Huckle Taisia (Orcid ID: 0000-0002-0669-0685)

Romeo Jose (Orcid ID: 0000-0002-6707-3429)

Estimating child maltreatment cases that could be alcohol-attributable in New Zealand

Taisia Huckle PhD and Jose S. Romeo PhD

SHORE and Whariki Research Centre, College of Health, Massey University, New Zealand.

PO Box 6137. Victoria Street West, Auckland

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Key words: alcohol; alcohol-attributable fraction; child maltreatment; alcohol policy; register data; physical abuse; neglect; abandonment; emotional abuse; psychological abuse; sexual abuse; intimate partner violence in the household

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Abstract

Background and Aims: Children are an important group harmed by others' alcohol consumption. This study 1) compared the risk of occurrence of child maltreatment among children exposed vs not exposed to parents with an alcohol-attributable hospitalisation or service use for mental health/addiction and 2) conducted sensitivity analyses to estimate the cases of child maltreatment that could be attributable to alcohol under two different conditions in New Zealand.

Design, setting and participants: This cohort study was conducted among 58,359 children 0-17 years and their parents (years 2000-2017) using the Statistics New Zealand Integrated Data Infrastructure. The prevalence of hazardous drinking among parents was obtained from the New Zealand Health Survey 2017 (*n* = 13,869).

Measurements: Survival analysis based on a Bayesian piecewise exponential model was used to estimate the risk of time-to-first substantiated child maltreatment event (identified from social service, hospital, mortality and police data) related to exposure to parents with an alcohol-attributable hospitalisation or who used a mental health/addiction service (vs no exposure). Potential confounders were included for parents and children. The sensitivity analyses i) estimated an alcohol-attributable admissions/service use fraction for maltreatment in 2017 and ii) calculated a population-attributable fraction using the relative risk from the cohort and prevalence of hazardous drinking (AUDIT 8+) among parents in 2017.

Findings: There was a 65.1% (1.65; 95% confidence interval [CI]: 1.46 – 1.86) increased risk of child maltreatment if a child was exposed to parents who had an alcohol-attributable hospitalised or mental health/addictions service use. The sensitivity analyses estimated that in 2017 14.6% (CI: 14.0% – 15.3%) and 11.4% (95% CI: 8.4% – 14.3%) of the documented cases of child maltreatment in New Zealand could be attributable to parents with severe or hazardous consumption.

Conclusion: In New Zealand, exposure to parents with an alcohol-attributable hospitalisation or service use is a risk factor for substantiated child maltreatment.

Introduction

Much of the quantification of alcohol-related harm globally relates to the impact of alcohol on the drinker him or herself. The contribution of alcohol's harm to people other than the drinker, including children, has largely been excluded from global comparative risk assessments such as the Global Burden of Disease study or the Global Status Report [1] which underestimates the total impact of alcohol globally and in separate countries [2]. As such, indicators of harm to others are urgently needed to provide a more complete picture of the burden of harm to others inform decision-making and strengthen policy on alcohol control.

Children have rights to be protected from maltreatment (Article 19 of the UN rights of the child) but remain under-protected from the impacts of unhealthy commodities including alcohol [3]. The Lancet Commission has recommended putting child wellbeing at the centre of Sustainable Development Goal policies [3], however, currently children are not well protected from the secondhand effects of alcohol i.e., the harms caused by the effects of alcohol on adult drinkers, for example, fetal alcohol syndrome disorder. In the case of maltreatment, this is of great concern as children cannot remove themselves from the situation of harm.

Some previous research has shown associations between caregiver alcohol use, in particular alcohol abuse [4-14], and child maltreatment. However, no published studies have begun the work of estimating the disease burden of child maltreatment attributable to risk factors, such as alcohol, in the population. Calculations have been limited by a lack of meta-analytical studies. The only meta-analysis we found assessing alcohol abuse and neglect and physical maltreatment, while showing that alcohol abuse was associated with child maltreatment, did not provide a risk estimate [4] necessary for such calculations.

Cohort studies have assessed the risk related to alcohol consumption and maltreatment [e.g., 5,6-10,12-15]. However, a number of studies have relied on social services data [e.g., 6,7,8,12,13] and welfare worker attributions of alcohol have been shown to be often inaccurate [16]. Sometimes objective data alcohol data have been used but have only focussed on one type of outcome data such as hospital data [5,11,15]. For example, in Wales, there was a 39% increased risk for an emergency department admission for victimisation

among children living with a household member who had presented with an alcohol-related hospital admission [17]. Other cohort studies have tended to focus on either one or two types of maltreatment or only one type [e.g., 14,18-20]. There is a need for more comprehensive and objective measurement of risk factors, such as alcohol, and child maltreatment in countries to start the process of estimating burden of disease measures.

The aims of the study are to a) compare the risk of occurrence of child maltreatment among children exposed vs not exposed to parents with an alcohol-attributable hospitalisation or service use for mental health/addiction and b) conduct sensitivity analyses to estimate the cases of child maltreatment that could be attributable to alcohol under two different conditions in New Zealand.

Methods

Design

This study 1) utilised a birth cohort using data from the Integrated Data Infrastructure (IDI) [21] and 2) conducted sensitivity analyses using data from the IDI and the New Zealand Health Survey.

1) The birth cohort

To compare the risk of occurrence of child maltreatment among children exposed vs not exposed to parents with an alcohol-attributable hospitalisation or service use for mental health/addiction, a cohort of all live births (*n*=58,359) in New Zealand in 2000 and their parents were followed from age 0 to 17 years. Data were obtained from the IDI which is register data that aims to include all people who have ever been a resident in New Zealand. It links individuals across numerous health, services, administrative and survey databases and links parents and children. Data in the IDI is de-identified. This means information like names, dates of birth, and addresses has been removed. Numbers that can be used to identify people, like Inland Revenue Department (IRD) and National Health Index (NHI) numbers, are encrypted (replaced with another number) [22]. The strength of using the IDI in this study is that it allows for a more objective and comprehensive understanding by bringing together information on all different types of child maltreatment and different objective measures of

children's exposure to parental drinking providing improved scope to consider the effects on maltreatment compared to previous studies. See supplementary material for more information on the IDI.

Measures

Independent: Hospitalisation or service use for mental health/addiction (which included community-based services) that were 100% attributable to alcohol (acute and chronic causes) (See Table 1). These events were recorded from 1995 to 2017. Events happening before the childbirth date (1995-2000) were considered as 'baseline' in the model. **Dependent:** The outcome was the age at the first substantiated child maltreatment event, in years. Child maltreatment was defined as: physical abuse (child assault, physical abuse), neglect or abandonment, emotional/psychological abuse, sexual abuse, intimate partner violence in the household (See Table 1). We investigated child deaths, but none were coded as maltreatment (most were suicide) and are therefore considered as censored events along with departures and end of the study date.

Potential confounders: Our intention was to adjust for variables that were a) related to the risk factor of interest and, independently of this, to outcome (child maltreatment), but not an intermediate factor on the causal path between the risk factor and outcome [23] as indicated by the literature, and b) if the variables were available in the IDI. See supplementary material for conceptual diagram of the potential confounding variables.

Potential confounders included for parents were: drugs problems/heavy use, mental health diagnoses (See Table 1), age at childbirth (only mother's age at childbirth was included as correlation with father age at childbirth was high (correlation 0.72)) and highest qualification [24] (see supplementary material for details on how this was calculated). If both parental qualifications were "not specified" we classified them into category "missing". Parental suicide attempts/self-harm (as an additional indicator of poor mental health) was considered for inclusion in the model but was excluded from the final model due collinearity with parent mental health diagnoses (correlation 0.52).

For the children, potential confounders included gender, ethnicity, and child characteristics which may be related to likelihood of maltreatment and increased parental stress (which may increase drinking [e.g., 25,26]. These were FASD and mental health/developmental

conditions (see Table 1 for codes). Prioritised ethnicity was included for the child and represents the ethnicity of both parents.

Potential confounders were considered in the model as categorical variables using reference levels as specified in the Table 2. Mother's age was categorised into 4 groups (< 19, 20-25, 26-35, 36+) and included by using dummy variables.
We have included details on each dataset's coverage of the New Zealand population in the supplementary material. Key points include that access to public hospital (hospital discharges) and mental health services (PRIMHD) are free in New Zealand so have excellent coverage of the population. The New Zealand Health Survey was not available in the IDI while we were conducting the birth cohort study.

2) Sensitivity analyses

Assuming a causal relationship between parental alcohol-attributable hospitalisation/service use and child maltreatment we then conducted two sensitivity analysis i) we estimated an alcohol-attributable admissions/service use fraction for child maltreatment in 2017 and ii) estimated a population-attributable fraction among hazardous drinking parents (AUDIT 8+) in 2017. The New Zealand Health Survey (NZHS) 2017 was used (n = 13,869) to obtain the prevalence of AUDIT 8+ among parents. The NZHS is one of New Zealand's most robust surveys with a response rate of 80%. The target population for the survey was New Zealand's usually resident population of all ages (including those living in non-private accommodation), however, in this study we use the adult population 15+ years and above. See supplementary material for further information on sampling.

Analysis:

Birth cohort: The association between age at the first child maltreatment event and exposure to mother and/or father with an alcohol-attributable hospitalisation or service use for mental health/addiction was assessed using survival analysis. We modelled the hazard function by considering a Bayesian piecewise exponential model [27,28], which assumes that the time is divided into different periods and that the hazard rate is then constant within any of these time periods. This model has the flexibility and interpretability of the Cox model with the advantage of modelling hazard functions of any shape.

Specifically, if J is a set of intervals with specified cut-points $a_0, a_1, \dots, a_J$, with $a_0 = 0$ and $a_J = \infty$ (infinity), the hazard function at time t, $h(t|\mathbf{x}_i(t))$, for an individual i with predictors $\mathbf{x}_i$, can be written as $h(t|\mathbf{x}_i) = \lambda_j \, exp(\mathbf{x}_i\boldsymbol{\beta})$, for $a_{j-1} \leq t < a_j$, $j = 1, \dots, J$. λ_j corresponds to the baseline hazard in the time period $[a_{j-1}, a_j)$, and $\boldsymbol{\beta}$ being the unknown parameters associated with the predictors. Predictors $\mathbf{x}_i$ are considered fixed at baseline or time-dependent, $\mathbf{x}_i(t)$, i.e., those where the values differ over time.

Children with no maltreatment events were followed up until the earliest occurrence of the following events: end of the study date (31st of December 2017), latest emigration date or death. A right-censoring scheme was considered for them.

Fixed predictors/confounders considered in the model were child gender, ethnicity and FASD/mental health issues, parental highest qualification, parental past alcohol-attributable hospitalisation or service use for mental health/addiction, parental past drug heavy use problems, parental past mental health diagnosis and age of the mother at childbirth. Time-dependent predictors (time-dependent covariates) considered were parental alcohol-attributable hospitalisation or service use for mental health/addiction, parental drug heavy use problems and parental mental health diagnosis. For these last 3 predictors we considered the first occurrence during the time study as an indicator of change in the status (dichotomic variable). Model diagnostics for checking proportional hazard (PH) assumption was carried out by analysing Schoenfeld residuals. When PH assumption was violated, time-varying coefficients, $\beta(t)$, were explored in the model. We found evidence that the parameter estimates corresponding to both the fixed effect child gender and the time-dependent effect associated with parental alcohol-attributable hospitalisation or service use for mental health/addiction use vary over time. The coefficient for child gender (being female vs male) differs after the child age t = 12.5, while the coefficient for parental alcohol use changes linearly with time (i.e., with the child age).

An overall parental alcohol effect was estimated by calculating the risk of adding the estimated coefficient effect of the time-to first event child maltreatment at baseline (i.e., parent had an alcohol-attributable hospitalisation or service use for mental health/addiction five years prior to birth) and the estimated effect of the time-dependent parental alcohol-attributable hospitalisation or service use for mental health/addiction.

We followed a Bayesian approach for estimating the model parameters since statistical inference is straight forward under a MCMC (Markov chain Monte Carlo) procedure and does not rely in normality distributional assumptions. DIC was used as model selection criterion when modelling time-varying coefficients. Parameters were considered statistically significant when the value 0 was not contained in their respective 95% credibility interval (CI). In the supplementary material we have included additional information on the Bayesian modelling.

Extraction and linking of data sets in the IDI was carried out using *SAS Enterprise Guide* version 7.1 by using *proc sql* procedure and data steps *SAS* statements. *RStudio Pro* version 1.2.5042-1 was used for converting the data set into counting process style and for fitting initial Cox PH models by using *tmerge* and *coxph* functions, respectively. Bayesian piecewise exponential model was fitted with SAS *proc phreg* procedure.

Missing data: Two variables had missing–data - parental education and age of mother. Parental highest qualification was missing for 21.2% of children. Given the relatively large percentage of missing data, we decided to include them in the analysis as a new category (missing) as it was unlikely these cases were missing at random. Age of parents when not available from the DIA data set was obtained from Census 2013, only 0.04% (24 children) was missing for age of mother at childbirth and therefore excluded from modelling.

The IDI uses both unique identifier and probabilistic linking process to combine data, which inevitably produces linkage error. However, the false positive linkage rate (i.e., if records for two different individuals are linked when they should not be) was estimated at less than 1% [29]. Linkage error can cause IDI population over-coverage or under-coverage but is likely to be minimal [30].

Sensitivity analysis: We conducted sensitivity analysis to account for any possible correlation between subjects, in this case siblings that share same household environment. Cox models considering frailty distributions (random effects) were implemented as 1.7% of the children in the cohort had siblings born to the same mother in the cohort in 2000 e.g., multiple births (3.5% had the same mother or father). We selected siblings with the same mother for the analysis as we hypothesised, they were more likely to be living in the same household as each other. However, the inclusion of the random effect did not provide any significant improvement or changes on the estimated parameters.

We also considered sensitivity analysis to understand how well the IDI captured the parents with an alcohol-attributable hospitalisation or service use for mental health/addiction compared to the general population in New Zealand. Using the 2017New Zealand Health Survey we found that the percentage of hazardous drinkers in the survey with an AUDIT score of 8+ with a hospitalisation or service use for mental health or addictions for alcohol was 4% compared to 7% in the IDI only.

We estimated an attributable fraction for admissions/service use by capturing every child aged 0-17 years in New Zealand in 2017 who had a documented maltreatment event and calculating the percentage of children who had a parent with a hospital admission or mental health service use for alcohol, in the 3 years before or one year after the documented maltreatment. Research suggests that parental alcohol problems will be long-standing before help is sought from services [31] and therefore this measure will be more a more sensitive indicator for severe alcohol exposure.

We also estimated a PAF [32,33] associated with hazardous drinking among parents. It was calculated using the formula $PAF = P \times (RR - 1) \div [1 + P \times (RR - 1)]$, where P is the proportion of parents with hazardous drinking (AUDIT 8+) in the New Zealand population and RR represents the risk estimate of substantiated child maltreatment from the birth cohort analysis. CI was obtained by estimating PAF within the MCMC procedure of the Bayesian modelling.

Results

Descriptives

There was a total of 58,359 children in the cohort and of whom, 14% (n = 8,040) had experienced at least one maltreatment event (Table S1). Of the parents, 6% (n = 3,408) had a documented alcohol-attributable hospitalisation or service use for mental health/addiction. The types of first maltreatment events were: 34% emotional abuse, 19% neglect, 11% physical abuse, 9% sexual abuse, 20% family violence in the household, 2% assault and 5% were unspecified.

Table S1, in the supplementary material, shows the descriptive statistics for cohort (children and parents) for all measures included in the model.

Risk of occurrence of child maltreatment

The risk of time-to first event child maltreatment at baseline (i.e., parent had an admission or service use for alcohol five years prior to birth) was 54.7%. Children who had exposure to parents with a hospitalisation or mental health/addictions services event during the time study (time varying exposure) at older ages had an increased risk of having a maltreatment event of with a maltreatment event at younger ages. Specifically, a 6.7% increase for every additional year of age. Overall alcohol-attributable hospitalisation or service use for mental health/addiction by parents was associated with a 65.1% increased risk of child maltreatment for every additional year of age (Table 2).

This result was found over and above several key potential confounders including parental mental health issues (past and over the time study), education, mothers age at childbirth, and drug use (past and over the time study). Most potential confounders included in the study were associated with a higher risk of child maltreatment than parents with an alcohol-attributable hospitalisation or service use for mental health/addiction, and this was particularly the case low or missing education and age of mother at birth being under 20 years (Table 2).

Sensitivity analyses

Discussion

Our study findings indicate that child maltreatment urgently needs to be considered in alcohol policy and intervention decisions. This is based on the results of the birth cohort analysis revealing a 65% increased risk of substantiated child maltreatment related to exposure to parents with a hospitalisation or service use event. We argue this study provides among the best evidence of the risk of child maltreatment as it relates to severe alcohol exposure to date as it relies on objective alcohol measurements linked to a comprehensive range of substantiated child maltreatment events from a wide range of data e.g., protective services, hospitalizations, police data and this comprehensive assessment has been missing from the literature previously.

In the cohort analysis, exposure to parents with an alcohol-attributable hospitalisation or service use event substantially increased the risk of child maltreatment while adjusting for a range of potential confounders. Over the total period of follow-up, the increased risk was 65.1%, but most of this risk (54.7%) was accrued at baseline (i.e., when a parent had an admission or service use up to five years prior to birth). This meant that children born into a challenging environment were at greater risk of maltreatment than if the family developed alcohol-problems as the child grew up. This probably reflects that families with a history of hazardous drinking prior to the child's birth have long-standing problems increasing risk of child maltreatment. This suggests that alcohol prevention prior to, or around the time of, a child's birth is therefore likely to be very important.

The task of documenting the burden of disease for harm to others is still in its infancy and causality needs to be established. However, our study provides first estimates of cases of maltreatment that could be alcohol- attributable among parents with severe or hazardous alcohol exposure in the literature and therefore contributes to growing evidence on the extent of alcohol's harms to others. We found that in 2017, 14.6% and 11.4% of child maltreatment could be attributable to parents with severe/hazardous alcohol exposure. These results are in range of the 13% of traffic crash deaths globally that are attributed to someone else's drinking [34], highlighting the size of the problem. Increasing tax on alcohol, banning/reducing marketing and reducing the availability of alcohol will work to reduce severe/hazardous alcohol consumption among adults [35] and better protect children who are unable to remove themselves from the harm.

Limitations

There are a number of limitations that led to underestimation: a) our risk estimate from the cohort analysis is underestimated as there will be some parents that drank at levels placing them at risk for adverse health events but who did not have a documented event and were inadvertently included in the non-exposed group meaning the true risk will be higher and b) data limitations lead to underestimation including that we could not account for the drinking of a non-biological caregiver living in a household (aside from adopted parents) as the linking of individuals to a household address is not possible due to privacy reasons in the IDI. We did

not have data from general practitioners or private after hours clinics. Although general practitioner data are in the IDI no diagnosis data are available. Also, we do not have estimates of non-reported maltreatment c) our PAF was calculated for parents with an AUDIT 8+ score only, and while this measure was chosen to be close to the population estimated in the cohort analysis, only a fraction of the drinking population was captured (past year drinkers 78.9% in 2017) [36]. Another limitation with the PAF is that while the risk is underestimated, the prevalence may be overestimated as not all parents with an AUDIT 8+ would go to hospital or use mental health or addiction services.

While we could adjust for important potential confounders in the Bayesian piecewise exponential model, these statistical adjustments reduce the plausibility of alternative explanations, rather than eliminate them. The inclusion of potential confounders showed that hazardous alcohol exposure is involved in child maltreatment as part of a cluster of precipitating factors [37]. We could not consider all potential confounders because we did not have measures included e.g., being isolated or lacking a support network [38,39], parental level of stress [4,40], household composition. We did not include parental gender as a potential confounder as almost all children had a mother and a father at birth.

There are some New Zealand specific conditions to consider when interpreting the findings. In New Zealand access to public hospital and mental health services is free and therefore replicating these methods may be difficult for some other countries where access to services are not free. Also, New Zealand has a relatively high child maltreatment rate among countries in the OECD [41] and this needs to be considered when interpreting the findings.

Conclusion

Reducing severe/hazardous drinking among parents may work to reduce substantiated child maltreatment. Policy makers should consider children in alcohol policy decisions. As most of the risk of alcohol-related child maltreatment is accrued around the time of the child's birth, more targeted interventions such through pre-natal care programs and referral to treatment could be considered.

Ethics: Low risk ethics approval was received from Massey University. Approved application number 4000020909. A low risk ethics application was appropriate as defined by a Massey University ethics check list and as all data in the Integrated Data Infrastructure are anonymous to researchers and de-identified.

Disclaimer:

Access to the data used in this study was provided by Stats NZ under conditions designed to give effect to the security and confidentiality provisions of the Data and Statistics Act 2022.The results presented in this study are the work of the author, not Stats NZ or individual data suppliers. These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/.

Author contributions

TH and JR conceptualised the study, were responsible for the methodology, JR wrote the analysis code and did the analysis. TH and JR wrote the original draft. JR reviewed and edited the manuscript. TH supervised the study.

Declaration of interests

We declare no competing interests.

Pre-registration: the analysis was not pre-registered and the results should be considered exploratory.

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Table 1: Datasets, dates and codes used from the population-based registers in the IDI.

	Children		Parents	
Datasets	Dates	Variables	Dates	Variables
DIA (births, deaths and marriages)	2000	Date of birth, gender, ethnicity & link births to parents	2000	Age at childbirth, gender
Census	2013		2013	Highest qualification, age
Publicly funded hospital discharges	2000 - 2017	Child maltreatment codes: T74.0, T74.1, T74.2, T74.3, T74.8, T74.9 FASD and mental health codes: main codes P04.3, Q86.0, F0, F2-F9	1995 - 2017	Alcohol codes: E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, R78.0, T51.0, T51.1, T51.9, X45, X65, Y15, Y90, Y91 Mental health codes: F0, F2 - F9 Other drug codes: F11- F19 Suicide attempts/self harms codes: X6, X7, X80, X81, X82, X83, X84
Mortality	2000 - 2017	Mortality events	2000 - 2017	Alcohol codes: same as above Other drug codes: same as above Suicide attempts/self harms codes: same as above
Mental health and addictions data (PRIMHD)	2009-2018	Child maltreatment codes: same as above Mental health codes: same as above	2009-2018	Alcohol codes: same as above Mental health codes: same as above Other drug codes: same as above Suicide attempts/self harms codes: same as above
Oranga Tamariki (Child, Youth and Family)	2000 - 2017	Child maltreatment events: emotional or psycological, neglect or abandonment, physical and sexual abuses		
Recorded crime (Offenders) (Victims)	2000 - 2017	Child maltreatment events: assaults, sexual assaults and family violence events in the household (parent perpertrator)	2000 - 2017	Child maltreatment events: assaults, sexual assaults and family violence events in the household (children victim)
Children's Action Plan (CAP)	2013 - 2017	Family violence events in the household		
Customs (border movements)	2000 - 2017	Last departure		
The New Zealand Health Survey			2017/18	AUDIT 8+ Hazardous drinking

Table 2: Bayesian piecewise exponential time-to-first child maltreatment event model. HR stands for hazard ratio, 95% credibility intervals (CI) calculated as highest probability density intervals.

Effect	Estimate	S.E.	HR	CI lower HR	CI upper HR
Child gender: Female vs Male	0.105	0.022	1.111	1.064	1.158
Child ethnicity: Asian vs NZ Euro	-0.102	0.063	0.905	0.799	1.026
Māori vs NZ Euro	0.741	0.027	2.098	1.991	2.220
Pacific vs NZ Euro	0.490	0.039	1.633	1.505	1.750
Other/DK vs NZ Euro	0.372	0.086	1.456	1.229	1.707
Any child FASD or mental health issue	0.666	0.049	1.949	1.778	2.142
Parental past alcohol admission/service use	0.434	0.063	1.547	1.367	1.740
Parental past heavy drugs use	0.492	0.077	1.641	1.382	1.879
Parental past mental health diagnosis	0.328	0.056	1.390	1.232	1.537
Parental highest qualification: Low vs High	1.585	0.062	4.888	4.347	5.511
Med vs High	0.670	0.065	1.959	1.722	2.212
Missing vs High	1.460	0.064	4.314	3.781	4.848
Mother age at childbirth: <19 vs 36+	0.927	0.048	2.531	2.302	2.764
20-25 vs 36+	0.605	0.041	1.832	1.696	1.983
26-35 vs 36+	0.184	0.040	1.203	1.103	1.289
Parental alcohol admission/service use *(t)*	0.065	0.006	1.067	1.056	1.080
Parental heavy drugs use	0.439	0.056	1.554	1.393	1.726
Parental mental health diagnosis	0.613	0.040	1.847	1.695	1.987
Child gender: Female vs Male *x* I(*t* > 12.5)	0.022	0.009	1.022	1.004	1.039
Overall parental alcohol use effect	0.500	0.063	1.651	1.460	1.855

All variables included in the model are reported in Table 2 – none were omitted.

Table 3: Alcohol-attributable admissions/service use fraction for child maltreatment in New Zealand 2017

Measure	Yes	No	Total	AAF %	95% CI
Parent alcohol-attributable hospitalisation/service use	1701	9975	11682	14.6%	14.0-15.3

The alcohol-attributable admissions/service use fraction for child maltreatment in 2017 was 14.6% (CI: 14.0% – 15.3%) (Table 3).

Table 4. Population-attributable fraction for child maltreatment associated with hazardous drinking (AUDIT 8+) in New Zealand (2017).

Measure	Prevalence %	PAF %	95% CI
Hazardous drinking (AUDIT 8+) among parents	20.6%	11.4%	8.4% - 14.3%

The prevalence of hazardous drinking (AUDIT 8+) among parents in the general population of New Zealand was 20.6% and the PAF was 11.4% (CI: 8.4% - 14.3%) (Table 4).