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Prevalence and context of firearms-related problems in child protective service investigations

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Abstract

Background.—Despite the significance of firearm safety, we need additional data to understand the prevalence and context surrounding firearm-related problems within the child welfare system.

Objective.—Estimate proportion of cases reporting a firearm-related problem during case initiation and the contexts in which these problems exist.

Sample and Setting.—75,809 caseworker-written investigation summaries that represented all substantiated referrals of maltreatment in Michigan from 2015–2017.

Methods.—We developed an expert dictionary of firearm-related terms to search investigation summaries. We retrieved summaries that contained any of the terms to confirm whether a firearm was present (construct accurate) and whether it posed a threat to the child. Finally, we coded summaries that contained firearm-related problems to identify contexts in which problems exist.

Results.—Of the 75,809 substantiated cases, the dictionary flagged 2,397 cases that used a firearm term (3.2%), with a construct accuracy rate of 96%. Among construct accurate cases, 79% contained a firearm-related problem. The most common intent for a firearm-related problem was violence against a person (45%). The co-occurrence of domestic violence and/or substance use with a firearm-related problem was high (41% and 48%, respectively). 49% of summaries that contained a firearm-related problem did not provide information regarding storage.

Conclusion.—When caseworkers document a firearm within investigative summaries, a firearm-related risk to the child likely exists. Improved documentation of firearms and storage practices among investigated families may better identify families needing firearm-related services.

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Keywords

Child Protective Services; child welfare; firearms; text data

Introduction

Firearm injuries are the second leading cause of death among US children and adolescents (Cunningham et al., 2018). Research consistently shows that the presence of a firearm in the home significantly increases a child's risk for firearm injury and/or death (Anglemyer et al., 2014; Brent et al., 1993; Dahlberg et al., 2004; Miller et al., 2002). A recent survey of pediatricians indicated near universal agreement that potential and actual access to loaded firearms constitutes child neglect (Evans et al., 2017), and this finding is consistent with a survey of social workers with child welfare expertise (Jennissen et al., 2019). Moreover, neglect--specifically lack of supervision--is one of the most frequent forms of child maltreatment (*Child Maltreatment 2018*, 2020), and research suggests that a lack of supervision places a child at risk for unintentional firearm injury and death (Fowler et al., 2017; Hardy et al., 1996). In addition to potential access to firearms, exposure to firearm-related violence has been regarded as a form of trauma that poses a risk to child health and development (Singer et al., 1995; Slovak, 2002). Despite the public significance of firearm safety in the general population and specifically within child welfare, the field has no data regarding the extent to which firearms and firearm-related problems are an issue within child welfare.

The data systems used for child welfare documentation, referred to as the Statewide Automated Child Welfare Information Systems (SACWIS), generally do not contain structured data fields specifically for documenting firearms and firearm-related problems. Consequently, the field has virtually no research and structured data for building a comprehensive understanding of firearm-related problems among child welfare-involved families. Addressing this gap in knowledge is critical for developing targeted safety and intervention strategies for families and caseworkers given the ubiquity of firearm violence and accidents in the United States.

In the current study, we addressed this knowledge gap by analyzing investigation summaries, which are unstructured text data. A key problem is retrieving relevant summaries from a large population of records. We responded to this problem by constructing an expert dictionary of terms that were used to search a large collection of investigation summaries. We then manually reviewed summaries to address the following study aims:

1. Estimate the prevalence of firearm-related problems among child welfare involved families; and
2. Describe the contexts in which firearm-related problems are observed among these families.

This knowledge can provide empirical data to shape policies around firearms within foster care and elucidate risks child welfare workers may encounter during both investigations of maltreatment and provision of services.

Methods

Data source

The research team obtained the administrative records for all substantiated referrals of child maltreatment in Michigan from 2015 through 2017. Substantiated referrals include those cases in which a caseworker found a preponderance of evidence that child maltreatment had occurred. That is, the worker believed it was more likely than not that an adult perpetrated abuse or neglect against a child in their care. State-level child welfare agencies originally collected these records for internal use, and these records contain detailed information related to all maltreatment referrals (i.e., sets of allegations) substantiated by the agency following investigation during this time period. These records also include investigation summaries. Per agency guidelines, investigation summaries detail:

[The] relevant facts/evidence pertaining to the allegations obtained during the investigation that resulted in the determination of whether a preponderance of evidence existed. ... Include documentation, as appropriate, of prevalent and underlying family issues (for example, substance abuse, lack of parenting skills, child behavioral issues, violence in the home) and any other issues found during the investigation.

The research team obtained all investigation summaries (hereafter referred to as 'documents') of substantiated cases of abuse or neglect from 2015 through 2017 (N = 75,843). The University of Michigan Institutional Review Board approved the current research.

The study team required each document to contain at least 50 words to be retained for analysis to ensure sufficient content if a firearm was present. The study team managed and analyzed all text data using R (version 3.4.4).

Expert dictionary

This project aimed to identify all possible cases in which a firearm-related problem was present. To do this, the research team developed a list of terms hypothesized to represent the common language used by caseworkers (e.g., "firearm," "gun," "rifle") to describe firearm-related problems in investigation summaries. We refer to this list of terms as an *expert dictionary*. We developed this dictionary using an online glossary of firearm terms (https://en.wikipedia.org/wiki/Glossary_of_firearms_terms) in addition to a review of investigation summaries. We identified all terms in the glossary that referred to an actual firearm, and we then omitted terms that did not occur within any cases and those terms with a high "false-positive" rate (e.g., Remington more often referred to a person's name compared to a firearm). We then used the dictionary to search investigation summaries that contained these terms, and we manually reviewed and coded a subset of these summaries. The development and use of the expert dictionary for querying records followed well-established procedures for content analyzing large collections of text data (Bengston & Xu, 1995).

To assess the accuracy of the expert dictionary, we randomly sampled 10% of documents flagged by the dictionary for further evaluation, as we expected 10% of flagged documents

would yield a substantial sample size with ample richness to provide saturation of firearm-related contexts. We considered the accuracy of the dictionary on two different dimensions: *construct accuracy* and *risk/service need*. *Construct accuracy* refers to whether the term used in the investigation summary specifically relates to a firearm, irrespective of whether an actual firearm-related problem exists. For example, a caseworker may have indicated that a family is living next to a *gun* shop. In this case, the term *gun* has construct accuracy because it is referring to actual firearms. Alternatively, a caseworker may have stated, “The presence of alcohol remains a significant trigger for the father’s alcohol problems.” In this example, the term *trigger* is terminology related to firearms, but we do not have construct accuracy because the usage does not relate to firearms.

All construct accurate cases were then reviewed to determine the existence of a *risk/service need* using the criteria outlined in Table 1. We defined a case as reporting a firearm-related problem if the case had construct accuracy and met any of the given risk/service need criteria. We defined a case as *not* reporting a firearm-related problem if the case was construct accurate but did not have a corresponding risk or service need.

A reliability check for construct accuracy showed 100% agreement among two reviewers. The kappa estimate of inter-rater reliability for risk/service need was .67—a moderate level of agreement (McHugh, 2012). Because this agreement was not as high as our other estimates, the study team elected to dual code all construct accurate cases to determine whether the case also had a risk/service need. The research team met to discuss and resolve any discrepancies regarding whether or not a case contained a risk/service need, and thus whether the case contained a firearm-related problem.

Context coding

After identifying cases with a firearm-related problem, we performed a qualitative review of the documents and coded their context of the risk. Through an iterative process of reviewing documents, we identified context coding fields. The specific codes included: the stated intent for the firearm’s presence (i.e., recreation, self-defense, suicide/self-harm, violence against a person, crime against a place, environmental exposure outside the home, present in the home without clearly stated intent); the possessor of the firearm (i.e., primary caregiver, secondary caregiver, child); storage of the firearm (i.e., locked, unlocked); concurrent mental health concerns of the firearm owner (i.e., present, not stated); concurrent substance abuse (i.e., present, not stated); and concurrent domestic violence (i.e., present, not stated). An author with prior experience as a child welfare worker conducted this context coding based on the investigation summaries detailed by the original caseworker. A second author reviewed the coding and the research team met to discuss and resolve any discrepancies.

Results

Of the 75,809 substantiated cases of abuse and neglect from 2015 through 2017, 2,397 cases were flagged by the expert dictionary as mentioning a firearm (3.2%). After randomly sampling 10% of these documents for further evaluation, we found that 231 out of 240 flagged documents were construct accurate (construct accurate rate = 96%).

Among the 231 construct accurate cases, we identified 182 as reporting a firearm-related problem; given the mention of a firearm within an investigative summary, the firearm posed a risk to the child around 79% of the time. Taken together, these extrapolated results suggest that over the span of three years, around 1,850 cases within the state's child welfare system included a firearm-related risk to the child.

Figure 1 illustrates the performance of the expert dictionary. 'Gun' was the most common term among studies (n=201) followed by 'firearm' (n=75). Most terms related to a construct accurate case within 100% of the documents where they were used; exceptions included 'gun' (n=7), 'pistol' (n=1), and 'rifle' (n=1). 'Automatic weapon' did not appear in any documents. The more general and common firearm-related terms, including 'gun', 'firearm', 'pistol', and 'rifle', were associated with firearm-related problems the majority--but not all--of the time (i.e., 77–89%). Although infrequently appearing within documents, 'revolver', 'Smith & Wesson', 'semi-automatic', 'AK-47', and 'Uzi' were associated with firearm-related problems at each mention.

We further assessed the context in which firearm-related problems existed, illustrated in Table 2. Among the 182 documents reporting a firearm-related problem, the most common intent for the firearm's presence was violence against a person (45% of cases reporting a firearm-related problem). No caseworker cited recreation (e.g., hunting) as the primary intent for a firearm given the firearm posed a firearm-related problem. Primary caregivers were most often the individuals in possession of the firearm (68% of cases with a firearm-related problem). Regarding firearm storage, a plurality of cases reporting a firearm-related problem (49%) did not include information on firearm storage, and 45% of cases reporting a firearm-related problem indicated that a firearm was unsafely stored (e.g., stored unlocked, even if not loaded). Domestic violence and substance use were present in a substantial proportion of cases with firearm-related problems (41% and 48%, respectively), whereas caseworkers noted mental health issues in a minority of cases (15%).

Discussion

The expert dictionary of firearm-related terms had a high rate of accuracy for identifying firearms within investigative reports. Moreover, when a caseworker documented a firearm within an investigative summary, the firearm posed a risk to the child in the majority of cases. These results provide methodological opportunities for extracting critical safety related information from unstructured child welfare records. Additionally, this study documents the risks of firearm-related problem in substantiated cases of abuse and neglect and possibly workplace safety issues for investigation workers.

Developing system-level safety and intervention strategies for families and caseworkers requires understanding the context in which firearms are present; e.g., what is the firearm's intended purpose, how is it stored, and who possesses the firearm? Recreation (e.g., hunting, sport) and protection are among the top-cited reasons for owning a firearm among Americans (Hepburn et al., 2007). Yet, in the present study, caseworkers never identified recreation as the intent for firearm presence that placed a child at risk, and caseworkers identified only four cases where protection was the intent for firearm presence that placed a

child at risk. This pattern of results suggests that caseworkers are unlikely to identify firearm-related problems if the only evident intent for the firearm is protection and/or recreation. An important qualifier to this statement, however, is that it relies on caseworkers' assessments which may exclude key information such as firearm storage.

Among cases with a firearm-related problem, 49% of cases did not include information regarding firearm storage. Yet, researchers have previously established the importance of firearm storage in protecting youth: when firearms are present in the home, the safe storage of these firearms is associated with a reduced risk of both intentional and unintentional injuries among youth (Grossman et al., 1999; Monuteaux et al., 2019). Moreover, firearm storage behaviors are modifiable factors that appropriate programming--specifically interventions that provide safety devices--can change (Rowhani-Rahbar et al., 2016). Because unsafe firearm storage increases the risk for youth firearm injury and death (Grossman et al., 1999; Monuteaux et al., 2019), and interventions can effectively promote safe storage (Rowhani-Rahbar et al., 2016), we recommend that caseworkers systematically document storage practices surrounding any firearms present in an investigated home and offer corresponding services.

The possessors of firearms in cases with firearm-related problems were most often the child's primary caregiver, and they often had a history of domestic violence and/or substance use; caseworkers cited the presence of caregiver mental health concerns comparably less often. This finding supports a growing body of literature that finds mental health does not play a central role in interpersonal firearm violence (Metzl & MacLeish, 2015; Pinals et al., 2015; Swanson et al., 2015). Although caregiver mental health is important to address, our findings suggest that other caregiver features such as a history of domestic violence involvement and/or substance use are more often associated with firearm-related problems for a child.

Given that the mention of firearms within investigative summaries is a rare event, we were not able to obtain estimates of the specificity and sensitivity of the dictionary. Identifying false negative cases would have required the manual review of thousands of investigative summaries that the expert dictionary did not flag, which would have outstripped the resources available for the present project. Additionally, firearms may have been present in a case, but a caseworker may not document it. For example, in the presence of a non-firearm related threat that represents a sufficient cause to intervene, a caseworker may not document the co-occurring presence of firearms. Furthermore, we only included substantiated referrals of child maltreatment in the present review. Future studies could evaluate if the prevalence of firearm-related problems at investigation differs according to if a case is substantiated versus unsubstantiated. Finally, we only sampled 10% of flagged documents. Although we expect similar patterns in the remaining documents, our prevalence estimates are imprecise. Given these limitations, the present results are likely an underestimate of the true presence of firearms and firearm-related problems in the home.

The present work is the first step in identifying and elucidating firearm-related risks among families involved in the child welfare system. Although a relatively rare event, firearm-related risks can carry severe consequences. Improved documentation of the presence of

firearms and corresponding storage practices among investigated families may better identify families in need of firearm-related services. Given the severity of firearm-related problems—and our estimate that annually nearly 2,000 children who are the subjects of substantiated maltreatment also face a firearm-related threat—we recommend future research and practice identify methods for case workers to more readily assess and intervene on firearm-related problems.

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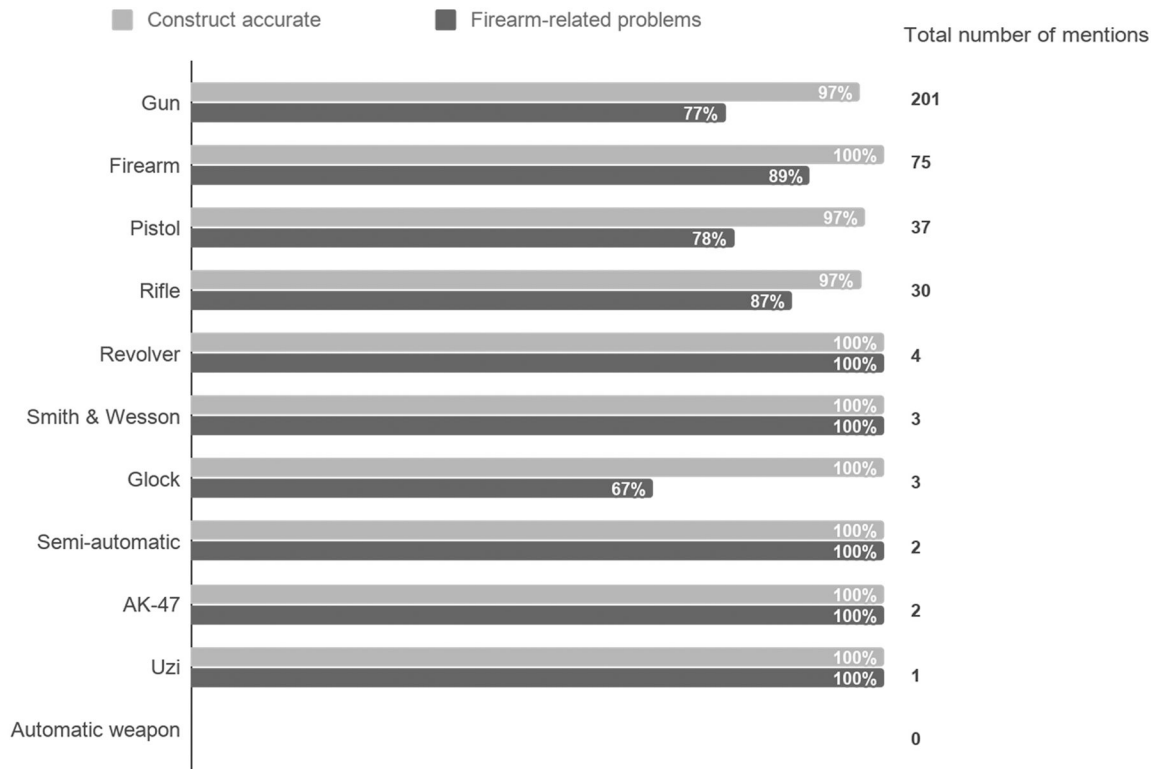


Figure 1.
Expert dictionary performance

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Table 1.

Criteria for indicating a firearm-related problem

Risk or service need criteria	Example
Use (or threat of use) of a firearm for violent or threatening means	Firearm used (or threatened use) in the context of domestic violence
Unsafe storage of a firearm (i.e., firearm stored unlocked, even if unloaded)	Firearm stored above a door frame
Carriage of a firearm if the purpose for carrying a firearm is malicious	Firearm carried for intended assault against a person and/or crime against a place
Negligent or concerning access/carriage/use of the firearm	Firearm used while experiencing a manic episode
Presence of an illegal firearm	Possessing a stolen firearm
Access/carriage/use of a firearm while under the influence of substances	Firearm used while intoxicated
A minor's unsupervised access/carriage/use of a firearm	Firearm accessed by child without adult supervision
Presence of a firearm in a violent home setting or home with high potential for violence	Firearms present in a home that is conducting illegal activity
Child's exposure to gun violence through witnessing the violence and/or its aftermath	Child sees a caregiver wounded by firearm violence
Past firearm incident with no evidence that the threat has been mitigated	Firearm previously stored unlocked, and there is no evidence it is now safely stored

Note: Actors within the "risk or service need" are either caregiver or child.

Table 2.

Context coding of firearm-related risks.

Context code	Percent of firearm-related risk documents (n=182)
Firearm intent	
Violence against a person	45% (81)
Present in home without clearly stated intent	34% (62)
Suicide or suicide attempt	11% (20)
Other	7% (13)
Self-defense	2% (4)
Environmental exposure	1% (2)
Firearm possessor	
Primary caregiver	68% (123)
Other	11% (20)
Secondary caregiver	8% (15)
Child	7% (12)
Unclear or unknown	7% (12)
Firearm storage	
Not stated	49% (89)
Safe	44% (81)
Unsafe	7% (12)
Mental health issue	
Not present or not stated	85% (155)
Present	15% (27)
Domestic violence	
Not present or not stated	59% (107)
Present	41% (75)
Substance use	
Not present or not stated	52% (94)
Present	48% (88)