British Journal of Social Work (2023) **00**, 1–21
https://doi.org/10.1093/bjsw/bcad141

Categorising Demand for Child Welfare Services Using Latent Class Analysis: A Study of the National Data-sets on Children in Need in England

Rick Hood[1,*], Allie Goldacre[1], Ed Jones[2], Adam King[2], Keith Clements [3] and Calum Webb [4]

[1]*Faculty of Health, Sciences, Social Care and Education, Kingston University, Kingston Hill, Kingston upon Thames, KT2 5EQ, UK*
[2]*Social Care Data and Analysis Team, Ofsted, 2 Rivergate, Redcliffe, Temple Quay, Bristol BS1 6DZ, UK*
[3]*National Children's Bureau, 23 Mentmore Terrace, Hackney, London E8 3PN, UK*
[4]*Sheffield Methods Institute, University of Sheffield, 219 Portobello, Sheffield S1 4DP, UK*

*Correspondence to Professor Rick Hood, Department of Social Work and Social Care, Kingston University, Kingston Hill, Kingston-Upon-Thames KT2 7LB, UK.
E-mail: *Rick.Hood@kingston.ac.uk*

Abstract

In England, administrative data on children's needs are recorded following a social work assessment. These data are typically used to understand prevalence of individual risk factors and to inform processes, such as the work of local safeguarding partners and multi-agency services. However, reporting individual factors at assessment cannot capture the complexity and heterogeneity of multiple and overlapping needs. This study aimed to identify common types of demand, via a limited number of clusters, using the factors recorded in a national data-set of over 4.2 million assessments carried out between 2014 and 2021, of which 3.6 million had at least one factor recorded. Latent class analysis was used to identify twelve distinct categories of demand for children's social care services, which were consistent across local authorities. Conditional probabilities were used to interpret the demand represented by each category, in consultation with stakeholders. The most prevalent category was domestic abuse and violence (19.7 per cent), followed by complexities around parental mental

health (18.4 per cent). Other categories included disability, child mental health, risks outside the home, complex domestic abuse and concerns about another person in the family or household. This article examines some of the operational and planning implications of categorising demand in this way.

Keywords: children's social care, demand, latent class analysis, quantitative analysis, risk factors

Accepted: May 2023

Introduction

Children's social care (CSC) denotes a range of services for children and families, including children's centres, family help, safeguarding and services for children in care. In England, they are mainly provided by local authorities (LAs), which are the country's primary layer of local government, although voluntary and private sector providers play an important role. This article predominantly concerns statutory CSC services, which incorporates social work assessments, direct work, case management, family support, investigation and protective interventions. A set of operational and legal thresholds determine eligibility for support. Initial contact with CSC services begins with a referral, either from the community or from universal services such as schools or the police. Referrals that have gone through initial stages of contact and screening proceed to an assessment, which is carried out by a social worker. These assessments establish the main presenting issues, analyse their impact on the child in the context of the family and social environment and make recommendations for support to address the child's needs. Some children who receive an assessment are deemed ineligible for statutory social care provision but may be signposted for other types of support and assistance, which are collectively known as 'Early Help' (Lucas and Archard, 2021). Those who are eligible receive services as 'children in need' (CIN), which also includes a minority of children who are subject to child protection (CP) plans. Children who are accommodated in care, either as a consensual arrangement with parents or under a court order, are termed children looked after.

The tiered system of CSC means that conventional measures of demand often focus on the quantity of work undertaken at different thresholds of provision. For example, a LA might monitor the data it collects on numbers of referrals or CP plans over the course of a year, but this type of quantity indicator does not specify the problems that services are being asked to address. Information about the child's needs, the parent's ability to meet those needs and the impact of wider family and

environmental factors are recorded in children's social work assessments. This information is collected as a checklist of forty risk factors, any number of which can be recorded in a single assessment. The intended purpose for collecting this data is to help facilitate analysis and service planning (Department for Education [DfE], 2020). Typically, the assessment data are used to look at frequency, and trends of frequency, which can then be used to inform other processes, such as the work of local safeguarding partners. For example, domestic abuse and substance misuse are factors that may have an impact on services needed (including multi-agency services).

One problem with reporting the frequency of single factors is that social workers often identify multiple and overlapping needs. Because data on co-occurrence are not reported, overly simplistic labels can emerge that are poorly aligned with the lived experience of children and families and do not accurately reflect the variety of demand. One example is the term 'toxic trio', often used to describe the co-occurrence of domestic violence (DV), substance misuse and mental health problems in situations where there is a high risk of child maltreatment (Skinner *et al.*, 2021). The term originally emerged from a meta-analysis of case reviews of serious injuries and deaths from child abuse (Brandon, 2009). However, it has since become used as a rather stigmatising label in CP work, even though evidence suggests it is not an accurate way of describing the problems being addressed (Hood *et al.*, 2021; Skinner *et al.*, 2021). Similarly, domestic abuse is a widespread social problem and a major reason for children receiving protective services (Peckover, 2014; Stewart and Arnull, 2023). However, this is also a very complex problem that does not lend itself to universalising frameworks and cannot be adequately captured in a single 'DV' category (Ferguson *et al.*, 2020).

Plainly, it would be impossible to consider every single possible set of combinations of factors. Even if only ten unique risks and needs were considered, this would amount to more than a thousand unique combinations and this number grows exponentially as more factors are introduced. It would also be inappropriate to assume that factors co-occur in individual cases in the same proportions as they occur in the entire population of children assessed. For example, although concerns about DV and concerns about parental mental health are the most common factors identified in social work assessments (DfE, 2022), it does not automatically follow that they are also the two most likely to co-occur in any given case—their frequencies in the population could equally result from many cases where only one or the other is present as from a smaller number of cases where both are present. A nuanced, data-driven model is needed to navigate this complexity and derive an empirically supported set of assessment categories.

Classification-based analysis, or cluster analysis, can be used to identify distinct, homogenous and hidden sub-groups within a population (Bailey,

1994). This type of process aims to divide a heterogeneous population into parsimonious and relatively homogenous groups (Yan *et al.*, 2018). Approaches to classification can be consensus-based or data-driven. In the former, panels of experts will define the criteria for categorising individuals, usually based on their experience and review of the literature. In data-driven approaches, statistical clustering techniques are applied to a population data-set, although experts may also contribute to interpreting the results. The resulting categories are designed to be mutually exclusive (individuals can only belong to one category at any point in time) and to be informative about the population as a whole. Latent class analysis (LCA) is one technique that can be used to detect sub-groups in a population based on patterns of association between multiple indicators (Hagenaars and McCutcheon, 2002).

A recent systematic review identified a number of studies where LCA has been used to identify different types of maltreatment (Rivera *et al.*, 2018). The review also highlighted the growing consensus that social work research must approach maltreatment as a multidimensional construct. In the USA, LCA has been used to classify maltreatment according to the timing, duration and co-occurrence of abuse types (Ziobrowski *et al.*, 2020), and to describe associations between childhood sexual abuse and substance abuse in adolescence (Shin *et al.*, 2010). In Canada, LCA has been used to identify patterns of child maltreatment and psychiatric disorders amongst pregnant adolescents (Romano *et al.*, 2006). In Denmark, LCA has been used to identify abuse typologies based on interviews with individuals who had been previously identified as CP cases (Armour *et al.*, 2014). To date, there have been few attempts to empirically classify demand for social care in England, except for a study carried out by Hood *et al.* (2021) based on a small sample of six LAs, which identified seven latent classes using the factors identified at social work assessments. The research described here aimed to extend this type of analysis to the national data-sets on CIN, which include all children referred to, and assessed by, CSC in England.

Methods

Ethics, data source and study population

The study was designed as a secondary analysis of longitudinal, administrative data from the CIN Census, which is a data-set of all children aged 0–17 referred to social care services in England. The data include individual case-level information on the assessed needs of children and whether they received social care support. Data were drawn from the population of all children who received a social work assessment over a 7-year period (2014–2021). All LAs ($n = 152$) are required to submit

their data annually to central government, using the Department for Education (DfE) online data collection portal (DfE, 2020). The CIN Census is controlled by the DfE and an extract is held by Ofsted, the inspectorate for CSC. The study conformed to internationally accepted ethical guidelines, and was reviewed by the Research Ethics Committee of Kingston University. Research governance approvals were obtained from both the DfE and Ofsted. Access to the anonymised data was via an encrypted Ofsted computer so that all data storage and processing remained within the Ofsted secure environment.

Factors at assessment

The factors identified at the end of assessment are the factors that social workers record as being relevant in a case. The framework for an assessment covers three domains: the child's developmental needs, the parents' or caregivers' capacities to respond appropriately and the wider family and environmental factors (DfE, 2018). The factors are selected from a checklist, which is broadly consistent over time. This checklist incorporates risks inside the home (e.g. DV), risks outside the home (e.g. concerns about anti-social behaviour), different types of abuse (e.g. emotional, physical and sexual abuse) and other indicators concerning the child's health and well-being (e.g. self-harm). In some instances, no factors are recorded, but this has changed over time as LAs are encouraged to record all potentially relevant factors; in the year ending 2021, 86.3 per cent of assessments had at least one factor recorded, compared with 80.2 per cent in the year ending 2015 (the first year in which factors data were collected). In total, the data-set comprised over 4.3 million assessments, of which 3.6 million (84 per cent) had at least one factor recorded. A range of descriptive statistics on the recording of factors and characteristics of children receiving assessments is provided in the Supplementary Information. Of all assessments that had at least one factor recorded, the average number of factors was 2.8 in the year ending 2021, up from 2.5 in the year ending 2015. The number of distinct combinations of factors found in the data was very large ($n = 134{,}058$).involvement

Brief introduction to LCA

LCA aims to identify mutually exclusive and distinct sub-groups within a population based on patterns of responses in observed variables (Hagenaars and McCutcheon, 2002). The purpose of LCA is to derive a categorical variable that cannot be directly observed, but can be inferred from a combination of 'indicator variables', which can be observed. A

latent class model estimates two main sets of parameters: the latent class frequency, which is the estimated probability that individuals belong to a particular latent class, and the conditional item probabilities (sometimes called 'indicator probabilities'), which describe the relationships between observable indicator variables and a finite number of latent class clusters. These probabilities are estimated via a process of iteration and convergence using maximum-likelihood estimation (McCutcheon, 1987). There are three main stages to carrying out a latent class model: first, the indicators to be included in the model must be selected, second, the number of latent classes must be chosen and last, the validity and reliability of the model must be assessed to ensure the model accurately represents the data. At each step, 'fit indices' can be used to inform the process of identifying an appropriate model (Nylund *et al.*, 2007).

Selecting indicators for LCA

All assessments with at least one factor recorded were included in the model. The relevant code set can be found in government guidance to LAs (DfE, 2020, p. 42). As of 2021, there were forty-two factors recorded at assessment. Assessments with no factors recorded and assessments where the factor recorded was 'no factors identified' (code 21) were excluded from the LCA as, by definition, they would form mutually exclusive classes on their own. Prior to 2017, the privately fostered factors (codes 8B, 8C, 8D, 8E and 8F) were grouped as a single factor (code 8), so these codes were grouped together in later years to be consistent with the earlier years. In 2017, two new factors were introduced: 'Female genital mutilation' and 'abuse linked to faith or belief'. Different models excluding these factors were carried out as part of reliability testing. The decision was taken to include them in the final LCA as they did not change the interpretation of the latent classes. In 2020, the factors on physical abuse and sexual abuse were split out into 'child on child physical abuse' (code 18a) and 'child on child sexual abuse' (code 19a), as well as 'adult on child physical abuse' (18b) and #adult on child sexual abuse' (code 19b). These were grouped together as single factors for physical abuse and sexual abuse in order to be consistent with earlier years. Given the size of the data-set it was not deemed necessary to exclude or group together factors further on the basis of low numbers. One of the most problematic factors was 'other' (code 20), as there is no universally agreed usage for the 'other' factor and no guidance on when it should be reported. This results in wide-ranging (potentially contradictory) interpretations by social workers, making it practically impossible to give it any substantive meaning. It was decided not to include 'other' in the LCA model. For completeness, assessments where only 'other'

was recorded ($n = 470{,}169$) are incorporated as an additional 'known' class after model estimation and reported for later analysis.

Choosing the optimum number of latent classes

Models were calculated with one–forty latent classes and statistical outputs were compared across the models. Goodness-of-fit statistics were calculated for each model, which included the Bayesian information criterion (BIC) and Akaike information criterion (AIC). Lower BIC and AIC values indicate a better fit. However, it is not uncommon that BIC and AIC scores continue to decrease for each additional class added, especially when the number of cases in a data-set is large. Elbow plots can also be used to seek a point of inflection or plateauing in the AIC and BIC scores in order to decide on an empirically supported number of classes (Nylund *et al.*, 2007). The entropy (R^2), a measure of class separation (which ranges from 0 to 1), was also calculated for each model (Celeux and Soromenho, 1996). Low entropy indicates less distinction between latent classes and high entropy indicates more precision in class membership. To select the most appropriate number of classes, the BIC, AIC and entropy were compared and contrasted along with the class membership probability and conditional item probabilities. The latent classes were then characterised based on the conditional item probabilities, which is the probability of each factor being recorded in each class.

Assessing the validity of latent class model

A range of sensitivity analyses were carried out to ensure that the findings were robust. Given the large number of cases and indicators, it was important to check that the maximum-likelihood solutions were identified across all models (increasing the iteration limits if necessary). Multigroup invariance models were carried out to test whether the same latent class solution could be applied equally across different LAs and across different years. This was achieved by comparing the BIC and AIC values of invariant and configural multi-group models (Kankaraš *et al.*, 2012). In the invariant models, the latent class loadings are fixed to be equal across groups (homogeneity is assumed). In the configural models, they are allowed to be freely estimated across groups (heterogeneity is assumed). If the BIC and AIC values are lower in the invariant models then the homogeneity restrictions are supported by the data which implies that the latent class solution can be applied in the same way across all groups. Only LAs whose boundaries were consistent between 2014 and 2021 were included in the invariant analysis ($n = 147$). Since some children may have multiple assessments as part of a CSC episode

and some children may have multiple CIN episodes, additional sensitivity analysis was carried out to compare first 'known' assessments separately with subsequent assessments (for children who had multiple assessments). The LCA categories were not found to be substantively different in the two groups (i.e. the same eleven-class LCA solution emerged for both groups).

All latent class models were estimated using LatentGOLD version 6.0. Included in the Supplementary Appendix is R and SPSS code that can be used to classify new observations based on the latent class model used in this article. This might be useful for LAs who wish to apply this same model to their administrative data or to carry out latent class modelling of their own.

Stakeholder consultation

The results of the LCA were shared with a range of stakeholders in order to help the research team define and interpret the categories, particularly those consisting of multiple complex needs. Consultation took the form of separate online meetings with five different stakeholder groups: parents with lived experience of CSC services ($n = 5$); young people with lived experience of CSC services ($n = 6$), practitioners and team mangers in CSC ($n = 5$), senior managers and administrators in CSC ($n = 3$) and managers of LA data and performance teams ($n = 6$). The parents' and young people's groups were arranged as part of NCB's ongoing research involving experts by experience. Practitioners, managers and data teams were approached through the research team's professional networks and the Developing Together Social Work Teaching partnership, which covers Southwest London and Surrey. Stakeholders were provided with a summary of the findings in advance. Meetings focused on the labelling of categories, their relevance to people's experience of receiving or providing services and any gaps or limitations in relation to specific areas of need. Feedback from these meetings was used to refine the interpretation of categories and was incorporated into the findings reported below.

Findings

Sample characteristics

Overall, there were 4.2 million assessments carried out between 2014 and 2021, of which 3.6 million (84 per cent) had at least one factor recorded. Following the data cleaning process, and unifying codes to be consistent across years, there were thirty-four factors in total. Appendix tables showing the frequencies of factors recorded and other

characteristics of children whose assessments were completed between 2014 and 2021 can be found in the Supplementary Material. All factors were included as indicators in the LCA model except for 'other'. Assessments where only 'other' was recorded ($n = 470{,}169$) were included as a 'known class', and reported for later analysis.

Results of the LCA

The goodness-of-fit indices did not point to a definitive number of classes as the best representation of the data, which was to be expected given the large number of assessments in the data. Relative decreases in the BIC and AIC scores appeared to level off after the ten-class model, as shown in Figure 1. Comparisons of these fit indices suggest that BIC is the most reliable fit statistic (Nylund *et al.*, 2007). Plateauing of the BIC elbow occurred around this point (indicating a point of 'diminishing returns'). The entropy value (indicating that the classes were distinct from each other) was higher in the eleven-class model (0.74) compared with models with five–ten classes (closer to 0.70). The eleven-class model was therefore selected as the most appropriate model for the data. The model was robust in a range of sensitivity analyses (e.g. it was reproducible across different years), whilst a qualitative assessment of the pattern of conditional probabilities indicated good intra-class homogeneity and

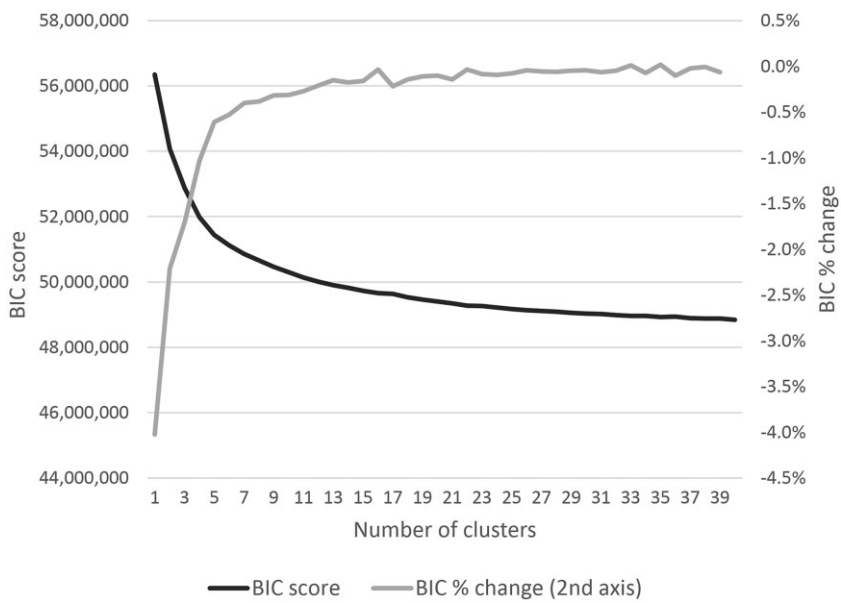

Figure 1: Goodness-of-fit statistics for latent class models examining the factors identified at CSC assessments.

interclass heterogeneity (e.g. fewer very similar classes in context). Each of the eleven classes were interpretable and could be characterised by the research team and by stakeholders, and few felt like duplications of the others. An appendix table showing goodness-of-fit statistics for all the latent class models estimated can be found in the Supplementary Material.

Results from the invariance tests showed that BIC and AIC values were lower in the restricted multi-group models where homogeneity between LAs is assumed (BIC, 44,980,199; AIC, 44,955,543) and where homogeneity between years was assumed (BIC, 45,466,630; AIC, 45,461,020). This implied that the latent class solution can be applied in the same way across different LAs and across different years. The results were sense-checked with sub-group analysis; the classes were substantively similar in a model conducted on 2020/21 assessments (the years affected by the Covid-19 pandemic) compared with a model conducted on all other assessments, and substantively similar in randomly selected LAs. A table showing the full results of invariance testing can be found in the Supplementary Information.

Types of demand in CSC

The frequency of each of the eleven latent classes in the national dataset is shown in Figure 2; a twelfth category constituted of the 470,169 assessments in which only 'other' is also included (not estimated in the latent class model). The features of each class are discussed below with reference to the conditional probabilities which load onto each of the thirty-four possible factors. These refer to likelihood of each factor being recorded in an assessment assigned to the latent class. For example, there was a 75 per cent probability of concerns about the child's parents or carers being subject to DV, and a 30 per cent probability of DV

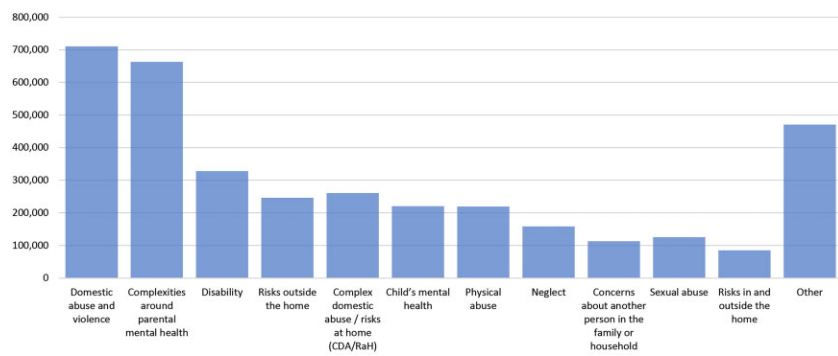

Figure 2: Bar chart showing the frequency of eleven latent classes + 'other' (twelve categories in total).

directed towards the child, being recorded in the 'domestic abuse and violence' (DAV) class. The conditional probabilities associated with each class are presented in Table 1. The labelling and interpretation of categories was carried out in consultation with stakeholders.

(1) Domestic abuse and violence

Domestic abuse and violence was the most common latent class, or category of demand, being assigned to a fifth of all cases. Social workers may select from three types of domestic violence (DV), depending on whether the person subject to abuse and violence is the parent/carer, the child or another person in the household. This category was characterised mainly by concerns about the child's parent or carer being subject to DV, which had a 75 per cent conditional probability. There was also a 30 per cent likelihood of cncerns about the child being subject to DV and a 25 per cent likelihood of emotional abuse being assessed. The category was initially labelled 'Domestic violence' to reflect the terminology used in the statutory guidance. However, consultation with stakeholders suggested that 'Domestic abuse and violence' was a more appropriate term for capturing the complexity of problems experienced in this area. Stakeholders expressed the view that the concept of domestic abuse better captures the range of physical, psychological, emotional and economic harm inflicted by abusive relationships, which includes witnessing the ill-treatment of others.

(2) Complexities around parental mental health

Complexities around parental mental health was the second most prevalent category, assigned to 18.4 per cent of cases. It was characterised mainly by the assessment of concerns about parental mental health, often in combination with concerns about parental drug or alcohol misuse, and sometimes in combination with DV. In addition, there was a 23 per cent likelihood of neglect and 20 per cent likelihood of emotional abuse being recorded within this category. The category was initially labelled 'complex parental mental health' to reflect the high likelihood of parental mental health being assessed with other factors. However, stakeholders suggested that this might lead people to understand that parents had been diagnosed with a complex mental health condition. This could be problematic for two reasons—first, in implying that it is the mental health issue itself that is complex, rather than their being other factors—and second, in implying that the parent had been assessed and supported by a mental health professional.

Table 1. Conditional probabilities of factors estimated in the eleven-class latent class model (plus 'other')

Latent classes Indicators	1. DAV	2. Complexities around parental mental health	3. Disability	4. Risks outside the home	5. Complex domestic abuse/risks at home	6. Child's mental health	7. Physical abuse	8. Neglect	9. Sexual abuse	10. Concerns about another person in the family or household	11. Risks in and outside the home	12. Known class ('other')
Prevalence of categories	20%	18%	9%	7%	7%	6%	6%	4%	3%	3%	2%	13%
Child's alcohol misuse	1%	1%	0%	7%	2%	3%	0%	0%	0%	7%	39%	–
Parent's alcohol misuse	14%	32%	2%	2%	38%	5%	1%	1%	1%	37%	25%	–
Another's alcohol misuse	2%	1%	0%	0%	1%	0%	0%	0%	0%	45%	5%	–
Child's drug misuse	1%	1%	0%	22%	4%	7%	0%	0%	0%	10%	64%	–
Parent's drug misuse	6%	36%	2%	4%	38%	2%	1%	4%	0%	38%	26%	–
Another's drug misuse	1%	3%	1%	2%	2%	0%	0%	1%	0%	52%	9%	–
DV (child)	30%	2%	1%	4%	39%	8%	1%	0%	0%	40%	33%	–
DV (parent)	75%	39%	5%	3%	77%	9%	0%	0%	1%	74%	38%	–
DV (another)	11%	1%	2%	1%	8%	1%	0%	0%	0%	66%	10%	–
Child's mental health	2%	3%	10%	12%	24%	84%	2%	0%	1%	19%	63%	–
Parent's mental health	14%	57%	26%	4%	70%	36%	5%	7%	4%	55%	46%	–
Another's mental health	2%	2%	6%	1%	4%	5%	0%	0%	1%	46%	8%	–
Child's learning disability	2%	2%	49%	5%	12%	14%	2%	0%	2%	7%	18%	–
Parent's learning disability	0%	3%	9%	0%	10%	1%	1%	3%	1%	5%	5%	–
Another's learning disability	0%	0%	7%	0%	2%	1%	0%	0%	0%	6%	3%	–
Child's physical disability	1%	1%	30%	1%	7%	5%	1%	1%	0%	4%	7%	–
Parent's physical disability	1%	5%	16%	1%	11%	7%	1%	1%	1%	7%	12%	–
Another's physical disability	0%	0%	5%	0%	2%	1%	0%	0%	0%	5%	3%	–
Young carer	0%	3%	8%	0%	13%	7%	0%	0%	0%	7%	12%	–

(continued)

Table 1. (continued)

Latent classes Indicators	1. DAV	2. Complexities around parental mental health	3. Disability	4. Risks outside the home	5. Complex domestic abuse/risks at home	6. Child's mental health	7. Physical abuse	8. Neglect	9. Sexual abuse	10. Concerns about another person in the family or household	11. Risks in and outside the home	12. Known class ('other')
Prevalence of categories	20%	18%	9%	7%	7%	6%	6%	4%	3%	3%	2%	13%
Privately fostered	0%	0%	0%	2%	1%	0%	0%	0%	0%	1%	2%	–
UASC	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	1%	–
Going/being missing	0%	0%	0%	16%	2%	5%	0%	0%	0%	1%	49%	–
Child sexual exploitation	0%	0%	2%	20%	2%	8%	0%	0%	6%	2%	43%	–
Trafficking	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	5%	–
Gangs	0%	0%	0%	14%	1%	0%	0%	0%	0%	1%	25%	–
Soc. unacc. behaviour	2%	2%	7%	39%	9%	14%	2%	2%	2%	9%	61%	–
Self-harm	0%	0%	2%	4%	7%	36%	1%	0%	1%	4%	38%	–
Neglect	4%	23%	11%	6%	53%	9%	9%	100%	3%	38%	39%	–
Emotional abuse	25%	20%	5%	5%	81%	16%	20%	8%	6%	51%	44%	–
Physical abuse	10%	2%	3%	2%	44%	7%	100%	0%	0%	22%	23%	–
Sexual abuse	1%	1%	3%	3%	8%	7%	3%	2%	100%	4%	17%	–
FGM	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	–
Faith/belief	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	–
Other	–	–	–	–	–	–	–	–	–	–	–	100%

(3) Disability

The disability category was assigned to just over 9 per cent of assessments. It was mainly constituted by children with disabilities but also included some children who were not recorded as having a disability themselves but had parents with a disability and/or mental health problems. The most likely factor to be recorded was concerns about the child's learning disability, followed by concerns about a physical disability or illness of the child. Stakeholders reflected on the differing definitions and terms used around childhood disability. Although social care legislation defines all disabled children as being CIN, not all children who receive support in school for their special educational needs and/or disability will receive a social care assessment. Stakeholders also suggested that young people with an autistic spectrum disorder may be subject to risks around their mental health and extra-familial harm (EFH), whilst not always having their condition recognised by social care services.

(4) Risks outside the home

Risks outside the home accounted for 6.8 per cent of assessments. This category was characterised by concerns about children's risk-taking behaviour and vulnerability to criminal and sexual exploitation outside the home. The category was not dominated by a single factor, with socially unacceptable behaviour, child's drug misuse and child sexual exploitation amongst the most likely to be assessed. The category was originally labelled as 'vulnerable young person', partly to overcome the child-blaming connotations of socially unacceptable behaviour or gang involvement but instead emphasise risks to the welfare of (usually older) children in this group. However, consultation with stakeholders raised the issue that effectively all the categories were about vulnerable children and young people, not just this one. Consideration was given to 'Extra-familial harm (EFH)', which is a professional term used in England to describe abuse and exploitation of children occurring outside of the family system. In the end, 'risks outside the family home' was preferred as a broader label that also offered a way of distinguishing between this group and another category where EFH was also a concern.

(5) Complex domestic abuse/risks at home

The complex domestic abuse/risks at home category was assigned to 7.2 per cent of assessments. It was defined by a combination of risks to the child's welfare at home, the most likely being DAV, often in combination with parental mental health problems and sometimes with parental substance misuse. There was a very high likelihood of concerns about

emotional abuse and a strong chance of neglect and physical abuse being assessed in these cases. The range of possible concerns made labelling and interpreting this category quite difficult. Initially, the term 'complex domestic abuse and violence' was used as a way of acknowledging the frequent identification of DV in these cases whilst drawing a distinction with the other main DV category. In consultation with stakeholders, it seemed important to highlight the wider breadth of risks and the significant risk of maltreatment in these cases, whilst also pointing to the contrast with the EFH categories identified elsewhere.

(6) Child's mental health

Child's mental health was characterised by concerns about the mental health of the child, sometimes in combination with suspected or actual self-harm, or with concerns about the parent's mental health. Concerns about emotional abuse or the child's learning disability were also identified in some cases. Stakeholders did not raise the same concerns with the reference to 'mental health' in this category as they did with those relating to parental mental health. However, it should not be assumed that children in this category have received a clinical diagnosis or treatment for their mental health.

(7–9) Physical abuse, neglect and sexual abuse

Three categories were characterised almost entirely by a single factor of abuse or neglect. Physical abuse was the most prevalent of these, accounting for 6.1 per cent of assessments. There was a 20 per cent probability of emotional abuse co-occurring with physical abuse in these cases. The neglect category accounted for 4.4 per cent of assessments, in which it was generally the only factor recorded. Finally, the sexual abuse category accounted for 3.5 per cent of assessments, in which it was generally the only factor recorded.

(10) Concerns about another person in the family or household

Concerns about another person in the family or household accounted for just over 3 per cent of assessments. It was characterised by the co-occurrence of parental risk factors with concerns about another person in the family or household. The most likely factors to be identified were DV and mental health problems, along with concerns about drug or alcohol misuse. The risk of emotional abuse or neglect was also likely to be assessed in these cases. Stakeholders suggested that it would be important to clarify that concerns could be about someone who is effectively part of the child's family (e.g. parents' partners, siblings and other

relatives who provide care to the child) as well as any unrelated people who may be in the same dwelling (e.g. lodgers, other adults in emergency accommodation). Whilst these two potential categories of person are not explicitly mentioned in the relevant factors at assessment, stakeholders suggested that this was an important distinction in terms of understanding and managing the risk to the child.

(11) Risks in and outside the home

Risks in and outside the home were the least prevalent category, assigned to 2.4 per cent of assessments. It was defined by a combination of concerns about EFH alongside problems within the family home. Key combinations included the child's own needs (e.g. substance misuse and mental health), behavioural issues (e.g. going/being missing), concerns about criminal exploitation (e.g. CSE and gang involvement) together with concerns about domestic abuse, emotional abuse and/or neglect. The category was originally labelled 'Extra-familial harm' but after consultation it was felt important to acknowledge the presence of problems inside the family home in many of these cases.

(12) Other

The 'other' category was assigned to assessments where 'other' was the only factor recorded. It accounted for 13.1 per cent of assessments. They were not included in the LCA so there are no conditional probabilities or probability means to report. This category naturally presents problems of interpretation because it contains no information about need, other than that the social worker completing the assessment apparently considered none of the other listed factors to be relevant. Consultation with practitioners and managers about the reasons for this suggested that time pressures on social workers could play a role, as could organisational culture and practices around data and reporting. For example, in some LAs, it is the convention to report a single factor rather than several different ones, making it more likely that 'other' will be selected in complex cases where there are multiple needs.

Discussion

The findings show that it is possible to categorise demand for CSC in England using the factors identified in social work assessments. Quantitative analysis of a large national data-set yielded twelve latent classes that were found consistently both over time and across different LAs. These classes broadly resemble those described in Hood *et al.*'s

(2021) study of assessments in six LAs. However, the size of the data-set led to more differentiation, including distinctive categories in relation to EFH, domestic abuse, and risks from other members of the household. Services wishing to study their own demand using these categories are welcome to use the template and code made available in the Supplementary Material to this article. There are potential applications for operational and planning purposes, as well as for understanding how risk and need are conceptualised and acted on by children's services. Equally, the study raises questions about whether this is the right way to categorise demand, whether assessments are recording the right things and what other measures might provide for other kinds of valuable insight.

Before discussing these issues, it is worth pointing out some limitations with the methodology itself. First, whilst the LCA procedure is transparent and replicable, interpretation is involved in selecting the class solution (i.e. the number of categories) and in describing the factor combinations. This is one reason why we wanted to consult with stakeholders on the initial findings and to highlight some of the choices involved in labelling the categories. Second, there are well-known issues with data quality in this area, such as inconsistency in whether and how many factors are recorded by different workers or in different areas. The validity and reliability of the factors, e.g. whether social workers have similar issues in mind when they record a particular factor, or whether they would record factors for similar cases in the same way, have not been verified in the same way as they would be for a psychometric questionnaire. Third, the administrative data cannot provide the same holistic picture of children and their needs that is contained in written reports and case histories. It is important to bear in mind that every child's situation is unique and may not be adequately represented by factors selected from a checklist. Moreover, further work is needed to examine questions that lay beyond the scope of this article, such as the relationship between demand categories and intervention pathways after assessment, or the analysis of repeat assessments.

With these limitations in mind, there are nonetheless benefits to examining demand for CSC through the lens of administrative data on assessments. Since these categories derive from the risk factors identified by social workers, they are explicitly linked to the professional and institutional priorities of child welfare agencies. As Hood *et al.* (2021) point out, this makes them a valuable evidence-based tool for planning and designing services. Unlike aggregate figures on provision, they are informative about the range of problems that agencies are required to address. In contrast to crude labels such as the 'toxic trio', they are also sensitive to the multiplicity of needs experienced by children whilst offering a degree of nuance and differentiation. This is particularly apparent in relation to DAV. In our consultation with social workers, DAV was

discussed as one of many factors (albeit the most prevalent one) driving a variety of demand, although the experience of child welfare professionals is that DAV often constitutes the bulk of their workload. Previous work (Hood *et al.*, 2021) suggests that cases of multiple complex needs, in which DAV is a significant component, are more likely to proceed to CP and accommodation in care, and so occupy more of social workers' time and attention. It may also be that where DAV co-exists with other factors, such as parental mental health problems, practitioners will attach more salience to the former as a source of harm. Nonetheless, our analysis reinforces the view that DAV in child welfare is a complex phenomenon that does not lend itself to one-size-fits-all frameworks of assessment and response (Ferguson *et al.*, 2020), and that the basis for operational judgements, e.g. about the severity and likelihood of harm, needs to be better understood.

The findings also point to some interesting distinctions in relation to EFH. This is a major area of concern for CSC services in England, due to increased awareness of child criminal and sexual exploitation, regulatory scrutiny following a series of scandals and the high cost of specialist care placements for adolescents with complex needs (Wroe and Lloyd, 2020). In response, agencies have found it necessary to adapt conventional CP procedures, which tend to focus on harm within the family system, in order to address a broader range of influences on children's development and safety—an approach sometimes termed 'contextual safeguarding' (Firmin, 2020). The findings from this study suggest that assessments in this area fall into two main categories: one in which risks are perceived to be entirely outside the home and another (less prevalent) group in which these risks are combined with factors within the family. This is likely to be down to a combination of assessment practices as well as children's profile and situation. For example, cases in the first category might include children and young people who are considered to be 'beyond parental control', leading practitioners to focus on their peer relationships and activities in the community. The second category might include children and young people whose vulnerability to exploitation and abuse outside of the home arises in the context of a problematic home life. However, this kind of contrast is troubling because it raises the question of whether some children are more likely to be viewed exclusively through the lens of child criminal exploitation or gang involvement, and as putting themselves at risk, whilst others receive a more holistic appraisal of their situation. Recent research into adultification in child safeguarding suggests that racial and ethnic biases may play into such distinctions (Davis and Marsh, 2020). It is also possible that cases that are initially treated as being about 'risks outside the home' become subject to more comprehensive assessment of children's family life when they are referred multiple times to CSC services. By implication, ongoing efforts to tackle EFH will require sensitivity to the variety of demand, perseverance with the creative and innovative aspects of contextual safeguarding and attention to

the underlying drivers of demand. Universalising frameworks, on the other hand, run the risk of encouraging procedural approaches to assessment and intervention, which will not address the complexity of the work and may reproduce inequalities in provision.

The examples of DAV and EFH highlight the importance of being able to validate the relative frequency of certain combinations of factors, for example, when designing (or justifying) new models of prevention and intervention, or considering which areas to prioritise for funding and resources. They also point to the difficulty of distinguishing between assessment practices and the nature of children's needs, something of particular relevance to evidence based on administrative data. The problem is less about data quality (although this matters too) but more epistemological questions: how do we construct knowledge about people's lives, and who has the power to tell the stories that count (or are counted)? In this respect, the needs identified in social work assessments are a one-sided story, told by professionals and mediated by the state. On a conceptual as well as methodological level, the categories reflect the nature of the checklist provided to practitioners, for example, in being geared towards individual or family-level issues such as mental health, domestic abuse or anti-social behaviour, rather than broader community or societal issues, such as poverty or access to services. The obvious question arises as to how children and families would themselves describe their needs and the kind of help they want—bearing in mind that many children assessed by CSC will not be considered 'in need' of any kind of statutory service, let alone protective intervention. Such descriptions are not routinely collected by CSC services, although they may well be recorded somewhere (as text) in the main body of assessments. From an organisational systems perspective, it has been argued that measuring and acting on what matters to people are one of the fundamental principles of designing people-centred services. Categories based on professional risk assessment could therefore be complemented by different kinds of measures, which capture in their own terms how children and young people would want to improve their everyday lives (Hood, 2019).

Conclusion

This article has outlined the results of a LCA of demand for CSC services based on the needs identified in social work assessments. Evidence was found for twelve main categories, representing predictable combinations of need that were consistently present over time and across LAs. The categories are a useful addition to conventional measures based on aggregate figures at different thresholds of provision or within broad classifications such as domestic abuse. Further examination and profiling of these categories in their local context may contribute to the planning and design of

services, for example, in relation to EFH or child and adolescent mental health. The process of interpreting and critiquing the categories adds value to the knowledge and experience held by practitioners and managers, helping to align the textual information gathered in assessments with the statistical data used for performance management. Further work is planned to demonstrate some of the analytical possibilities, including a longitudinal analysis of outcomes for different types of demand. Finally, the study points to the need to balance professional categories derived from risk assessment with more people-centred measures.

Supplementary material

Supplementary material is available at *British Journal of Social Work Journal* online.

Funding

The project has been funded by the Nuffield Foundation (grant number FR-000022960), but the views expressed are those of the authors and not necessarily the Foundation. Visit www.nuffieldfoundation.org.

References

Armour, C., Elklit, A. and Christoffersen, M. N. (2014) 'A latent class analysis of childhood maltreatment: Identifying abuse typologies', *Journal of Loss and Trauma*, **19**(1), pp. 23–39.

Bailey, K. D. (1994). 'Numerical taxonomy and cluster analysis', in Bailey, K.D. (Ed) *Typologies and Taxonomies*, London, Sage, pp. 34–65.

Brandon, M. (2009) 'Child fatality or serious injury through maltreatment: Making sense of outcomes', *Children and Youth Services Review*, **31**(10), pp. 1107–12.

Celeux, G. and Soromenho, G. (1996) 'An entropy criterion for assessing the number of clusters in a mixture model', *Journal of Classification*, **13**(2), pp. 195–212.

Davis, J. and Marsh, N. (2020) 'Boys to men: The cost of 'adultification' in safeguarding responses to Black boys', *Critical and Radical Social Work*, **8**(2), pp. 255–9.

Department for Education. (2020) 'Children in need census 2020 to 2021: Guide for local authorities', available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908363/Children_in_need_census_2020_to_2021_guide_v1.1.1B.pdf (last accessed February 5, 2021).

Department for Education. (2022) 'Characteristics of children in need: 2021–2022 (England)', available online at: https://explore-education-statistics.service.gov.uk/find-statistics/characteristics-of-children-in-need (last accessed February 5, 2023).

Ferguson, G., Featherstone, B. and Morris, K. (2020) 'Framed to fit? Challenging the domestic abuse 'story' in child protection', *Critical and Radical Social Work*, **8**(1), pp. 25–40. https://doi.org/10.1332/204986019X15668424450790.

Firmin, C. (2020) *Contextual Safeguarding and Child Protection: Rewriting the Rules*, Abingdon, Routledge.

Hagenaars, J. A. and McCutcheon, A. L. (2002) *Applied Latent Class Analysis*, Cambridge, Cambridge University Press.

Hood, R. (2019) 'What to measure in child protection?', *The British Journal of Social Work*, **49**(2), pp. 466–84.

Hood, R., Goldacre, A., Webb, C., Bywaters, P., Gorin, S. and Clements, K. (2021) 'Beyond the toxic trio: Exploring demand typologies in children's social care', *The British Journal of Social Work*, **51**(6), pp. 1942–62.

Kankaraš, M., Moors, G. and Vermunt, J. K. (2012) 'Testing for measurement invariance with latent class analysis', in Davidov, E., Schmidt, P. and Billiet, J. (eds), *Cross-Cultural Analysis*, Abingdon, Routledge, pp. 381–406.

Lucas, S. and Archard, P. J. (2021) 'Early help and children's services: Exploring provision and practice across English local authorities', *Journal of Children's Services*, **16**(1), pp. 74–86. https://www.emerald.com/insight/publication/issn/1746-6660#earlycite.

McCutcheon, A. L. (1987) *Latent Class Analysis*, London, Sage.

Nylund, K. L., Asparouhov, T. and Muthén, B. O. (2007) 'Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study', *Structural Equation Modeling: A Multidisciplinary Journal*, **14**(4), pp. 535–69.

Peckover, S. (2014) 'Domestic abuse, safeguarding children and public health: Towards an analysis of discursive forms and surveillant techniques in contemporary UK policy and practice', *British Journal of Social Work*, **44**(7), pp. 1770–87.

Rivera, P. M., Fincham, F. D. and Bray, B. C. (2018) 'Latent classes of maltreatment: A systematic review and critique', *Child Maltreatment*, **23**(1), pp. 3–24.

Romano, E., Zoccolillo, M. and Paquette, D. (2006) 'Histories of child maltreatment and psychiatric disorder in pregnant adolescents', *Journal of the American Academy of Child and Adolescent Psychiatry*, **45**(3), pp. 329–36.

Shin, S. H., Hong, H. G. and Hazen, A. L. (2010) 'Childhood sexual abuse and adolescent substance use: A latent class analysis', *Drug and Alcohol Dependence*, **109**(1–3), pp. 226–35.

Skinner, G., Bywaters, P., Bilson, A., Duschinsky, R., Clements, K. and Hutchinson, D. (2021) 'The "toxic trio" (domestic violence, substance misuse and mental ill-health): how good is the evidence base?', *Children and Youth Services Review*, **120**, 105678, available online at: https://doi.org/10.1016/j.childyouth.2020.105678.

Stewart, S. and Arnull, E. (2023) 'Mothers, domestic violence, and child protection: The UK response', *Violence against Women*, **29**(3–4), pp. 626–47, available online at: https://doi.org/10.1177/10778012221097141.

Wroe, L. E. and Lloyd, J. (2020) 'Watching over or working with? Understanding social work innovation in response to extra-familial harm', *Social Sciences*, **9**(4), p. 37.

Yan, S., Kwan, Y. H., Tan, C. S., Thumboo, J. and Low, L. L. (2018) 'A systematic review of the clinical application of data-driven population segmentation analysis', *BMC Medical Research Methodology*, **18**(1), pp. 1–12.

Ziobrowski, H. N., Buka, S. L., Austin, S. B., Sullivan, A. J., Horton, N. J., Simone, M. and Field, A. E. (2020) 'Using latent class analysis to empirically classify maltreatment according to the developmental timing, duration, and co-occurrence of abuse types', *Child Abuse & Neglect*, **107**, p. 104574.