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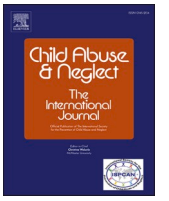

Differences in ambulance attendances between children with and without an identified history of out-of-home-care

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ABSTRACT

Background: Children in out-of-home-care (OOHC) are a vulnerable population, typically with complex needs, however there is minimal research examining the behavioural presentations that lead to the increased use of acute emergency care by OOHC children.
Objective: This study aimed to describe differences in lifetime complexity factors identified during ambulance attendances between children with and without an identified history of OOHC. Further, this study aimed to describe whether having an identified history of being in OOHC was associated with increased utilisation of emergency care resources and increased likelihood of multiple ambulance attendances.
Method: Electronic patient care records from ambulance attendances during the period January 2017 and June 2023 for 27,565 children 0–17 years in Victoria, Australia were examined.
Results: Children with an identified history of OOHC had a substantially higher co-occurrence of substance-related harms, violence, self-harm, suicide ideation and attempts, a developmental or intellectual disability and mental health conditions compared with children where there was no identified OOHC history. As hypothesised, logistic regression found, after controlling for all complexity factors, an identified history of OOHC increased likelihood of multiple ambulance attendances ($OR = 2.65$; 95 % CI: 2.17–3.24, $p < .001$).
Conclusions: The findings suggest children within OOHC have increasingly complex comorbidities, and this may be associated with increased emergency care utilisation. Development of tailored

Abbreviations: OOHC, Out-of-home-care; ED, Emergency departments; NASS, National Ambulance Surveillance System; SLK-581, Statistical linkage key.

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support to these multiple and complex needs is necessary to help reduce repeated emergency care responses for this at-risk population.

Ideally, every child will grow and thrive in the care of their parents, but for many children this is not the case. In Australia, if a child has been found to have been maltreated, through either neglect, emotional, physical or sexual abuse (Australian Institute of Health and Welfare, 2020), child protection services may intervene by removing the child from the care of their parents and placing them in care of the state, known as out-of-home care (OOHC) (Australian Institute of Health and Welfare, 2020). This may take the form of foster care, kinship care, or often for children with increasingly complex needs, in residential care or group accommodation (Tarren-Sweeney, 2008). While the majority of these OOHC placements are involuntary, as a result of a court order, in some cases, children and parents consent to a voluntary placement to ensure adequate care for the child. In June 2021, most Australian children in OOHC were in home-based care with foster (36 %) or kinship carers (54 %), and 7.3 % were in residential care (Australian Institute of Health and Welfare, 2022). OOHC systems aim to promote the health of the child by providing them with safe and stable placement (Szilagyi et al., 2015). However, children in OOHC often find themselves in the revolving door of the social welfare systems (Davidson et al., 2019), with infants and adolescents having increased risk of re-entering the OOHC system (Wulczyn et al., 2020). Lack of carer support, challenges in service coordination between health, welfare and justice systems, and placement instability all contribute to difficulties in providing adequate support to the child or family (Szilagyi et al., 2015). Some OOHC placements hinder therapeutic benefit by exposing the child to further neglect or abuse (Commission for Children and Young People, 2015; Commonwealth Government, 2017). This interplay between past and present trauma leads to children in the OOHC system having increased likelihood of complex physical and mental health needs (Szilagyi et al., 2015).

A history of maltreatment can affect developmental domains in a child, increasing the risk of poor mental health, early initiation of alcohol use, heavy episodic drinking or externalising behaviours including aggression perpetration or suicidal behaviours (Dube et al., 2006; Gilbert et al., 2009; Salmon et al., 2022; Shin et al., 2013). Due to an increased risk of a history of maltreatment and trauma, children in OOHC are also at increased risk of experiencing mental health conditions, suicidal behaviours, hospitalisation with substance use involvement, and involvement in criminal activity when compared with children not in OOHC (Kääriälä & Hiilamo, 2017; Pilowsky & Wu, 2006). These negative outcomes may stem from trauma occurring prior to OOHC placement, trauma occurring during OOHC placement, or a combination of both. This increased level of lifetime complexity factors, combined with the overrepresentations of developmental disorders and chronic health conditions leads to children in OOHC requiring many additional supports and resources (Davidson et al., 2019; Szilagyi et al., 2015).

Research has demonstrated that children in OOHC have significantly higher rates of admission to inpatient beds and emergency departments (ED) compared with those not in OOHC (Bennett et al., 2020), with older OOHC children having nearly double the amount of ED presentations compared with non-OOHC children (Rubin et al., 2004). While increased primary healthcare utilisation, particularly in the older cohort, may relate to higher rates of developmental disorders, or chronic physical conditions for those in OOHC (Davidson et al., 2019; Szilagyi et al., 2015), there is minimal research examining the behavioural presentations that lead to acute emergency care for children in OOHC (Bennett et al., 2020). Although there is an established relationship between poorer mental health, substance use and suicidal behaviours among children in OOHC (Kääriälä & Hiilamo, 2017; Pilowsky & Wu, 2006), it is unclear whether these lead to increased emergency healthcare presentations. If these factors were found to be drivers of the increased primary health utilisation of those in OOHC, targeted supports could be created for this vulnerable population, to assist with managing these harms outside of the primary health care system, thereby reducing some burden on an overstretched system. However understanding the relationship between these factors and health care presentations is difficult, as examining the mental health, substance use and self-harm behaviour of children, particularly those in OOHC can be fraught as many surveys do not capture information for those under the age of 12 years (Scott et al., 2018) and OOHC placement instability (Szilagyi et al., 2015) can make school-based data collection problematic for this cohort. There are also ethical and moral concerns associated with children having to repeatedly recount what are likely traumatic experiences (Fisher, 2003).

Ambulance attendance data offer a unique opportunity for exploring emergency healthcare utilisation among children (Scott et al., 2018, 2024). In Australia, ambulance services are jurisdiction-based, with all states and territories offering either free or heavily subsidised coverage to jurisdiction-based members or concession or benefit card holders (i.e., individuals entitled to discounted health care such as pensioners), providing almost universal coverage. Paramedics document their assessment and care in electronic patient care records that describe not only their professional assessment of the patient's circumstance but often includes detailed information of the patients' history from bystanders, family, or friends who are on scene. This makes ambulance data a rich source of population data that provides insight into both the history of the patient, and the acute healthcare needs of children and young people.

The current study uses data from the Victorian arm of the National Ambulance Surveillance System (NASS). These data are part of a globally unique surveillance system that captures details documented in the text of the electronic patient care record through an ongoing, validated and purpose-built coding system. This study aimed to describe differences in demographics, use of emergency services resources (i.e. police co-attendance, transportation to hospital) and lifetime complexity factors identified during ambulance attendances, between children with and without an identified history of OOHC. Additionally, this study aimed to describe whether having an identified history of being in OOHC was associated with increased utilisation of ambulance services for mental health, suicide or self-injury, alcohol or other substances. Finally, after controlling for known complexity factors, the current study aimed to assess whether an OOHC history increases the likelihood of repeat ambulance attendances. We hypothesised that having a history of OOHC will be associated with a higher likelihood of multiple ambulance attendances during the study period.

1. Method

1.1. Study design and data source

The current project conducted data analysis of ambulance attendances for Victorian children within the NASS. The NASS is designed to identify trends and patterns in use of alcohol and other drugs, mental health conditions and suicide and self-harm behaviours and associated violence related ambulance attendances. The methods have been published elsewhere (Lubman, Heilbronn, et al., 2020; Lubman, Matthews, et al., 2020) but briefly, the NASS contains a filtered dataset, which records all ambulance attendances flagged for substance use, mental health, or self-harm. A unique patient identifier, or statistical linkage key (SLK-581) is created for every ambulance attendance (Australian Institute of Health and Welfare, 2016). A team of trained coders manually review each case and record variables based on established guidelines. Ethics approval for NASS is granted through the Eastern Health Human Research Ethics Committee.

1.2. Setting and cohort

Victoria is Australia's second most populous state. In 2021–22 the Victorian child population (0–17 years old) was approximately 1.4 million (Australian Bureau of Statistics, 2022) and the population of children with care and protection orders was approximately 14,800 (Australian Institute of Health and Welfare, 2022). All Victorian ambulance attendances for individuals aged under 18 years between January 2017 and June 2023 within the NASS were examined. Due to inconsistent recording in clinical case notes, patients who did not identify as either male or female (1.38 %) were excluded from the current study. Additionally, individuals whose gender was missing or cases without a valid SLK-581 (<1 %) were also excluded from the current study. The SLK-581 was used to merge all presentations for the same individual into a unique presentation profile, resulting in a final sample of 27,565 individuals aged between 0 and 17 years. As the NASS is filtered to include only ambulance attendances related to mental health, suicidal or self-harm behaviours and substance use (Lubman, Heilbronn, et al., 2020; Lubman, Matthews, et al., 2020), those identified as having an identified history of OOHC only represent those captured within this filtered cohort and therefore, only represent children identified as being in OOHC during an attendance related to mental health, suicide or self-harm or substance use.

1.3. Quantitative variables

1.3.1. Demographic

Gender of individual, age of first ambulance attendance, and years between first and last ambulance attendance within the NASS dataset were analysed. This 'years at risk' variable was calculated by comparing the last ambulance attendance within the NASS for a given individual from their first. If an individual only had a single ambulance attendance within the NASS, this was recorded as 0 years. History of OOHC placement was recorded if the child had at least one ambulance attendance where either previous or current OOHC placement was identified by the paramedics in the details of patient history, or in the patient case notes.

1.3.2. Resources

Frequency and proportion of total ambulance attendances in which police co-attended, and frequency and proportion of attendances where the individual was transported to hospital were recorded.

1.3.3. Case complexity factors

Using variables captured within the NASS that have a known association with children in OOHC (Kääriälä & Hiilamo, 2017; Pilowsky & Wu, 2006) the following complexity factors were examined: (1) Alcohol involved in any previous ambulance attendance; (2) substance involvement in any previous ambulance attendance; (3) history of a mental health condition; (4) history of self-injury (intentional self-injury without suicidal intent such as deliberate lacerations); (5) history of suicidal ideation (thoughts or plans of suiciding, where no action took place); (6) history of suicide attempts (acts of self-harm with the intent to end one's life); (7) diagnosis of a developmental disorder (autism spectrum disorder or attention-deficit/hyperactivity disorder); (8) diagnosis of an intellectual disability; (9) history of violence victimisation; or (10) history of violence or aggression perpetration. Both violence complexity factors (9 & 10) are inclusive of physical aggression, verbal aggression, emotional or psychological abuse and/or neglect. The presence of these complexity factors was identified in at least one lifetime ambulance attendance, by either the attending paramedic, police, the patient or bystanders.

1.4. Statistical analysis and cleaning methods

All analyses were conducted using Stata15 (StataCorp, 2017). Due to the overpowered sample and increased risk of Type 1 error (Hochster, 2008; Zhang & Hughes, 2020), differential tests of association for comparison of complexity factors were not run. Therefore, examination of complexity factors will focus on proportional difference between groups. To understand the unique association of having an identified history of OOHC on likelihood of repeat ambulance attendances, a sequential logistic regression was conducted. Following the methodology of Locker et al. (2007), a truncated Poisson regression was run to determine the statistical cut-point of how many ambulance attendances would categorise someone as having multiple attendances. At Step 1, the gender of the individual and years between first and last attendance were entered as covariates. At Step 2 the ten complexity factors were entered. Finally, current

or historical indication of being in OOHC was entered at Step 3. The presence of multicollinearity was assessed through Spearman's correlations, linear relationship of continuous variables was assessed through Box-Tidwell test and outliers were checked through examination of variation inflation factors (VIF) values >3. No violation of assumptions was found. Finally, due to the overpowering of the sample, a significance threshold of $p < .001$ was taken, and focus was placed on odds-ratios and confidence intervals rather than on significance (Halsey, 2019) with odds-ratios of 1.68 and 3.47 respectively representing small or medium effects (Chen et al., 2010).

2. Results

2.1. Descriptive

There were a total of 49,035 ambulance attendances to Victorian children (0–17 years) between 1 January 2017 and 30 June 2023 in the NASS dataset. The attendances comprised 27,565 children, of whom 7.42 % had an identified history of being in OOHC. Table 1 details the demographic information, emergency service resources associated with the ambulance attendances per individual, and history of complexity factors for each individual. The demographics of children with ambulance attendances were similar for those with and without an identified history of OOHC. However, attendances for children with an identified history of OOHC involved substantially more resources, with a higher mean of repeat attendances, police attendance, and transportation to hospital. Those with an identified history of OOHC had a higher proportion of all complexity factors compared with those with no identified OOHC history.

Table 1
Descriptive comparison of children with and without an identified history of OOHC.

Category	Sub-Category	No identified OOHC History	Identified History of OOHC
Demographics			
N		25,520	2045
Gender	Female	14,744 (57.77 %)	1269 (62.05 %)
	Male	10,776 (42.23 %)	776 (37.95 %)
Mean age of first appearance in ambulance database[a]		*M* = 14.84	*M* = 14.04
		SD = 3.15	*SD* = 2.26
		Range = 0–17	Range = 0–17
Mean years at risk (years between first and last attendance <18 years)[a]		*M* = 0.19	*M* = 0.97
		SD = 0.62	*SD* = 1.35
		Range = 0–6	Range = 0–10
Resources			
Mean number of lifetime ambulance attendances		*M* = 1.71	*M* = 7.42
		SD = 2.80	*SD* = 18.30
		Range = 1–121	Range = 1–313
Mean lifetime police co-attendances		*M* = 0.64	*M* = 3.92
		SD = 1.33	*SD* = 12.15
		Range = 0–58	Range = 0–271
Proportion of police co-attendances across all attendance		*M* = 37.35 %	*M* = 52.94 %
Mean number of lifetime transportation to hospital		*M* = 1.17	*M* = 4.92
		SD = 1.62	*SD* = 12.71
		Range = 0–75	Range = 0–225
Proportion of attendances leading to transportation to hospital all attendance		*M* = 74.03 %	*M* = 71.95 %
Complexity Factors			
Developmental disorder		4311 (16.89 %)	700 (34.23 %)
Intellectual disability		492 (1.93 %)	252 (12.32 %)
Mental health condition	Any	11,954 (46.84 %)	1344 (65.72 %)
	- History of anxiety disorder	9319 (36.52 %)	1000 (48.90 %)
	- History of depressive disorder	8601 (33.70 %)	1059 (51.78 %)
	- History of other mental health disorder [b]	4519 (17.71 %)	900 (44.01 %)
History of alcohol and/or other substance-related presentation	Any	13,484 (52.84 %)	1202 (58.78 %)
	- Alcohol only	6529 (25.58 %)	563 (27.53 %)
History of Suicide and/or Self-injury	Any	12,617 (49.44 %)	1579 (77.21 %)
	- History of Attempt	7245 (28.39 %)	1105 (54.03 %)
	- History of Ideation	7716 (30.24 %)	1134 (55.45 %)
	- History of Self Injury	4670 (18.30 %)	968 (47.33 %)
History of violence victimisation		1941 (7.61 %)	448 (21.91 %)
History of violence perpetration		3337 (13.08 %)	764 (37.36 %)
Cumulative complexity score (out of 10)		*M* = 2.24	*M* = 4.09
		SD = 1.52	*SD* = 2.30

[a] Identified between 2014 and 2023.[b] Obsessive Compulsive Disorder, schizophrenia, bipolar, eating disorders, or personality disorders.

Notably, 77 % of children with an identified history of OOHC also had an identified history of suicide attempts, suicidal ideation or self-injury behaviour, compared to 49 % of children with no identified history of OOHC. Additionally, 37 % of those with an identified history of OOHC had a history of violence perpetration, and 22 % had a history of violence victimisation, compared to 13 % and 8 % of those without a history of OOHC.

2.2. Co-occurrence of complexity factors

Fig. 1 shows the overlapping proportion of complexity factors for violence, developmental disorders, alcohol and/or other substance related attendances, suicidal and self-injury thoughts and behaviours. Approximately 12 % of those with an identified history of OOHC had all ten complexity factors, compared with 1 % of those with no identified history of OOHC. Fig. 2 shows the overlapping proportion of suicidal and self-injury thoughts and behaviours (suicide attempt, suicidal ideation, self-injury, self-injury ideation). Notably, 53 % of those with an identified history of OOHC have had a prior suicide attempt (compared with 28 % of those with no history of OOHC), and 26 % have an identified history of both mental health conditions and suicidal and self-injury thoughts and behaviours, compared with 5 % of those with no history of OOHC.

2.3. Factors associated with repeat attendances

Truncated Poisson regression indicated that individuals with nine or more lifetime ambulance attendances were reflective of a unique multiple attendance group (see Appendix A for regression output and attendance frequency table). To determine the unique association of having an identified history of OOHC on the likelihood of having multiple attendances, a sequential logistic regression was run (see Table 2). The final model correctly classified 97.82 % of cases, χ^2 (13, n = 27,565) = 2998.41, $p < .001$, and possessed good model fit (Pseudo $R^2 = 0.44$).

At Step 1 being female ($OR = 1.56$) and years at risk ($OR = 2.93$) were related to an increased likelihood of multiple attendances. At Step 2, being female was no longer a significant predicator ($p = .687$), with all complexity factors related to an increased likelihood of having multiple attendances. Finally, at Step 3 all complexity factors remained significantly related to having multiple attendances, with having an identified history of OOHC also increasing the likelihood of having multiple attendances (OR = 2.60; 95 % CI: 2.19–3.10).

3. Discussion

The current study described the differences in alcohol and drug, mental health, suicide and self-harm-related ambulance attendances between children with and without an identified history of OOHC in Victoria, Australia. As hypothesised, we found that having a history of OOHC is associated with a higher likelihood of multiple ambulance attendances among children under 17 years of age.

In general, children with an identified history of OOHC appeared to have a higher frequency of lifetime ambulance attendances, as well as lifetime ambulance attendances with police co-attendance compared with those without an identified history of OOHC. These findings highlight the increased demand that those with an identified history of OOHC have on emergency services. Those with OOHC history were also found to have more frequent histories of mental health diagnoses, suicidal and self-harm behaviours, violence and developmental disorders, but not ambulance attendances that involved alcohol or other substances. These findings are consistent with previous reviews which highlight that those in OOHC have increasingly complex comorbidities compared with those not in OOHC

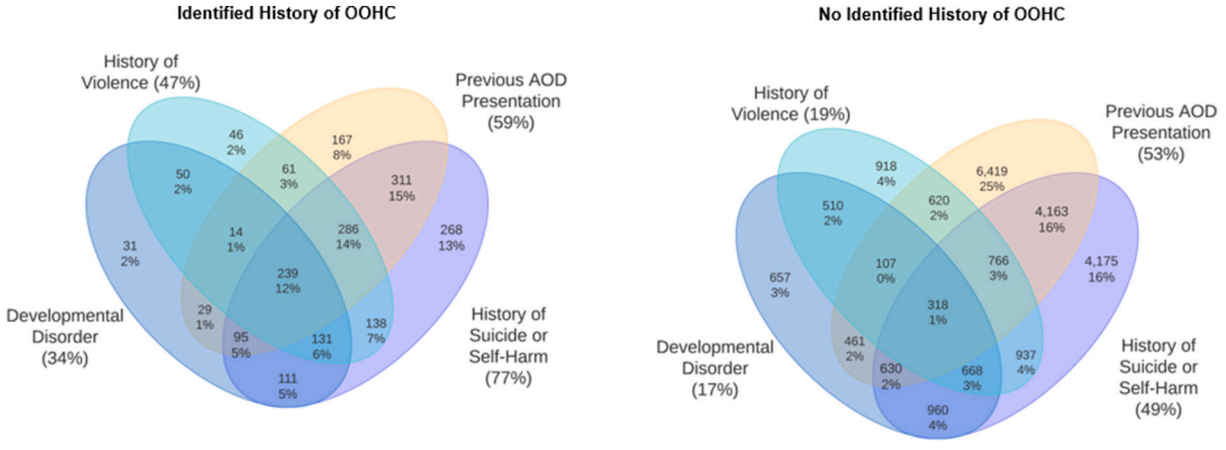

Fig. 1. Overlapping proportions of complexity factors for children with and without an identified history of OOHC
Note. N = 2045 with identified history of OOHC, n = 68 (3 %) had none of the stated complexity factors Note. N = 25,520 with no history of OOHC n = 3311 (13 %) had none of the stated complexity factors
AOD = alcohol and other drugs.

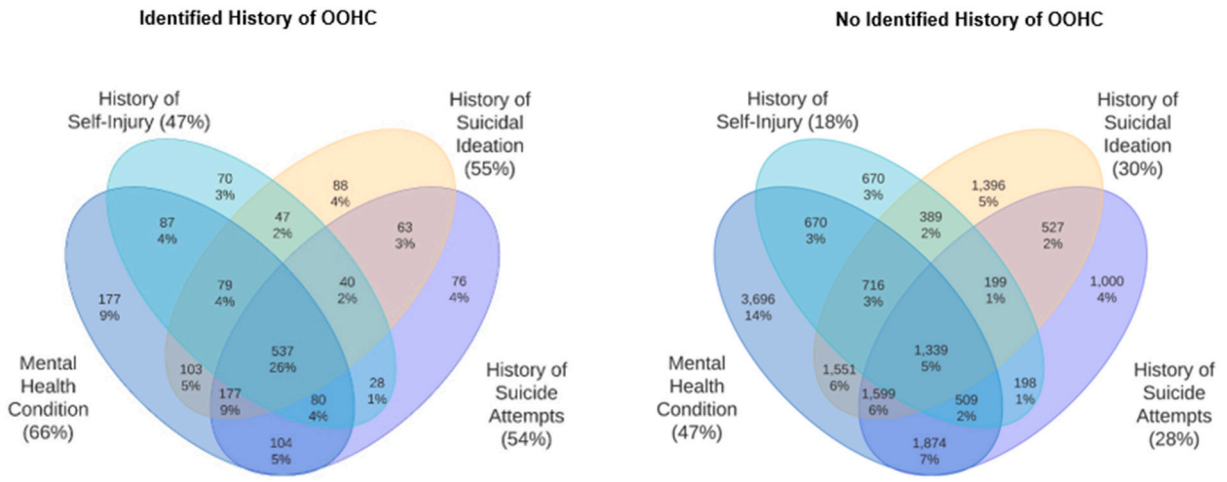

Fig. 2. Overlapping proportions of mental health and suicidal self-harm complexity factors for children with and without an identified history of OOHC.
Note. N = 2045 with identified history of OOHC, *n* = 289 (14 %) had none of the stated complexity factors Note. N = 25,520 with no identified history of OOHC, *n* = 9207 (36 %) had none of the stated complexity factors.

Table 2
Sequential Logistic Regression: Correlates of Multiple (≥9 lifetime) Ambulance Attendances.

	OR	95 % C.I. OR	Wald z	McFadden Pseudo r^2
Step 1				0.23
Years at Risk	2.93	2.78–3.08	40.24	
Gender[a]	1.56	1.32–1.86	5.09	
Step 2				0.42
Years at Risk	1.58	1.48–1.70	12.96	
Gender	0.96	0.78–1.18	−0.40	
History of suicide attempt	1.73	1.37–2.18	4.65	
History of suicidal ideation	2.38	1.90–3.00	7.45	
History of self-injury	2.83	2.32–3.46	10.24	
Diagnosed mental health condition	2.90	2.16–3.89	7.06	
Alcohol related ambulance presentation	1.93	1.59–2.33	6.74	
Other substance related ambulance presentation	3.25	2.62–4.03	10.8	
History of violence victimisation	1.53	1.23–1.90	3.81	
History of violence perpetration	2.95	2.43–3.58	10.98	
Developmental disorder diagnosis	1.25	1.02–1.54	2.19	
Intellectual disability diagnosis	4.39	3.27–5.88	9.89	
Step 3				0.44
Years at Risk	1.51	1.40–1.62	11.2	
Gender	0.98	0.80–1.20	−0.22	
History of suicide attempt	1.65	1.31–2.09	4.21	
History of suicidal ideation	2.37	1.88–2.99	7.33	
History of self-injury	2.57	2.10–3.15	9.13	
Diagnosed mental health condition	2.89	2.15–3.88	7.02	
Alcohol related ambulance attendance	1.78	1.46–2.16	5.79	
Other substance related ambulance attendance	3.08	2.48–3.82	10.18	
History of violence victimisation	1.31	1.05–1.64	2.38	
History of violence perpetration	2.70	2.22–3.28	9.91	
Developmental disorder diagnosis	1.27	1.03–1.56	2.27	
Intellectual disability diagnosis	3.55	2.63–4.79	8.25	
History of out-of-home-care	2.65	2.17–3.24	9.61	

[a] Note: male reference category.

(Kääriälä & Hiilamo, 2017; Pilowsky & Wu, 2006). The current findings extend this literature by highlighting that these children also more frequently access emergency services in response to harms or distress stemming from mental health, suicide or self-injury thoughts or behaviours.

Notably those with an identified history of OOHC had a much higher rate of co-occurring mental health and self-harm behaviours, with over a quarter having an identified history of diagnosed mental health, self-injury, suicidal ideation and suicide attempt, compared with only 5 % of those with no identified OOHC history. This highlights the need for tailored mental health supports for

children in OOHC and additional training for carers and support services to appropriately meet their needs. Ensuring that all parties involved with the care of children in OOHC can adequately understand the unique needs of the individual may assist in reducing future harm or distress. Previous research outlines how a lack of coordinated response to the complex support needs of some children in OOHC allows disability, mental health, and health systems to repeatedly "handball" and exclude children with more complex support needs from their services (Baidawi et al., 2014; Ellem et al., 2020). Introducing an early preventative intervention of individualised, trauma informed approach to care that addresses the underlying causes, rather than only the presenting symptoms is essential in ensuring that the needs of this vulnerable population are being met (Beyerlein & Bloch, 2014; Fratto, 2016).

Nine out of the ten complexity factors examined were related to increased odds of multiple ($\geq$9) ambulance attendances, with an identified history of OOHC increased the odds of having multiple ambulance attendances by more than two and half times. This finding reflects emergency department and inpatient admission data which highlight an increased need for hospital care by children in OOHC (Bennett et al., 2020). The current findings extend this literature by demonstrating increased service use outside the hospital setting, and for acute health needs beyond physical conditions. This suggests that children with a history of OOHC may be in a revolving healthcare door where existing supports may not be sufficient in addressing their complex needs, resulting in increased crisis responses requiring ambulance services. It is possible that the increased ambulance usage for some individuals in OOHC may represent carers following established risk management plans, particularly for children with a prior history of self-injury or suicidal behaviours. However even if the increased ambulance usage may be partially driven by increased clinical surveillance, this repeated use of emergency healthcare adds pressure to already under-resourced health care systems and represents potential opportunities for tailored intervention around substance use, mental health, and suicide prevention. Future research should utilise linked data to identify how children in OOHC move through healthcare systems, identify appropriate points of intervention and what point in their maltreatment trajectory they are connected to appropriate mental health supports. As children from OOHC are at an increased risk of premature death (Commission for Children and Young People, 2019), these multiple points of contact with the relevant systems could allow for a tailored process to be put in place. Although there has been a state-wide policy in relation to ensuring priority mental health access for children in OOHC for some time (Department of Health, 2011), this appears to have had limited impact in terms of minimising the use of crisis responses. We suggest that this may be due to a lack of a coordinated multidisciplinary service response that is necessary to ensure that children with complex needs in OOHC are not simply shuffled between, referred onto other services, and excluded from the services and supports they require.

3.1. Limitations

Due to the nature of information in ambulance electronic patient care records, the current study was unable to differentiate between different types of OOHC. Whilst still within the child protection systems, there are typically different levels of mental health complexity across OOHC settings (Baidawi et al., 2014), with children in residential care more likely to have a higher level of complexity compared with other forms of OOHC (Tarren-Sweeney, 2008). Additionally, a history of OOHC was only able to be determined if paramedics identified a current or previous placement within the patient history or within their clinical case notes. It is therefore possible that some individuals with a history of OOHC were not identified within the NASS, or that individuals within obvious OOHC settings, such as residential placements, may have been identified more frequently compared to those in potentially less obvious settings (i.e., foster or kinship care). As such, it is possible that some individuals with OOHC histories were included within the comparison group, and all descriptive statistics related to those with a history of OOHC should be considered lower bound estimates. These limitations are not unique to the use of ambulance attendance data (Kenny et al., 2024), and highlight the need for future research to utilise linked data to better identify how children in OOHC move through healthcare systems.

As the current study examined history of OOHC placement during any ambulance attendance throughout the study period as a dichotomous variable, we were unable to determine exactly when a child entered or left the OOHC system. We were therefore unable to ascertain whether each ambulance attendance occurred prior to, during, or after a child's placement in OOHC. As such, the current study is unable to examine ambulance attendances that happened prior to child protection involvement, or trends once the child has left the OOHC system. Whilst there are many supports in place for children within OOHC, once they transition out of care, these may be abruptly removed, or not accessed, continuing the cycle of unmet (Mendes et al., 2014). This is something that a future study using data linkage could examine in detail.

Finally, as NASS is a filtered dataset for mental health, alcohol or substance use, and suicidal self-harm ambulance attendance (Lubman, Heilbronn, et al., 2020; Lubman, Matthews, et al., 2020), we are unable to compare findings related to a broader range of ambulance attendances (e.g. accidents and other health emergencies), or to children in OOHC without ambulance attendances. As such, complexity factors are likely an underestimation of the impact of experiencing OOHC, as the current comparison group is already an at-risk population.

4. Conclusion

This study identified that the use of ambulance service data is a useful addition to the understanding of the acute healthcare needs of children in OOHC. The current study identified that within the NASS, compared to those without a history, those with a history of OOHC disproportionally utilised ambulance services and had increased" harms related from substance use, mental health and/or suicide or self-harm. To reduce this disproportionate use of crisis healthcare responses it is imperative that support systems are put in place to better assist children with complex support needs. By utilising a trauma informed approach to the health care of children within child protection, services may help to improve the outcomes from children in OOHC, and begin to work preventatively, rather

than in a reactionary, or crisis-driven manner, to respond to the needs of children in OOHC.

CRediT authorship contribution statement

Ryan Baldwin: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Susan Baidawi:** Writing – review & editing, Writing – original draft, Supervision. **Christine Grove:** Writing – review & editing, Writing – original draft, Supervision, Conceptualization. **Tina Lam:** Writing – review & editing, Writing – original draft, Supervision. **Rowan P. Ogeil:** Writing – review & editing, Writing – original draft, Validation, Methodology. **Ziad Nehme:** Writing – review & editing, Writing – original draft. **Agatha Faulkner:** Writing – review & editing, Writing – original draft, Conceptualization. **Naomi Beard:** Writing – review & editing, Writing – original draft. **Dan I. Lubman:** Writing – review & editing, Writing – original draft, Supervision, Resources, Funding acquisition. **Debbie Scott:** Writing – review & editing, Writing – original draft, Project administration, Conceptualization.

Declaration of competing interest

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Appendix A

Table 3
Truncated Poisson Model Output.

Grouping	Attendance Mean (SE)	95 % CI	Estimated Classification Probability
Class 1	1.00 (0.01)	0.98–1.02	95.8 %
Class 2	8.90 (0.20)	8.51–9.23	4.1 %

Table 4
Attendance Count by Out of Home Care Status.

Lifetime attendance count	No Identified History of OOHC	History of OOHC	Total
1	19,017	756	19,773 (71.7 %)
2	3326	287	3613 (13.1 %)
3	1236	194	1430 (5.2 %)
4	662	132	794 (2.9 %)
5	410	102	512 (1.9 %)
6	230	81	311 (1.1 %)
7	149	64	213 (0.8 %)
8	111	60	171 (0.6 %)
9	72	41	113 (0.4 %)
10	59	22	81 (0.3 %)
11	42	26	68 (0.2 %)
12	34	23	57 (0.2 %)
13	32	20	52 (0.2 %)
14	22	11	33 (0.1 %)
15	15	17	32 (0.1 %)
16	11	11	22 (0.1 %)
17	9	15	24 (0.1 %)
18	8	16	24 (0.1 %)
19	9	7	16 (0.1 %)
20	6	6	12 (0.1 %)
21+	60	154	214 (0.08 %)
Total	25,520	2045	27,565

Data availability

The authors do not have permission to share data.

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