365-75.
13. Dalgleish T, Goodall B, Chadwick I, et al. Trauma-focused cognitive behaviour therapy versus treatment as usual for post traumatic stress disorder (PTSD) in young children aged 3 to 8 years: study protocol for a randomised controlled trial. *Trials* 2015;16(1):116. doi: 10.1186/s13063-015-0632-2

14. Salloum A, Wang W, Robst J, et al. Stepped care versus standard trauma-focused cognitive behavioral therapy for young children. *Journal of Child Psychology and Psychiatry* 2016;57(5):614-22. doi: 10.1111/jcpp.12471
15. Meltzer H, Bebbington P, Brusha T, et al. The reluctance to seek treatment for nuerotic disorders. *J Mental Health* 2000;9(3):319-27. doi: 10.1080/713680243
16. Green H, McGinnity A, Meltzer H, et al. Mental health of children and young people in Great Britain 2004. London: Palgrave McMillan 2005.
17. Office for National Statistics. Mental Health of Young People Looked After by Local Authorities in Great Britain, 2001-2003. Colchester, Essex: UK Data Archive 2005.
18. Meltzer H, Gatward R, Goodman R, et al. The mental health of children and adolescents in Great Britain: HM Stationery Office London 2000.
19. Goodman R, Ford T, Richards H, et al. The development and well‐being assessment: Description and initial validation of an integrated assessment of child and adolescent psychopathology. *Journal of Child Psychology and Psychiatry* 2000;41(5):645-55.
20. Hiller RM, Meiser-Stedman R, Elliott E, et al. A longitudinal study of cognitive predictors of (complex) post-traumatic stress in young people in out-of-home care. *Journal of Child Psychology and Psychiatry* 2020;n/a(n/a) doi: 10.1111/jcpp.13232
21. Cohen JA, Deblinger E, Mannarino AP, et al. A Multisite, Randomized Controlled Trial for Children With Sexual Abuse–Related PTSD Symptoms. *Journal of the American Academy of Child & Adolescent Psychiatry* 2004;43(4):393-402. doi: http://dx.doi.org/10.1097/00004583-200404000-00005
22. Scheeringa, M.S., et al., Trauma-focused cognitive-behavioral therapy for posttraumatic stress disorder in three-through six year-old children: a randomized clinical trial. *Journal of Child Psychology and Psychiatry*, 2011. **52**(8): p. 853-860.

Table 1. Sample Characteristics and Prevalence Rate of Disorder for Children Aged 5-6

	General Population			LAC		
	Non-PTSD	PTSD DSM-IV	AA-PTSD	Non-PTSD	PTSD DSM-IV	AA-PTSD
Demographics						
Gender (%)						
Female	49.2	None	36.4	42.3	100.0	25.0
Male	50.8	diagnosed	63.6	57.7	0	75.0
Ethnicity (%)		using				
White	87.8 [a]	DSM-IV	70.0 [a]	89.7	100.0	100.0
Minority ethnicity	12.2 [a]		30.0 [a]	10.3	0	0
Marital Structure (%)						
Married/Cohabiting	78.3 [a]		30.0 [a]	-	-	-
Lone parent	21.7 [a]		70.0 [a]			
Income (%) (£/wk)						
0-199	22.3 [a]		66.7 [a]	-	-	-
200+	77.7 [a]		33.3 [a]			
Tenure (%)						
Owned	67.2 [a]		10.0 [a]	-	-	-
Rented	32.8 [a]		90.0 [a]			
Comorbidity						
Separation Anxiety	1.3 [a]		100.0 [a]	3.8	50.0	8.3
Specific Phobia	0.9		0	2.6	0	16.7
Social Phobia	0.2		0	1.3	0	0
Panic Disorder	0		0	0	0	0
OCD	0		0	1.3	0	0
Generalized Anxiety	0.1		10.0	0 [b]	50.0 [b]	0
Anxiety NOS	0.4		10.0	1.3	0	8.3
Major Depressive Disorder	0.2		0	1.3 [b]	50.0 [b]	0
Depression NOS	0		0	0	0	0
ADHD	1.7		0	16.7	0	25.0
Conduct/Oppositional	3.1 [a]		30.0 [a]	30.8	100.0	50.0
Years						

Note. Shared superscript letters ([a,b]) indicate significant group differences, $\chi^2 > 1$, $p < .05$ Reported demographic values are the percentage of the survey sample in each demographic category. Reported comorbidity values are population-based prevalence of disorder in children 6 years old and younger in each survey. All comorbid diagnoses made using DSM-IV criteria. PTSD DSM-IV includes cases also diagnosed with AA-PTSD. ADHD= attention-deficit/hyperactivity disorder; LAC = looked after children; Minority ethnicity= Black, Asian or other minority ethnicity; NOS= disorder not otherwise specified; OCD = obsessive-compulsive disorder;

Table 2. Sample Characteristics and Prevalence Rate of Disorder for Children Aged 8 Years and Younger.

	General Population			LAC		
	Non-PTSD	PTSD DSM-IV	AA-PTSD	Non-PTSD	PTSD DSM-IV	AA-PTSD
Demographics						
Gender (%)						
Female	50.2	None	35.7	47.3	60.0	30.6
Male	49.8	diagnosed	64.3	52.7	40.0	69.4
Ethnicity (%)		using				
White	88.4	DSM-IV	88.5	90.4	80.0	88.9
Minority ethnicity	11.6		11.5	9.6	20.0	11.1
Marital Structure (%)						
Married/Cohabiting	77.7 [a]		30.8 [a]	-	-	-
Lone parent	22.3 [a]		69.2 [a]			
Income (%) (£/wk)						
0-199	21.7 [a]		61.9 [a]	-	-	-
200+	78.3 [a]		38.1 [a]			
Tenure (%)						
Owned	67.7 [a]		11.5 [a]	-	-	-
Rented	32.3 [a]		88.5 [a]			
Comorbidity						
Separation Anxiety	1.1 [a]		25.0 [a]	2.4 [b, c]	60.0 [c, d]	13.9 [b, d]
Specific Phobia	0.9 [a]		7.1 [a]	2.4	0	8.3
Social Phobia	0.2		0	1.8	0	0
Panic Disorder	0		0	0	0	0
OCD	0.1		0	0.6	0	0
Generalized Anxiety	0.2 [a]		10.7 [a]	0.6	0	0
Anxiety NOS	0.4 [a]		7.1 [a]	0	0	0
Major Depressive Disorder	0.2		0	1.8	20.0	2.8
Depression NOS	0		0	0	0	0
ADHD	2.1		7.1	13.8	20.0	22.2
Conduct/Oppositional	4.0 [a]		35.7 [a]	32.3 [b, c]	80.0 [c]	58.3 [b]

Note: Shared superscript letters ([a,b,c,d]) indicate significant group differences, $\chi 2 > 1$, $p < .05$ Reported demographic values are the percentage of the survey sample in each demographic category. Reported comorbidity values are population-based prevalence of disorder in children 6 years old and younger in each survey. All comorbid diagnoses made using *DSM-IV* criteria. PTSD *DSM-IV* includes cases also diagnosed with AA-PTSD. ADHD = attention-deficit/hyperactivity disorder; LAC = looked after children; minority ethnicity = Black, Asian, or other minority ethnicity; NOS = disorder not otherwise specified; OCD = obsessive-compulsive disorder.

Figure 1. Sampling Details

Note: Numbers were taken from [16-18], published under Creative Commons license CC BY: https://creativecommons.org/ licenses/by/4.0). 1a) Sampling of participants in the 1999 and 2004 British Child and Adolescent Mental Health Surveys (Green et al., 2004[16]; Meltzer et al., 2000[18]). 1b) Sampling of participants in the Mental Health of Young People Looked After by Local Authorities in Great Britain, 2001-2003 (Office for National Statistics, 2005).

Figure 2. Percent Prevalence of Diagnosis of Posttraumatic Stress Disorder (PTSD)

Note. The charts show the percent prevalence of PTSD in trauma-exposed young people according to the DSM-IV and AA-PTSD, per age band, in a) the general population and b) looked-after-children (LAC). See Supplement 1, Results section, available online, for further detail.

1b)