



Parental risk factors and children entering out-of-home care: The effects of cumulative risk and parent's sex

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ABSTRACT

Background: Parental difficulties, including mental ill health, substance misuse, domestic violence and learning disability have been associated with children entering out-of-home care. There is also evidence that these issues may co-occur within families. Understanding how the co-occurrence of these difficulties is associated with care entry is complex because they may co-occur in the same or different household members and have different impacts on the likelihood of care entry when they occur in mothers, fathers or in single parent households.

Method: Administrative data from local authority children's services in Wales were linked with demographic data to identify households in which children lived prior to entering care. Linkage to birth data identified biological mothers. Linkage with primary care, emergency department, hospital admissions and substance misuse services data enabled indicators of substance misuse, mental health, assaults in the home, learning disability and neurodivergence in the adults in those households to be identified. A series of multilevel binary logistic regression models were used to explore the odds of a household having one or more children entering care if risk factors were present. These considered the effects of individual risks, and cumulative risk both in individual adults in the household, and across the whole household. The effects of the number of adults, having adults with no risks and the differential impacts of risks in biological mothers, other women or men were also explored. Additional models explored these factors in single adult households.

Results: Cumulative risks increased the likelihood of care entry, however this effect disappeared when individual risks were controlled for. The presence of an individual with no risks in the household acted as a protective factor. Overall, the impact of the risks on the odds of care entry was substantially greater if the risks were present in the biological mother than if they occurred in other adults (men or women) in the household. In single adult households risk factors had a much greater impact when they occurred in households headed by women as opposed to men.

Conclusion: Substantial differences in the effects of risk factors in female and male adults are apparent and further research is needed to understand why this is occurring to ensure that parents are treated equally in terms of support and statutory intervention regardless of their sex.¹

1. Background

The association between certain parental risk factors including

substance misuse, mental health, domestic violence and learning disability, and children's involvement in social care in the UK has been much discussed over the last few decades (Skinner et al., 2020). These

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¹ Throughout this paper we refer to the "sex" of the parents /adults in households, as opposed to their "gender." This is because in the analysis we carried out the sex of these individuals was determined by their GP records. We have chosen to use the term "sex," rather than "gender," as we believe this data is more likely to reflect their biological sex, rather the gender that the individuals identify as.

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risk factors were highlighted by Cleaver and Freeman (1995) as being more prevalent among families where there are concerns about child abuse and have been identified as risk factors for children experiencing serious harm (Sidebotham et al., 2016). Parental mental health and substance misuse have also been associated with an increased likelihood of children entering out-of-home care (Franzén et al., 2008, Simkiss et al., 2012) and receiving care orders (Johnson et al., 2021). Johnson et al (2021) also explored the effects of two forms of neurodivergence in the parents of children who receive care orders: Autistic Spectrum Disorders (ASD) and Attention Deficit Hyperactivity Disorder (ADHD). Both conditions were more common in the parents of children who receive care orders. That study did not consider additional forms of neurodiversity including types of specific learning difficulty. However, feedback from parents of children involved in children's social care, who were consulted as part of our study, highlighted how literacy problems affected their ability to engage with social services, and so it is plausible that learning difficulties may also impact on the likelihood of entry to out-of-home care (henceforth 'care entry').

While there is evidence for certain parental risk factors increasing the likelihood of care entry there is a lack of evidence about the interrelationship between these risk factors and how they affect the likelihood of child maltreatment and subsequent care entry. Skinner et al (2020) carried out a review of the "toxic trio," a term sometimes used to describe parental domestic violence, mental health, and substance use and occasionally learning disability, and their relationship with child abuse and neglect. The review highlighted that while associations between these individual factors and abuse and neglect have been identified, the evidence about many aspects of this relationship is limited by a paucity of evidence for the interaction of these factors. Their review examined 20 studies comparing at least two "toxic trio" factors on child maltreatment outcomes, however only one of these, Hood et al (2020), appears to provide evidence that when multiple risks are present together children are more likely to enter care. This study used latent class analysis to categorise the factors identified by social workers at social work assessment in six local authorities in England. This showed that where there were multiple complex needs in the family children were more likely to be 'looked after' by a local authority (the term in the UK for being in the care of the state). There was a similar finding in a more recently published paper (Anthony et al., 2021), which used latent class analysis to look at children in receipt of care and support by local authorities in Wales, and found those individuals with multiple adversities were the most likely to be looked after.

Both of these studies used unlinked social care data to identify parental problems. This provides a good understanding of the family problems, as local authorities perceive them, and their relationship with care entry. However, it is limited to what the local authorities know about and how they perceive the family's problems. The use of social care data linked to other sources of administrative data is a good alternative to this. Where social care data is linked to health data it enables the household problems to be identified based on individuals' involvement with health services, rather than solely on local authorities' perception of the problem, and so is arguably less subjective.

Linked social care and health data also provide an opportunity to look at the effects of risk factors in both individual parents and entire households. This may be key to understanding the interrelationship between risks and the likelihood of children entering care. Children come from households of various sizes and compositions. However, it is unclear how the makeup of those households influences the impact of parental risk factors on the likelihood of care entry. For example, being from a single parent family has been identified as a predictor of care entry (Bebbington and Miles, 1989; Franzen 2012, Simkiss et al., 2012), but it is not known whether the occurrence of these problems in a single parent household impacts care entry in a different way from their presence in a household where more than one adult is present. The presence of an adult in a household without a problem has also been suggested as a protective factor in preventing care entry (Forrester and

Harwin, 2008), but we do not know whether this or the number of adults in a household has a bigger impact on care entry in households where these risks are present.

Reviews have brought together a body of evidence suggesting that children's services are more likely to be involved with mothers as opposed to fathers (Gordon et al., 2012; Maxwell et al., 2012; Zanon et al., 2013). Factors affecting this tendency can be identified at the level of the individual, family, service provider, programme, community and policy (Gordon et al., 2012). In terms of service provision, it has been consistently argued that the lens of child protection is biased towards an analysis of mothering, with fathers often out of view (Milner, 1993; Featherstone, 2003; Scourfield, 2003; Philip et al., 2019). However, much of this evidence is exclusively qualitative, with a lack of quantitative evidence on this issue. It is unclear whether this overall tendency translates into differences in the likelihood of children entering care when particular parental risks are present in mothers, fathers or different members of the household. In considering how the sex of the parent affects the impact of risks on the likelihood of care, it is worth considering effects both in households with multiple adults and those headed by a lone adult. Haworth's (2019) review highlights how social workers do not fully engage with single fathers or understand their needs. However, it is not known if this translates into any differences in the effects that risk factors have on the likelihood of care in single parent households headed by men as opposed to those headed by women.

This study set out to understand some of these issues by using linked administrative health and social care data with national coverage (Wales, UK). This data set enables biological mothers of individuals and other adults living within their household to be identified, so within the constraints of this data it set out to answer the following questions:

1. What are the associations between different parental risk factors and the likelihood of a child entering care?
2. What are the impacts of both cumulative risk in an individual in a household, and in the overall household on the likelihood of a child entering care, and what are the impacts of having an individual in the household with no risks?
3. What are the differential impacts of risks if they occur in a child's biological mother, or an adult man, or another woman in their household?
4. What are the differential impacts of these risks in single parent households headed by women and by men?

2. Methods

2.1. Study design

This was a retrospective, national-scale, observational e-cohort study of children entering care in Wales. Welsh anonymised individual-level, linked administrative health and social care datasets were accessed through the Secure Anonymised Information Linkage (SAIL) Databank (<https://saildatabank.com>). The SAIL databank is a privacy-protecting Trusted Research Environment that holds anonymised population-scale data pertaining to the population of Wales (Ford et al., 2009).

2.2. Data sources and linkage

This study used the Welsh Demographic Service dataset (WDDS) to construct a dataset of households in Wales with at least one child between the age of three and 17 between the beginning of April 2016 and the end of March 2020. This was linked to the datasets listed in Table 1. Further information about all datasets is available on the Health Data Research Innovation Gateway (2023).

2.3. Study Population: Children entering care

The Looked After Children Wales (LACW) dataset was used to

Table 1
Datasets Used.

Dataset	Description	Used to identify
Looked After Children Wales (LACW)	Information collected by local authorities and submitted annually to Welsh Government about looked after children. Provides information about demographics and episodes in care	Children who entered care, local authorities from which they entered
Welsh Demographic Service Dataset (WSDS)	Register of all individuals registered with a Welsh GP, includes individuals anonymised address and practice history	Household members living with children prior to care entry and local authorities in which they were based Deprivation level
National Community Child Health Dataset (NCCHD)	Information from the Child Health System in Wales including birth registration with links to both children and their biological mothers	Biological mothers
Welsh Longitudinal General Practice Dataset (WLGP)	Attendance and clinical information for all interactions with general practices registered to share their data with the SAIL Databank. This includes patients' symptoms, investigations, diagnoses, prescribed medication and referrals to tertiary care	Risk factors
Patient Episode Database for Wales (PEDW)	All inpatient and day case activity undertaken in NHS Wales plus data on Welsh residents treated in English Trusts.	Risk factors
Emergency Department Dataset (EDDS)	Clinical and attendance information about all attendances at Accident and Emergency (A & E)	Risk factors
Substance Misuse Dataset (SMDS)	Data on individuals presenting for substance misuse treatment in Wales	Risk factors

identify children aged three to 17 who had entered care between April 2016 and March 2020 ($n = 4,958$). Children who entered care for short-term break arrangements only, were not included as these children enter care only temporarily to provide their families with respite (Welsh Government, 2021). Unaccompanied asylum seekers were not included in the analysis as their original households were by definition not located in Wales and the SAIL data would not contain information about their parents. Anonymous Linking Fields (ALFs) (Ford et al., 2009) were used to match these children to the Welsh Demographic Service Dataset (WSDS). Initial analysis highlighted the poor match quality for the children aged two and under in the LACW dataset. This occurs because there is more information available about the school age children in the LACW dataset to enable the matching to occur. The process to derive ALFs for datasets in the SAIL Databank is carried out by a third party and uses information such as name, gender, postcode and date of birth. For the LACW dataset it also uses children's Unique Pupil Number (UPN) (Allnatt et al., 2022). The UPN is provided to children when they start in state-funded nursery or primary school. So, much more information is provided to the third party to enable them to derive the ALFs for school age children. Because of the poor quality of the matching for the under 3s it was decided to limit this analysis to households containing children aged three to 17. The number of children with ALFs in the LACW dataset were enhanced by re-linkage to additional social care and education datasets (Melis et al., 2023) (See Appendix A for more information). Once this was complete, 4,657(93.9 %) of the children who entered care had an ALF enabling them to be matched.

To identify the households where children were living on the day before entering care, Residential Anonymous Linking Fields (RALFs)

were used. These use GP registrations so that individuals registered with a GP at the same address can be linked (Rodgers et al., 2009). Of the 4,657 linkable children that entered care, 4,308 (92.5 %) could be matched to a RALF for addresses in Wales on that date, and these were used to define the households from which someone entered care. The 4,308 children who entered care matched to 2,885 RALFs.

2.4. Comparator population

Comparison households (containing at least one child between the ages of three and 17 years but from which no one had entered care between April 2016 and March 2020), were derived from RALFs in the Welsh population. To ensure that the comparison households accurately mirrored the households from which a child entered care, the distribution of care entry over the four-year period was explored. Index dates for a child's entry into care were taken from the LACW dataset. Where a child entered care more than once during the period the first date of care entry within the four-year period was used and where households had more than one child entering care on different dates in the period the date of the first child to enter care was used for the household.

To create the comparison population, RALF based households which had a least one child between the ages three and 17 years at some point over the four-year period, but from which no one entered care, were randomly assigned 'pseudo' care entry index dates. These were distributed over the whole four-year period with a distribution equivalent to the RALFs from which someone had entered care. Any additional RALFs that did not contain a child aged between three and 17 years on the specific 'pseudo' care entry date allocated to them were then removed. Households were removed from the dataset if they included more than 10 individuals, as these may be indicative of individuals living in institutions. This delineation has been used in previous studies exploring households with adverse childhood experiences (Evans et al., 2020). Households were also removed if they contained no adult aged over 18. The NCCHD was used to identify children's biological mothers. In order to provide a household status of biological mother and to prescribe characteristics of biological mothers at the household level, a reference child was used. In cases where at least one child entered care this was the first child to enter care during the period. For comparison households this was a random child. Households were excluded if their reference child could not be matched to a biological mother, or if they were matched to an individual that was either less than 14 years old or greater than 55 when the reference child was born. Additional households were removed if data identifying their local authority was missing. This data was required in order to control for local authority effects in models (see analysis below).

This resulted in 274,526 households with 2,535 households where children entered care and 271,991 comparison households. Biological fathers could not be identified from the data available, therefore the remaining adults were classified as either men, or other women. Fig. 1 shows the numbers of households that had to be excluded from the analysis.

2.5. Measures

All adults in cases and controls were linked to health datasets to identify the following risk factors: drugs, alcohol, assault at home, bipolar disorder, schizophrenia, other psychotic disorders, anxiety, depression, eating disorders, self-harm, learning disability, learning difficulties, ADHD and ASD. 'Learning disability' was used to refer to people who have a significantly reduced ability to understand new or complex information and new skills and a reduced ability to cope independently, while 'learning difficulty' described those with scholastic difficulties.

Risk factors were identified from a combination of datasets: Welsh Longitudinal General Practice Dataset (WLGP), Emergency Department Dataset (EDDS), Patient Episode Database for Wales (PEDW) and

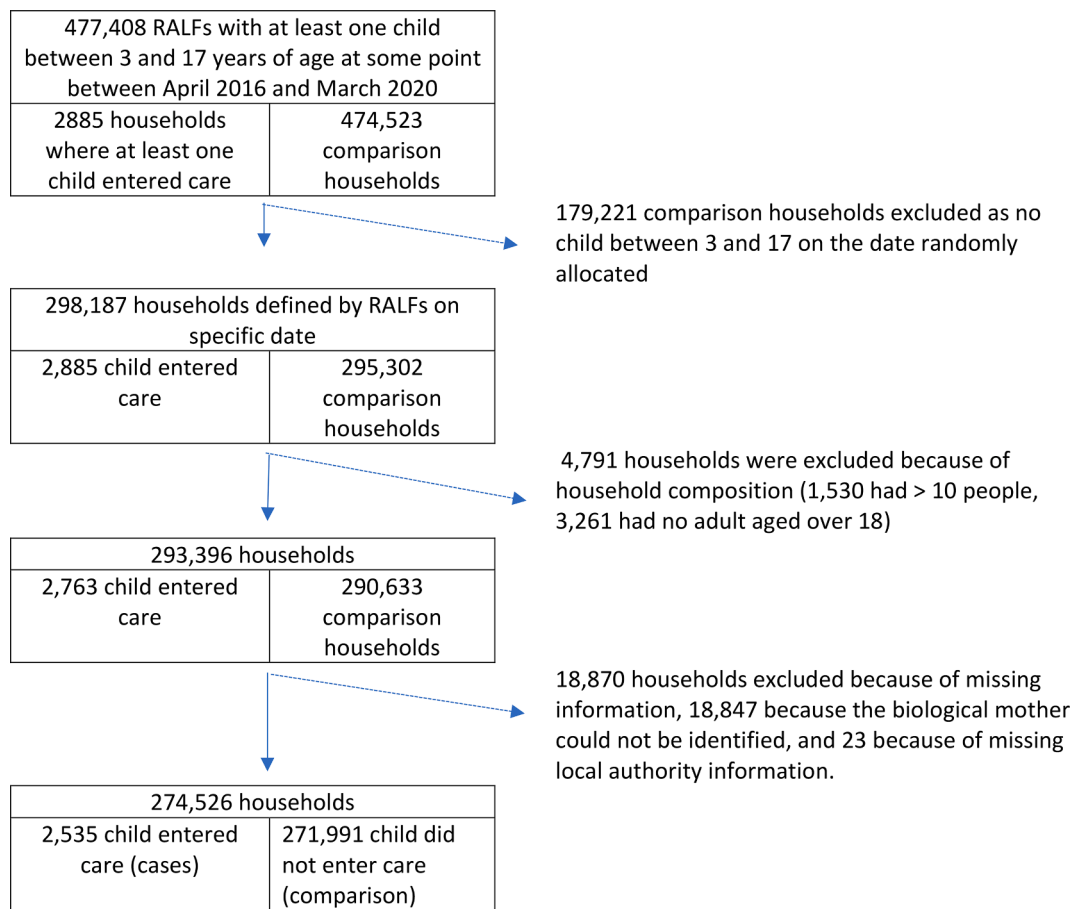


Fig. 1. Numbers of households removed from Household dataset.

Substance Misuse Dataset (SMDS). Risks were identified from WLGP data using published Read code lists. IC10 codes were used to identify risk factors in PEDW and EDDS using published code lists. Appendix B provides details of all codes used in defining variables. While we are aware that parental domestic abuse is often discussed as one of the factors strongly associated with care entry, because of the quality of data we could not identify a variable that could properly encompass this. However, a related variable, assault at home, was derived from EDDS and used to identify individuals who presented at Accident and Emergency departments because they were the victim of an assault that had occurred within their own homes. The substance misuse dataset was used to identify those receiving NHS substance misuse services for either alcohol or drug problems. Indications of risks from each of these different sources were combined to indicate if the individual had a risk from any of these sources. For certain variables, bipolar disorder, schizophrenia, learning disability, learning difficulties, ADHD and ASD then any diagnosis of the disorder at any time was taken as a risk factor. Drugs, alcohol, assault at home, other psychotic disorders, anxiety, depression, eating disorders and self-harm were only counted as risk factors if they occurred in the two-year period before the child went into care or the pseudo-care date for the comparison population.

To develop a measure of cumulative risk a composite variable was created denoting any mental health problem (bipolar disorder, schizophrenia, other psychotic disorder, anxiety, depression or eating disorder) and a clinical neurodiversity composite variable was created denoting diagnosis with either ASD or ADHD. Cumulative risk for each adult was therefore calculated by adding eight binary variables together (drugs, alcohol, assault at home, any mental health, self-harm, learning disability, learning difficulty, clinical neurodiversity).

Variables denoting the presence of risk at the household level were

derived to indicate if the risks were present in any adult in the household. Additional household level variables were calculated indicating risks were present in the biological mother, in any man or in any other woman in the household. Variables were created to characterise cumulative risk at the household level. These indicated the presence of at least one adult in the household with 3 or more risks on the cumulative risk index and presence of an individual in the household with no risks. Finally, a household cumulative risk index was also calculated, and this showed the total number of risks present in the household from all adults present.

Three variables were developed to use as controls in models, all from information derived from WSD: the number of adults in the household, the age of the reference child and the Welsh Index of Multiple Deprivation (WIMD) decile. The number of adults in the household was used as a numerical variable. The age of the reference child was converted to a binary variable indicating if the reference child was aged 11 or over. WIMD was used to control for deprivation and is a measure of area level deprivation based on small geographical areas called lower layer super output areas comprising of approximately 1500 individuals (Welsh Government, 2019). We controlled for deprivation to compensate for the fact that many of the risks we explored are also related to deprivation. However, we are aware that there are important issues to be explored about the inter-relationship between risk factors and deprivation and their relative impacts on the likelihood of care. These issues are explored in more detail in a different part of this study (Authors forthcoming).

2.6. Analysis

Bivariate analysis was carried out to look at the likelihood of a household having one or more child enter care if the risks were present

in the household. A series of multilevel (households nested in local authorities) binary logistic regression models were used to explore the impacts of the risks in different situations. Parameter estimates are shown as an odds ratio (OR) and accompanied by 95 % confidence interval (CIs) and p-value. The first set of models considered the effects of both individual and cumulative risks. The first stage looked at individual risks in isolation using univariable regression models. Next multivariate Model 1 was run using the individual risks only. This was followed by multivariate Model 2 in which individual and household cumulative risk and the presence of an individual with no risk factors were added. The second set of models considered the variation in effects of the variables when present in biological mothers, adult men or other women in the household. Models were limited to only households with these categories of adults present. Both univariable regression models and multivariate models were run. The variable eating disorder was omitted at this stage as the frequency was too low among the men in the sample to enable the model to be developed. Finally, the third set of models explored the differential effects of the risk factors in single adult households, headed by women and men. Biological mothers and other women were considered together for the single adult households due to the low prevalence of some of the risk factors in the households headed by single other women. Again the analysis included both univariable regression models and multivariate models. Three additional variables (assault at home, other psychotic disorders and ASD) were omitted as they were either not sufficiently prevalent in the households headed by single men or predicted failure of the models. All models were multilevel models to control for the clustered nature of the data as children in Wales enter care through 22 local authority areas. They controlled for deprivation level using WIMD deciles, the age of the reference child, and all (excluding those that related to single adult households) controlled for the number of adults in the household. Because some children, who were identified as entering care in the LACW dataset, could not be matched to households due to the poor quality of matching, a weighting system was used so that care entry rates in models remained representative of care entry rates in the population across each of the 22 local authorities.

3. Results

3.1. Bivariate analysis

Based on the 274,526 households in the analysis, the frequency of all risk factors in the dataset and which individual they are found (biological mother, other adult woman, adult man) is shown in Table 2. It also shows the breakdown in single parent households only (n = 58,292) where headed by a woman or man. The most prevalent risk factor was depression, present in an adult in 24 % of households, followed by anxiety that was present in 13.5 % of households.

Table 3 shows the prevalence of a household having one or more children taken into care by presence of risks. Most risk factors are much more common in households where a child entered care, although ASD is similar in both groups. Among the households from which a child entered care the most common risk factor overall was depression, with 49.8 % of these households having at least one adults who was depressed. However this risk factor is also prevalent among the comparison population, and so the percentage of households that have a child enter care is relatively low at 1.9 %. The variable that increased the chances of care the most was having an individual with more than three risks in the house, with 7.5 % of the households where there was someone with three or more risks having a child enter care. However, the likelihood of care was also increased by almost as much by some of the individual risk factors: 6.7 % of households where an adult had a drug misuse problem and 6.6 % of households from which an adult was the victim of assault at home had a child enter care. The presence of someone in the household with no risks was associated with not entering care, as was having at least two adults in the household.

Table 2
Frequency (%) of risk factors in different individuals in Households.

	Biological Mother	Other adult woman	Adult Man	All individuals
Risk Factors				
Drugs	1,925 (0.8)	609 (0.9)	3,660 (1.7)	6,005 (2.2)
Alcohol	2,245 (0.9)	785 (1.2)	3,919 (1.9)	6,838 (2.5)
Assault at home	395 (0.2)	110 (0.2)	198 (0.1)	693 (0.3)
Bipolar disorder	1,905 (0.8)	484 (0.8)	785 (0.4)	3,144 (1.1)
Schizophrenia	944 (0.4)	333 (0.5)	1,583 (0.7)	2,821 (1.0)
Other Psychotic	236 (0.1)	77 (0.1)	200 (0.1)	512 (0.2)
Anxiety	23,470 (9.3)	5,745 (8.9)	9,961 (4.7)	36,928 (13.5)
Depression	44,661 (17.7)	10,340 (16.0)	19,484 (9.2)	66,023 (24.0)
Eating Disorder	234 (0.1)	156 (0.2)	18 (0.0)	407 (0.1)
Self-Harm	1,680 (0.7)	968 (1.5)	1,732 (0.8)	4,317 (1.6)
Learning Disability	566 (0.2)	480 (0.7)	1,566 (0.7)	2,564 (0.9)
Learning Difficulty	694 (0.3)	606 (0.9)	1,754 (0.8)	3,010 (1.1)
ADHD	922 (0.4)	443 (0.7)	2,780 (1.3)	4,064 (1.5)
ASD	239 (0.1)	338 (0.5)	1,404 (0.7)	1,951 (0.7)
Number of Risks in Household				
Individual with no risks				248,472 (90.5)
Individual with 3 plus risks				3,084 (1.1)
3 plus risks in household				4,016 (1.5)
All households, containing type of adult	252,977	64,463	211,357	274,526
Single Parent Households	Headed by adult woman^a	Headed by adult man		
Drugs	845 (1.6)	132 (2.8)		
Alcohol	799 (1.5)	127 (2.7)		
Bipolar disorder	656 (1.2)	24 (0.5)		
Schizophrenia	332 (0.6)	57 (1.2)		
Anxiety	6,802 (12.7)	299 (6.3)		
Depression	12,964 (24.2)	660 (13.8)		
Self-Harm	654 (1.2)	51 (1.1)		
Learning Disability	191 (0.4)	38 (0.8)		
Learning Difficulty	207 (0.4)	41 (0.9)		
ADHD	344 (0.6)	49 (1.0)		
All households	53,518	4,774		

ADHD = Attention Deficit Hyperactivity Disorder; ASD = Autistic Spectrum Disorder.

a = biological mother or other adult woman.

3.2. Individual vs cumulative risk

Table 4 shows the odds ratios for the first set of models: The unadjusted regression models, Model 1 which shows the effects of the individual risks only, and Model 2 in which effects of cumulative risk and no risks are added. The unadjusted odds ratios show no association between ASD within a household and the likelihood of children entering care, however other risks at the household level are associated with children entering care. Households with a large number of adults, including an individual with no risks and living in a WIMD decile indicating low levels of deprivation are protective factors. When the risk factors are entered in multivariable regression Model 1 then all odds ratios attenuate and the effects of bipolar disorder, other psychotic disorders and eating disorders become insignificant. Odds ratios for anxiety and self-

Table 3
Household risk factors according to whether or not one or more children in the household entered care.

	Households where child entered care (Cases)	Households where child did not enter care (comparison)	% all households which have the risk from which someone entered care
	n (%)	n (%)	
Total households	2,535 (100.0)	271,991 (100.0)	0.9
Drugs	404 (15.9)	5,601 (2.1)	6.7
Alcohol	319 (12.6)	6,519 (2.4)	4.7
Assault at Home	46 (1.8)	647 (0.2)	6.6
Bipolar disorder	90 (3.6)	3,054 (1.1)	2.9
Schizophrenia	120 (4.7)	2,701 (1.0)	4.3
Other Psychotic Disorder	25 (1.0)	487 (0.2)	4.9
Anxiety	652 (25.7)	36,276 (13.3)	1.8
Depression	1,262 (49.8)	64,761 (23.8)	1.9
Eating Disorder	11 (0.4)	396 (0.1)	2.7
Self-Harm	196 (7.7)	4,121 (1.5)	4.5
Learning Disability	85 (3.4)	2,479 (0.9)	3.3
Learning Difficulty	85 (3.4)	2,925 (1.1)	2.8
ADHD	111 (4.4)	3,953 (1.5)	2.7
ASD	19(0.7)	1,932 (0.7)	1.0
Number of risks in household			
Someone in house had no risk factors	1,623(64.0)	246,849 (90.8)	0.7
Individual in household with 3 plus risks	232 (9.2)	2,852 (1.0)	7.5
3 or more risks in any adult in household	252 (9.9)	3,764 (1.4)	6.3
Variables used as controls:			
Reference Child aged over 11	1,243 (49.0)	121,668 (44.7)	1.0
Adult Number^a			
1	1,031 (40.7)	57,261 (21.1)	1.8
2	939(37.0)	138,985 (51.1)	0.7
3	375(14.8)	48,897 (18.0)	0.8
4 plus	190 (7.5)	26,848 (9.9)	0.7
WIMD Decile^b			
1	657 (25.9)	31,850 (11.7)	2.0
2	478 (18.9)	29,551 (10.9)	1.6
3	339 (13.4)	27,893 (10.3)	1.2
4	273 (10.8)	28,241 (10.4)	1.0
5	194 (7.7)	24,886 (9.1)	0.8
6	171 (6.7)	25,647 (9.4)	0.7
7	152 (6.0)	26,118 (9.6)	0.6
8	127 (5.0)	24,678 (9.1)	0.5
9	93 (3.7)	25,813 (9.5)	0.4
10	51 (2.0)	27,314 (10.0)	0.2
Adults Present in Household			
Biological mother present	1,881 (74.2)	251,096 (92.3)	0.7
Adult man present	1,472 (58.1)	209,844 (77.2)	0.7
Other woman present	851 (33.6)	63,612 (23.4)	1.3
Single parent biological mother	817 (32.2)	50,287 (18.5)	1.6

Table 3 (continued)

	Households where child entered care (Cases)	Households where child did not enter care (comparison)	% all households which have the risk from which someone entered care
	n (%)	n (%)	
Single parent other woman	88 (3.5)	2,326 (0.9)	3.6
Any single woman	905 (35.7)	52,613 (19.3)	1.7
Single parent adult man	126 (5.0)	4,648 (1.7)	2.6

a adult number added as numerical variable from ranging from 1 to 9, b. decile 1 = most deprived, decile 10 = least deprived.

harm and ADHD are also very small, though confidence intervals show significance. Larger effects are found for drug misuse, assault at home, alcohol, learning disability, schizophrenia, depression and learning difficulties.

When the unadjusted odds ratios are considered, both having an individual with three-plus risks in the household and having three-plus risks across the whole household both increase the odds of care entry. Having an individual with three plus risks in the household increases the odds of care entry slightly more than having three-plus risks across the household. When entered into regression Model 2 these effects however seem to disappear and having three-plus risks across the entire household appears to decrease the likelihood of someone going into care. Having an individual with no risks in the household decreases the odds of a child being taken into care, and having more adults in the household decreases the likelihood of children entering care.

3.3. Sex of parent

The second set of models explored the differential effects if risks were identified in a biological mother in the household, a man or another woman. Models were run using subsamples of the dataset so that they were limited only to the population of households that contained biological mothers (n = 252,977), men (n = 211,316) or other women (n = 64,463) respectively. Eating disorder was not added to these models because of low frequency of the condition among men in the dataset. Both unadjusted odds ratios and odds ratios from multivariate regression are presented in Table 5.

Unadjusted odds ratios show that all risks and protective factors have an effect when present in the biological mothers, except the age of the reference child. For men, all risk and protective factors had an effect except for bipolar disorder and ASD and the number of adults in the house. For other women all risks had an effect except for other psychotic disorders, learning disability, learning difficulties, ASD and having a reference child over 11. When regression models were run, no significant effects were found for other psychotic disorders, self-harm or ASD in either biological mothers or men in households. Bipolar disorder had no significant effect when present in men, and in households containing men having a reference child over 11 reduced the odds of care in the model (although it increased it in the unadjusted models). For many risk factors, the odds ratios were higher for the effects of the risks in biological mothers as compared to men. The regression model looking at the effect of risks when present in other women in the household identified five risks as having a significant effect: drugs, assault at home, schizophrenia, depression and ADHD.

3.4. Single adult households

In the final stage, the differential effects of the risk factors in single adult households headed by women and men were explored. Of the 274,526 households, 58,292 households were headed by a single adult. 53,518 were headed by a single woman, and 4,774 by a single man. The

Table 4
Models showing effects of cumulative vs individual risks on likelihood of a household having a child entering care.

	Unadjusted Regression Model				Adjusted Regression Model 1				Adjusted Regression Model 2			
	Odds ratio	P-value	[95 % conf. interval]		Odds ratio	P-value	[95 % conf. interval]		Odds ratio	P-value	[95 % conf. interval]	
Drugs	9.03	<0.001	8.21	9.94	3.59	<0.001	3.17	4.07	3.91	<0.001	3.42	4.47
Alcohol	5.94	<0.001	5.26	6.7	2.31	<0.001	1.99	2.67	2.57	<0.001	2.20	3.00
Assault at home	7.71	<0.001	6.39	9.29	3.43	<0.001	2.56	4.60	3.48	<0.001	2.59	4.67
Bipolar disorder	3.26	<0.001	2.49	4.27	1.28	0.157	0.91	1.79	1.19	0.297	0.86	1.66
Schizophrenia	4.98	<0.001	4.23	5.86	2.11	<0.001	1.71	2.59	2.03	<0.001	1.66	2.47
Other Psychotic Disorder	5.67	<0.001	4.01	8.03	1.44	0.118	0.91	2.26	1.49	0.065	0.98	2.27
Anxiety	2.26	<0.001	1.99	2.56	1.28	<0.001	1.13	1.45	1.15	0.029	1.01	1.29
Depression	3.20	<0.001	2.98	3.43	2.14	<0.001	1.98	2.31	1.72	<0.001	1.58	1.87
Eating disorder	2.91	0.001	1.53	5.54	1.32	0.460	0.63	2.75	1.31	0.469	0.63	2.75
Self Harm	5.52	<0.001	4.75	6.42	1.35	0.002	1.12	1.64	1.81	<0.001	1.52	2.17
Learning Disability	3.73	<0.001	2.81	4.96	2.22	<0.001	1.56	3.17	2.41	<0.001	1.70	3.41
Learning Difficulty	3.22	<0.001	2.62	3.95	2.07	<0.001	1.63	2.64	2.26	<0.001	1.79	2.84
ADHD	3.22	<0.001	2.60	3.97	1.51	0.001	1.17	1.95	1.64	<0.001	1.26	2.13
ASD	1.07	0.834	0.56	2.04	0.65	0.221	0.33	1.30	0.68	0.270	0.34	1.35
Adult number in household ^a	0.71	<0.001	0.67	0.75	0.63	<0.001	0.60	0.67	0.74	<0.001	0.70	0.78
Reference child 11 or over	1.20	0.030	1.02	1.42	1.35	<0.001	1.15	1.58	1.35	<0.001	1.15	1.58
WIMD decile ^b	0.79	<0.001	0.78	0.80	0.83	<0.001	0.82	0.85	0.84	<0.001	0.82	0.85
No risk individual	0.18	<0.001	0.17	0.19					0.53	<0.001	0.48	0.59
3 + risk individual	9.62	<0.001	8.58	10.78					0.83	0.188	0.62	1.10
3 + risk household	7.96	<0.001	7.08	8.95					0.60	0.001	0.45	0.80
constant					0.03	<0.001	0.03	0.04	0.04	<0.001	0.03	0.05
LA variance					0.10		0.05	0.18	0.10		0.05	0.18

a from 1 to 9, b 1 = most deprived, 10 = least deprived, Crude odds ratios and models calculated with whole dataset n = 274,485, Both crude odds ratios and regression models are weighted and adjusted for local authority affects.

53,518 households headed by a single woman consisted of 51,104 headed by a biological mother and 2,414 headed by another woman.

Unadjusted odds ratios and the findings from multivariable regression models with the single parent households are shown in Table 6. Several risk factors were excluded from the model because they were not sufficiently prevalent in the single parent households headed either by men or predicted failure of the models. These were assault at home, other psychotic disorders, eating disorders and ASD.

All of the risk factors have a significant effect on the likelihood of a household having a child entering care when present in households headed by single women, although in the regression model the odds ratios for bipolar disorder becomes insignificant. For households headed by a single man, when the unadjusted odds ratios are examined then five risk factors drugs, alcohol, anxiety, depression and self-harm have a significant effects. However this is reduced to only one risk factor, anxiety, in the regression model.

4. Discussion

By using linked social care and health data, this study has looked at the relative impacts of different risk factors, within the adults in the households, on the likelihood of households having at least one child entering care. The majority of the risk factors were associated with the likelihood of households having children enter care. The chances of a child being taken into care were increased the most by the presence of drug misuse in the household, followed by an adult being the victim of assault in the home, and alcohol problems. Learning disability was also found to be consistently related to a greater likelihood of care entry, in common with previous studies.

In terms of mental health problems, the effects appear to be different depending on the type of problem, with the effects for bipolar disorder and psychotic disorders other than schizophrenia tending to disappear in multivariable regression models while the effects for schizophrenia still remain. For common mental health problems, the effects for anxiety at a household level appear to be relatively small, with slightly bigger effects found for depression. It is notable however that because anxiety and depression are much more prevalent within the population than any of the other risk factors studied, then even with only a small odds ratio,

they are nonetheless very prevalent within the population of households who have a child taken into care. This is apparent from the bivariate statistics provided: 24.0 % of all the households contained a depressed adult, rising to 49.8 % of the households from which someone enters care.

This study also considered the relative different impacts of learning difficulties, ADHD and ASD. ASD at a household level was not associated with a greater likelihood of children entering care. The only situation in which it was associated was when it occurred in the biological mother, echoing the finding of Johnson et al (2021), however this effect disappeared when it was put in the regression model with the other risk factors. Learning difficulties and ADHD do both have a consistent relationship with the likelihood of care, with the relative impact of each of them varying across different models. The finding relating to learning difficulties provides evidence to back up problems raised by user-groups consulted in the development of this project and further work is needed in this area.

The first set of models looked at the presence of having three or more risk factors both in an individual and in a household, and the effects of having an adult with no risk factors in the household. The presence of an adult with no risk factors was a clear protective factor, reducing the odds of care. This provides further evidence for the effect previously highlighted by Forrester and Harwin (2008). Unadjusted odds ratios show the presence of three or more risks either in an individual or across the household is strongly related to the likelihood of care entry, although these effects are not that different from the odds ratios for drug misuse alone. However, when put in a multivariable regression model, the effects of multiple risks disappear and do not appear to have any effect on the likelihood of care over and above the effects of the individual risks. This contrasts with the findings of others, for example Hood et al (2020) and Anthony et al (2021), who suggest that of those families involved in social care it is those with multiple complex needs that are the most likely to have children taken into care. We do not know why these research findings differ. It may be because we have looked at problems as they occur through health records as opposed to how social care perceives them. We have also included the whole population and therefore those who are not involved in social care services at all and this might have contributed to a different finding. However the differences

Table 5
Subgroup analysis: Sex of Parent, unadjusted and adjusted regression models.

Households with Biological mums, n= 252,977								
Biological mum with risk	Unadjusted Regression				Adjusted Regression			
	Odds ratio	P-value	[95% conf. interval]		Odds ratio	P-value	[95% conf. interval]	
Drugs	22.43	<0.001	19.79	25.42	5.64	<0.001	4.73	6.73
Alcohol	14.00	<0.001	12.65	15.50	3.49	<0.001	2.95	4.13
Assault at home	13.11	<0.001	10.06	17.07	5.71	<0.001	3.77	8.66
Bipolar disorder	5.20	<0.001	4.15	6.51	1.44	0.047	1.00	2.05
Schizophrenia	9.02	<0.001	6.98	11.66	3.23	<0.001	2.29	4.56
Other Psychotic Disorder	9.29	<0.001	6.15	14.04	1.46	0.205	0.81	2.61
Anxiety	3.00	<0.001	2.61	3.45	1.34	<0.001	1.18	1.52
Depression	4.38	<0.001	3.98	4.81	2.56	<0.001	2.35	2.79
Self-Harm	10.69	<0.001	8.89	12.85	1.25	0.063	0.99	1.59
Learning Disability	10.70	<0.001	7.62	15.04	4.60	<0.001	3.08	6.89
Learning Difficulty	6.14	<0.001	4.25	8.89	2.18	0.002	1.33	3.56
ADHD	6.83	<0.001	5.43	8.59	1.93	<0.001	1.38	2.71
ASD	3.50	0.018	1.24	9.90	1.46	0.494	0.49	4.31
Adult Number	0.63	<0.001	0.58	0.68	0.73	<0.001	0.68	0.78
Reference child 11 or over	1.04	0.720	0.85	1.27	1.20	0.080	0.98	1.47
WIMD	0.78	<0.001	0.76	0.79	0.81	<0.001	0.80	0.83
Constant					0.02	<0.001	0.02	0.03
LA Variance					0.12		0.06	0.21
Households containing men, n= 211,316								
Man with risk								
Drugs	7.23	<0.001	6.21	8.41	3.10	<0.001	2.54	3.78
Alcohol	4.91	<0.001	4.12	5.86	1.96	<0.001	1.55	2.49
Assault at home	4.65	<0.001	2.17	9.96	2.17	0.043	1.02	4.61
Bipolar disorder	2.01	0.209	0.68	5.96	0.84	0.756	0.27	2.57
Schizophrenia	4.67	<0.001	3.68	5.93	1.82	<0.001	1.46	2.28
Other Psychotic Disorder	6.07	<0.001	2.41	15.27	1.38	0.557	0.47	4.09
Anxiety	2.33	<0.001	1.98	2.75	1.28	0.009	1.06	1.55
Depression	2.64	<0.001	2.39	2.92	1.64	<0.001	1.46	1.84
Self Harm	4.80	<0.001	3.64	6.32	1.12	0.525	0.79	1.58
Learning Disability	3.51	<0.001	2.40	5.14	1.69	0.026	1.06	2.67
Learning Difficulty	3.58	<0.001	2.86	4.49	2.21	<0.001	1.65	2.96
ADHD	3.28	<0.001	2.47	4.36	1.55	0.002	1.17	2.07
ASD	1.03	0.947	0.49	2.12	0.50	0.076	0.24	1.07
Adult Number	0.95	0.204	0.88	1.03	0.83	<0.001	0.77	0.89
Reference child 11 or over	1.42	<0.001	1.21	1.67	1.50	<0.001	1.29	1.75
WIMD	0.79	<0.001	0.77	0.80	0.81	<0.001	0.79	0.82
Constant					0.02	<0.001	0.02	0.03
LA Variance					0.08		0.04	0.15
Households containing other women, n = 64,463								
Other woman with risk	Unadjusted Regression				Adjusted Regression			
	Odds ratio	P> z	[95 % conf. interval]		Odds ratio	P> z	[95 % conf. interval]	
Drugs	3.98	<0.001	2.93	5.40	1.97	<0.001	1.38	2.80
Alcohol	2.52	<0.001	1.69	3.77	1.21	0.411	0.77	1.91
Assault at home	3.81	<0.001	1.94	7.47	1.99	0.035	1.05	3.79
Bipolar disorder	2.00	0.030	1.07	3.76	1.04	0.919	0.52	2.07
Schizophrenia	3.61	<0.001	1.93	6.76	2.22	0.013	1.18	4.16
Other Psychotic Disorder	2.06	0.314	0.50	8.42	0.88	0.855	0.21	3.61
Anxiety	1.64	<0.001	1.34	2.02	1.19	0.104	0.96	1.46
Depression	2.10	<0.001	1.87	2.35	1.66	<0.001	1.48	1.87
Self Harm	2.59	<0.001	1.76	3.80	1.25	0.312	0.81	1.91
Learning Disability	1.48	0.229	0.78	2.78	1.13	0.748	0.54	2.37
Learning Difficulty	1.81	0.052	0.99	3.28	1.71	0.146	0.83	3.52
ADHD	2.68	<0.001	1.74	4.11	1.85	0.008	1.17	2.92
ASD	0.70	0.625	0.16	2.98	0.48	0.349	0.10	2.23
Adult Number	0.62	<0.001	0.57	0.68	0.65	<0.001	0.60	0.71
Reference child 11 or over	1.19	0.052	1.00	1.42	1.23	0.026	1.02	1.47
WIMD	0.85	<0.001	0.82	0.87	0.86	<0.001	0.84	0.89
Constant					0.08	<0.001	0.06	0.11
LA Variance					0.09		0.04	0.22

Both crude odds ratios and regression models are weighted and adjusted for local authority affects.

may also be apparent in part because of the risk factors that we are able to look at. These could not encompass all the problems that a family might have. In particular, we are aware that domestic abuse is one of the problems often highlighted by social workers in discussions about families with multiple problems, and that our data was not able to reflect this sufficiently. Our analysis focused specifically on the number of

factors rather than particular combinations of factors and differences may arise when certain combinations of factors occur together (Hood et al., 2021). A useful development of this study would therefore be to repeat this work looking at the effects of different combinations of risks. However, based on the analysis we did our findings show that when the risk factors we have looked at are considered, it is the type of problem

Table 6
Sex of parent in single adult households, raw odds ratios and regression models.

	Single Woman (mum or other woman), n = 53,518						Single Man, n = 4,774									
	Unadjusted regression			Adjusted regression			Unadjusted regression			Adjusted regression						
	Odds ratio	P> z	[95 % conf. interval]	Odds ratio	P> z	[95 % conf. interval]	Odds ratio	P> z	[95 % conf. interval]	Odds ratio	P> z	[95 % conf. interval]				
Drugs	11.81	<0.001	10.16	13.72	4.32	<0.001	3.46	5.40	4.00	<0.001	1.89	8.48	1.81	0.104	0.89	3.72
Alcohol	9.01	<0.001	7.58	10.73	2.96	<0.001	2.29	3.83	3.70	0.001	1.69	8.12	1.88	0.120	0.85	4.18
Bipolar disorder	3.69	<0.001	2.87	4.74	1.38	0.091	0.95	2.02	1.60	0.641	0.22	11.52	0.82	0.831	0.14	4.83
Schizophrenia	6.02	<0.001	4.36	8.32	3.15	<0.001	2.14	4.63	2.74	0.039	1.05	7.15	1.55	0.425	0.53	4.60
Anxiety	2.32	<0.001	1.90	2.83	1.25	0.049	1.00	1.56	3.05	<0.001	1.77	5.25	1.95	0.013	1.15	3.29
Depression	3.19	<0.001	2.81	3.62	2.16	<0.001	1.88	2.49	2.26	<0.001	1.45	3.51	1.43	0.095	0.94	2.17
Self-Harm	7.02	<0.001	5.93	8.30	1.45	0.008	1.10	1.90	4.07	0.007	1.46	11.31	1.52	0.505	0.44	5.21
Learning Disability	8.03	<0.001	5.29	12.18	4.21	<0.001	2.48	7.15	2.11	0.294	0.52	8.53	1.90	0.423	0.40	9.13
Learning Difficulty	5.30	<0.001	3.51	8.00	2.51	0.005	1.32	4.78	0.91	0.922	0.12	6.57	0.41	0.424	0.04	3.69
ADHD	5.92	<0.001	3.80	9.23	2.46	<0.001	1.48	4.07	2.44	0.142	0.74	8.05	1.54	0.543	0.38	6.17
Reference child 11 or over	1.18	0.224	0.90	1.53	1.21	0.155	0.93	1.58	0.97	0.897	0.65	1.45	0.97	0.882	0.64	1.47
WIMD	0.83	<0.001	0.81	0.86	0.86	<0.001	0.83	0.88	0.82	<0.001	0.76	0.88	0.84	<0.001	0.77	0.90
Constant					0.02	<0.001	0.02	0.03					0.05	<0.001	0.03	0.08
LA Variance					0.10		0.05	0.21					0.04		0.00	0.39

rather than the number of problems that will have a bigger effect on the likelihood of care.

Perhaps the most striking finding of this paper is the differential effect of risks when they occur in biological mothers as opposed to men in the household. For those risk factors that increase the odds most strongly, drugs, assault at home, alcohol, schizophrenia and learning disability, then the effects are much greater when the risks are present in biological mothers rather than men in the household. We are aware that comparing “biological mothers” with “men” is not comparing like with like. It is a shortfall of the data that biological fathers could not be identified. However, when households headed by a single adult were looked at, this effect was still apparent. This has to be considered within the context that children are overall more likely to be entering care from households headed by a single man than a single woman: 2.6 % of all households headed by a single man had a child enter care compared to 1.7 % of households headed by a single woman. However, the impact of the risk factors on the likelihood of care is very different between the two types of household. In fact, only one risk factor, anxiety, was significantly associated with the likelihood of care in the regression model containing only the households headed by a single adult man. This result was obtained while controlling for the reference child being of an older age, to compensate for any effects due to the different ages of children in households headed by single men and single women. Differences in the likelihood of statistical significance will also be due to the smaller size of the sample, however, notwithstanding this, the odds ratios for a child entering care from households headed by a single man are smaller than those headed by single women.

We do not know what the reasons for our findings are. However we have already highlighted that there is a body of evidence suggesting that children’s services are more likely to be involved with mothers as opposed to fathers (Gordon et al., 2012; Maxwell et al., 2012; Zanoni et al., 2013), and discussed how service provision is more likely to be biased towards mothering. There is also qualitative research which has suggested a tendency of social workers to view fathers positively, in a child protection context, when they provide care for children in the absence of positive maternal care (e.g. Scourfield, 2003; Sobo-Allen, 2022). These issues may all help to explain our findings. However, we can not be sure exactly what is causing this pattern, and more work will be needed to identify if it is related to social work practice, some other whole system effect, or by differences between lone mother and lone father households that were not measured in our study.

4.1. Limitations

Any study using administrative data will be limited by the quality of the data recorded, small errors in recording have affected the quality of all the variables used. However this is offset to a certain extent by the size of the dataset, with this study using population level comparisons. Several additional limitations stand out because of the data available. One of these is that the linkage quality of the Looked After Children Wales dataset was poor and so this study was limited to three to 17 year-olds. This was not the initial intention of the study and is a clear limitation, as there are a large proportion of children who enter care who are under three years old (36.8 % of the care entries in Wales in our study period). This leaves a large group of children that were not investigated by this study, and since these children are so young it seems likely that the parental factors we have been investigating in this paper would play an important role in their entry into care. As methods become available to enhance the linkage of the data it would be important to compare the findings for these children with those aged zero to two. It was also not possible to identify biological fathers from the data, and so the study had to compare biological mothers, to men and other women. Another limitation was the difficulty of identifying domestic abuse through the data. Because of the poor quality of the data we decided to use assaults that took place at home as a proxy for domestic abuse, and it is anticipated that this must have only covered a limited proportion of the extent of domestic abuse.

5. Conclusion

This paper has provided important empirical evidence about risk factors within households and the likelihood of children entering care. These show that while cumulative risk does indeed increase the likelihood of care entry, these effects disappear when individual risk are controlled for. The research results also show the effects of risks on the likelihood of care are much greater when they occur in biological mothers rather than other members of the household. In single adult households, risks have a much greater impact on the odds of care if they appear in households headed by a woman as compared to a man. The reasons for this are unclear, but further work is needed to understand if this is related to social work practice or to wider systems effects, so that we can ensure that parents are treated equally regardless of their sex.

CRedit authorship contribution statement

Nell Warner: Conceptualization, Funding acquisition, Writing – original draft, Formal analysis. **Jonathan Scourfield:** Writing – review & editing, Supervision. **Rebecca Cannings-John:** Methodology, Writing – review & editing. **Olivier Y. Rouquette:** Data curation, Software. **Alex Lee:** Data curation, Software. **Rachael Vaughan:** Conceptualization. **Karen Broadhurst:** Writing – review & editing, Supervision. **Ann John:** Writing – review & editing, Supervision.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A:

Table A1 Process through which the linkage of the looked after Children’s dataset was enhanced by linkage to other datasets held in the SAIL databank
Process through which the linkage of the Looked After Children’s dataset was enhanced by linkage to other datasets held in the SAIL databank.

Step	
1.	Link Children in Need Wales (CINW) and Education Data Wales (EDUW) using unique pupil number
2	If the ALF field in CINW contains missing data, replace it with the ALF from EDUW
3	Link the resulting dataset to Looked After Children Wales Data (LACW) using the unique social care identifier provided by local authorities
4	If the ALF field in LACW contains missing data, replace it with the ALF from the newly merged file
5	Link Children in Need of Care and Support (CRCS) and EDUW using unique pupil number
6	If the ALF field in CRCS contains missing data, replace it with the ALF from EDUW
7	Link the resulting dataset to Looked After Children Wales Data (LACW) using the unique social care identifier provided by local authorities
8	If the ALF field in LACW still contains missing data after stage 4, replace it with the ALF from the newly merged file
9	Link the resulting file to EDUW using the unique pupil number
10	If the ALF field in LACW still contains missing data after stage 8, replace it with the ALF from the newly merged file

Appendix B:. Concepts and algorithms used to identify risk factors in health data

Table B1 Concepts and algorithms used to identify risk factors in health data.

	WLGP_GP Read Code Lists	PEDW IC10 Lists	EDDS IC10 Lists	SMDS
Drugs	Drug Misuse – Primary Care ID: C2945 Version: 8649 https://conceptlibrary.saildatabank.com/concepts/C3294/detail/ Rees, S., Watkins, A., Keauffling, J., & John, A. (2022). Incidence, Mortality and Survival in Young People with Co-Occurring Mental Disorders and Substance Use: A Retrospective Linked Routine Data Study in Wales. <i>Clinical Epidemiology</i> , 14, 21–38. https://doi.org/10.2147/CLEP.S325235	Drug Misuse – IC10 ID: C2947 Version: 8644 https://conceptlibrary.saildatabank.com/concepts/C2947/version/8644/detail/ Rees, S., Watkins, A., Keauffling, J., & John, A. (2022). Incidence, Mortality and Survival in Young People with Co-Occurring Mental Disorders and Substance Use: A Retrospective Linked Routine Data Study in Wales. <i>Clinical Epidemiology</i> , 14, 21–38. https://doi.org/10.2147/CLEP.S325235	Internal diagnostic codes for poisoning and overdose by illicit drug and chronic drug abuse.	Any mention of individual having drug misuse issues
Alcohol	Alcohol Misuse- Primary Care ID: C3293 https://conceptlibrary.saildatabank.com/concepts/C3293/detail/ Rees, S., Watkins, A., Keauffling, J., & John, A. (2022). Incidence, Mortality and Survival in Young People with Co-Occurring Mental Disorders and Substance Use: A Retrospective Linked Routine Data Study in Wales. <i>Clinical Epidemiology</i> , 14, 21–38. https://doi.org/10.2147/CLEP.S325235	Alcohol Misuse- ICD-10 ID: C2946 https://conceptlibrary.saildatabank.com/concepts/C2946/detail/ Rees, S., Watkins, A., Keauffling, J., & John, A. (2022). Incidence, Mortality and Survival in Young People with Co-Occurring Mental Disorders and Substance Use: A Retrospective Linked Routine Data Study in Wales. <i>Clinical Epidemiology</i> , 14, 21–38.	Internal diagnostic codes for alcohol poisoning and overdose and chronic alcohol abuse.	Any mention of individual having alcohol misuse issues

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Table B1 (continued)

	WLG_P Read Code Lists	PEDW IC10 Lists	EDDS IC10 Lists	SMDS
	S325235	https://doi.org/10.2147/CLEP.S325235		
Bipolar	<p>Bipolar Disorder and Other Mood Related Disorders - Primary Care John, A, McGregor, J., Jones, I, Lee, S. C., Walters, J. T. R., Owen, M. J., O'Donovan, M., DelPozo-Banos, M., Berridge, D., & Lloyd, K. ID: C2714 Version: 8444 https://conceptlibrary.saildatabank.com/concepts/C2714/version/8444/detail/</p>	<p>Bipolar Disorder and Other Mood Related Disorders- ICD-10 John, A, McGregor, J., Jones, I, Lee, S. C., Walters, J. T. R., Owen, M. J., O'Donovan, M., DelPozo-Banos, M., Berridge, D., & Lloyd, K. ID: C2932 Version: 8648 https://conceptlibrary.saildatabank.com/concepts/C2932/version/8648/detail/</p>	<p>Bipolar Disorder and Other Mood Related Disorders- ICD-10 John, A, McGregor, J., Jones, I, Lee, S. C., Walters, J. T. R., Owen, M. J., O'Donovan, M., DelPozo-Banos, M., Berridge, D., & Lloyd, K. ID: C2932 Version: 8648 https://conceptlibrary.saildatabank.com/concepts/C2932/version/8648/detail/</p>	
Schizophrenia	<p>Schizophrenia - Primary Care John, A, McGregor, J., Jones, I, Lee, S. C., Walters, J. T. R., Owen, M. J., O'Donovan, M., DelPozo-Banos, M., Berridge, D., & Lloyd, K. ID: C2716 Version: 8446 https://conceptlibrary.saildatabank.com/concepts/C2716/version/8446/detail/</p>	<p>Schizophrenia- ICD-10 John, A, McGregor, J., Jones, I, Lee, S. C., Walters, J. T. R., Owen, M. J., O'Donovan, M., DelPozo-Banos, M., Berridge, D., & Lloyd, K. ID: C2939 Version: 8647 https://conceptlibrary.saildatabank.com/concepts/C2939/version/8647/detail/</p>	<p>Schizophrenia- ICD-10 John, A, McGregor, J., Jones, I, Lee, S. C., Walters, J. T. R., Owen, M. J., O'Donovan, M., DelPozo-Banos, M., Berridge, D., & Lloyd, K. ID: C2939 Version: 8647 https://conceptlibrary.saildatabank.com/concepts/C2939/version/8647/detail/</p>	
Other Psychotic	<p>Other Psychotic Disorders and Severe Mental Illnesses - Primary care Ann John, Joanna McGregor, Ian Jones, Sze Chim Lee, James T.R. Walters, Michael J. Owen, Michael O'Donovan, Marcos DelPozo-Banos, Damon Berridge, Keith Lloyd ID: C3160 Version: 8652 https://conceptlibrary.saildatabank.com/concepts/C3160/version/8652/detail/</p>	<p>Other Psychotic Disorders and Severe Mental Illnesses - ICD-10 Alexis Economou, Michelle Grey, Joanna McGregor, Nick Craddock, Ronan A Lyons, Michael J Owen, Vaughn Price, Sue Thomson, James TR Walters & Keith Lloyd ID: C3159 Version: 8651 https://conceptlibrary.saildatabank.com/concepts/C3159/version/8651/detail/</p>	<p>Other Psychotic Disorders and Severe Mental Illnesses - ICD-10 Alexis Economou, Michelle Grey, Joanna McGregor, Nick Craddock, Ronan A Lyons, Michael J Owen, Vaughn Price, Sue Thomson, James TR Walters & Keith Lloyd ID: C3159 Version: 8651 https://conceptlibrary.saildatabank.com/concepts/C3159/version/8651/detail/</p>	
Anxiety	<p>Includes contacts with a recorded anxiety diagnosis or symptom, and contacts with a recorded anxiolytic or hypnotic prescription following a previous anxiety diagnosis. Therapeutic procedures that unequivocally indicate a diagnosis of anxiety are used as "anxiety diagnoses" by the algorithm. ID: C3297 https://conceptlibrary.saildatabank.com/concepts/C3297/detail/ John, A., McGregor, J., Fone, D., Dunstan, F., Cornish, R., Lyons, R. A., & Lloyd, K. R. (2016). Case-finding for common mental disorders of anxiety and depression in primary care: an external validation of routinely collected data. BMC medical informatics and decision making, 16(1), 1–10 Cornish, R. P., John, A., Boyd, A., Tilling, K., & Macleod, J. (2016). Defining adolescent common mental disorders using electronic primary care data: A comparison with outcomes measured using the CIS-R. BMJ Open, 6(12).</p>	<p>ID: C3297 https://conceptlibrary.saildatabank.com/concepts/C3297/version/10127/detail/ John, A., McGregor, J., Fone, D., Dunstan, F., Cornish, R., Lyons, R. A., & Lloyd, K. R. (2016). Case-finding for common mental disorders of anxiety and depression in primary care: an external validation of routinely collected data. BMC medical informatics and decision making, 16(1), 1–10 Cornish, R. P., John, A., Boyd, A., Tilling, K., & Macleod, J. (2016). Defining adolescent common mental disorders using electronic primary care data: A comparison with outcomes measured using the CIS-R. BMJ Open, 6(12).</p>	<p>ID: C3297 https://conceptlibrary.saildatabank.com/concepts/C3297/version/10127/detail/ John, A., McGregor, J., Fone, D., Dunstan, F., Cornish, R., Lyons, R. A., & Lloyd, K. R. (2016). Case-finding for common mental disorders of anxiety and depression in primary care: an external validation of routinely collected data. BMC medical informatics and decision making, 16(1), 1–10 Cornish, R. P., John, A., Boyd, A., Tilling, K., & Macleod, J. (2016). Defining adolescent common mental disorders using electronic primary care data: A comparison with outcomes measured using the CIS-R. BMJ Open, 6(12).</p>	
Depression	<p>Includes contacts with a recorded depression diagnosis, and contacts with a recorded antidepressant treatment or prescription following a previous depression diagnosis. Administrative codes that unequivocally indicate a diagnosis of depression are used as "depression diagnoses" by the algorithm. ID: C3295 https://conceptlibrary.saildatabank.com/concepts/C3295/detail/ John, A., McGregor, J., Fone, D., Dunstan, F., Cornish, R., Lyons, R. A., & Lloyd, K. R. (2016). Case-finding for common mental</p>	<p>ID: C3295 https://conceptlibrary.saildatabank.com/concepts/C3295/detail/ John, A., McGregor, J., Fone, D., Dunstan, F., Cornish, R., Lyons, R. A., & Lloyd, K. R. (2016). Case-finding for common mental disorders of anxiety and depression in primary care: an external validation of routinely collected data. BMC medical informatics and decision making, 16(1), 1–10 Cornish, R. P., John, A., Boyd, A., Tilling, K., & Macleod, J. (2016). Defining adolescent common mental disorders using electronic</p>	<p>ID: C3295 https://conceptlibrary.saildatabank.com/concepts/C3295/detail/ John, A., McGregor, J., Fone, D., Dunstan, F., Cornish, R., Lyons, R. A., & Lloyd, K. R. (2016). Case-finding for common mental disorders of anxiety and depression in primary care: an external validation of routinely collected data. BMC medical informatics and decision making, 16(1), 1–10 Cornish, R. P., John, A., Boyd, A., Tilling, K., & Macleod, J. (2016). Defining adolescent common mental disorders using electronic</p>	

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Table B1 (continued)

	WIGP_GP Read Code Lists	PEDW IC10 Lists	EDDS IC10 Lists	SMDS
	disorders of anxiety and depression in primary care: an external validation of routinely collected data. BMC medical informatics and decision making, 16(1), 1–10 Cornish, R. P., John, A., Boyd, A., Tilling, K., & Macleod, J. (2016). Defining adolescent common mental disorders using electronic primary care data: A comparison with outcomes measured using the CIS-R. BMJ Open, 6(12).	primary care data: A comparison with outcomes measured using the CIS-R. BMJ Open, 6(12).	primary care data: A comparison with outcomes measured using the CIS-R. BMJ Open, 6(12).	
Eating Disorder	ID: 3305 https://conceptlibrary.saildatabank.com/concepts/C3252/detail/ Wood, S., Marchant, A., Allsopp, M., Wilkinson, K., Bethel, J., Jones, H., & John, A. (2019). Epidemiology of eating disorders in primary care in children and young people: a clinical practice research Datalink study in England. BMJ open, 9(8), e0266	ID: 3306 https://conceptlibrary.saildatabank.com/concepts/C3252/detail/ Wood, S., Marchant, A., Allsopp, M., Wilkinson, K., Bethel, J., Jones, H., & John, A. (2019). Epidemiology of eating disorders in primary care in children and young people: a clinical practice research Datalink study in England. BMJ open, 9(8), e0266	ID: 3306 https://conceptlibrary.saildatabank.com/concepts/C3252/detail/ Wood, S., Marchant, A., Allsopp, M., Wilkinson, K., Bethel, J., Jones, H., & John, A. (2019). Epidemiology of eating disorders in primary care in children and young people: a clinical practice research Datalink study in England. BMJ open, 9(8), e0266	
Self Harm	ID: C3292 https://conceptlibrary.saildatabank.com/concepts/C3292/detail/ Marchant, A. Turner, S. Balbuena, L. Peters, W. Williams, D. Lloyd, K. Lyons, R. & John, A. 2020. "Self-Harm Presentation across Healthcare Settings by Sex in Young People: An e-Cohort Study Using Routinely Collected Linked Healthcare Data in Wales, UK." Archives of Disease in Childhood 105 (4):347–54.	ID: C3292 https://conceptlibrary.saildatabank.com/concepts/C3292/detail/ Marchant, A. Turner, S. Balbuena, L. Peters, W. Williams, D. Lloyd, K. Lyons, R. & John, A. 2020. "Self-Harm Presentation across Healthcare Settings by Sex in Young People: An e-Cohort Study Using Routinely Collected Linked Healthcare Data in Wales, UK." Archives of Disease in Childhood 105 (4):347–54.	ID: C3292 https://conceptlibrary.saildatabank.com/concepts/C3292/detail/ Marchant, A. Turner, S. Balbuena, L. Peters, W. Williams, D. Lloyd, K. Lyons, R. & John, A. 2020. "Self-Harm Presentation across Healthcare Settings by Sex in Young People: An e-Cohort Study Using Routinely Collected Linked Healthcare Data in Wales, UK." Archives of Disease in Childhood 105 (4):347–54.	
Learning Disability	Learning Disability - Primary Care Evangelos Kontopantelis, Ivan Olier, Claire Planner, David Reeves, Darren M Ashcroft, Linda Gask, Tim Doran, Sioban Reilly. Id C1928 Version 4994 https://conceptlibrary.saildatabank.com/concepts/C1928/version/4994/detail/ * four codes were excluded from this concept as they overlap with learning difficulties concept: Eu81. Eu81y Eu81z Eu81z00			
Learning Difficulties	Learning Difficulties - Primary care John,A., Friedmann, Y., DelPozo-Banos, M., Frizzati, A., Ford, T., & Thapar, A. ID: C2711 Version: 8449 https://conceptlibrary.saildatabank.com/concepts/C2711/version/8657/detail/	Learning Difficulties- ICD-10 John,A., Friedmann, Y., DelPozo-Banos, M., Frizzati, A., Ford, T., & Thapar, A. ID: C2940 Version: 7735 https://conceptlibrary.saildatabank.com/concepts/C2940/version/8658/detail/		
ADHD	Attention-Deficit hyperactivity disorder (ADHD) Primary care John,A., Friedmann, Y., DelPozo-Banos, M., Frizzati, A., Ford, T., & Thapar, A ID: C2708 Version: 8670 https://conceptlibrary.saildatabank.com/concepts/C2708/version/8447/detail/	Attention-Deficit hyperactivity disorder (ADHD)- ICD-10 John,A., Friedmann, Y., DelPozo-Banos, M., Frizzati, A., Ford, T., & Thapar, A ID: C2931 Version: 8637 https://conceptlibrary.saildatabank.com/concepts/C2931/version/8637/detail/		
ASD	Autism Spectrum Disorder (ASD) - Primary care Underwood JFG, Del Pozo Baños M, Frizzati A, John A, Hall J ID: C2709 Version: 8442 https://conceptlibrary.saildatabank.com/concepts/C2709/version/8442/detail/	Autism Spectrum Disorder (ASD)- ICD-10 Underwood JFG, Del Pozo Baños M, Frizzati A, John A, Hall J ID: C2930 Version: 7867 https://conceptlibrary.saildatabank.com/concepts/C2930/version/7867/detail/		

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