NATIONAL CENTER FOR FATALITY REVIEW & PREVENTION

National Fatality Review Case Reporting System (NFR-CRS)
Application for De-identified Data for Research

IMPORTANT: Please read "Data Dissemination Policies and Guidelines for Requesting Access to De-identified Data from the National Fatality Review Case Reporting System (NFR-CRS) for Research Purposes" prior to completing your application.

Please submit the completed application via e-mail to info@ncfrp.org.

A. Proposed Study

1. Project Title: Social and demographic characteristics of fatal fires and the role of fireplay in fire-related mortality among children.

2. Principal Investigator Name: Jane P Smith, PhD

3. Date: January 1, 2020

4. Description of proposed research.

Background and Rationale

Fires are a leading cause of unintentional injury death among children from ages 1-14 in the US.[1] Young children are at highest risk of death in a residential fire;[2-4] nearly half of all children who died in US fires in 2016 were under age 5.[5] In addition to having young children in residence, other risk factors for fire deaths include smoking, low income, household size, residence in mobile home or apartment, rental property, absence of smoke alarm, supervisor's impairment by drugs or alcohol, and elderly residents.[4,6-7]

Fireplay, defined as children playing with fire- or fire-starting materials, was responsible for an estimated 7,100 home structure fires per year during 2007-2011; 43% of these fires were started by a child under age 6.[8] Research suggests that fireplay accounts for 40%-83% of fire deaths among children under age 5.[3,9-11] Further evidence suggests that smoke alarms may not be effective in preventing child deaths in fires started by fireplay.[3]

Despite the decrease in fires and fire-related deaths over the past 40 years,[12] fires remain a leading cause of unintentional injury death among children ages 1- 14 in the US. Prior research on fatal fires involving children have relied on fire department and/or medical examiner/coroner data; these data have limited information on social and demographic characteristics of decedents. To compensate for this limitation in prior research, we propose using Child Death Review (CDR) program data with its wealth of detail on the circumstances of child deaths to meet the objectives of our study. The ultimate goal is to better understand circumstances of fire deaths among children to better inform prevention strategies.

Study objectives

This application proposes research to address the following three objectives:

1. Describe the circumstances of fire deaths among children ages 1-14, using the National Fatality Review-Case Reporting Data NFR-CRS.

2. Identify deaths related to fireplay in the NFR-CRS.

3. Compare the social, demographic, and fire incident characteristics of children whose deaths were related to fireplay to non-fireplay-related deaths.

References

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Study Design and Methods

Study Design. We propose a descriptive epidemiologic study.

Study Population. Our study population consists of children, ages 0-17 years who died between January 1, 2004 and December 31, 2016; had a manner of death listed as accident on the death certificate (Question G5); had an external injury cause of death recorded as "fire, burn or electrocution (Question G6);" AND "fire" selected for the type of incident (Question H2b) in the NFR-CRS. Deaths meeting these criteria are defined as fire deaths, the dependent variable for Objective 1 where we will describe the circumstances of fire deaths among children ages 1-14

Fireplay is defined as children playing with matches, lighters, and other fire sources. Fireplay deaths are defined as deaths that occur in fires started by fireplay. All other fire deaths are defined as non-fireplay deaths. The NFR-CRS does not contain a specific fireplay variable. However, it does contain a variable that describes the child's activity at the time of the incident (Question E12) with "playing" as a response option, and a variable that denotes the source of the fire (Question H2a) with "matches," and "lighters" response options. Using these responses to these two variables is analogous to the criteria used

by the National Fire Protection Association to identify fireplay.[10] We propose classifying a death as due to fireplay when 1) the child's activity at the time was "playing" and the source of the fire was listed as "matches" or "lighter." Using this classification will only identify deaths in which the decedent child was the fire starter; we will miss classifying the death of another child in the home at the time, if that child happened to be sleeping when the fire started. Consequently, we acknowledge that our estimate of fireplay deaths using this strategy will likely be an undercount of the actual number. We will use the question H2g. "Fire started by a person" as a check on our classification of fireplay deaths.

Once fireplay deaths are identified using these methods (Objective 2), a variable will be created, fireplay yes/no. This fireplay variable will be the dependent variable for the comparative analysis (Objective 3) where we will compare the social, demographic, and fire incident characteristics of fireplay deaths to deaths in fires not started by fireplay.

The proposed independent variables needed to carryout the study are listed in Table 1.

Table 1. Variables requested from the NFR-CRS, needed to complete the study.**

NFR-CRS Section/Question	Analysis plan
A4. Child age	Demographic characteristic for descriptive and comparative analysis
A5. Child race	Demographic characteristic for descriptive and comparative analysis
A6. Child Ethnicity	Demographic characteristic for descriptive and comparative analysis
A7. Child sex	Demographic characteristic for descriptive and comparative analysis
A13. Child history of disability/chronic disease	Social characteristic for descriptive and comparative analysis
A22. History of child maltreatment	Social characteristic for descriptive and comparative analysis
A23. Open CPS case at time of death	Social characteristic for descriptive and comparative analysis
D1. Supervision at time of incident	Incident characteristic for descriptive and comparative analysis
D3/4. Person responsible for supervision	Incident characteristic for descriptive and comparative analysis
D15. Was supervisor asleep	Incident characteristic for descriptive and comparative analysis
D16. Was supervisor impaired	Incident characteristic for descriptive and comparative analysis
E2. Incident time of day	Incident characteristic for descriptive and comparative analysis
E3. Incident place	Incident characteristic for descriptive and comparative analysis
E12. Child's activity at time of incident	Incident characteristic descriptive analysis, + use for defining fireplay (dependent variable)
E13. Number of child deaths	Incident characteristic for descriptive and comparative analysis
F15. CPS action because of death	Incident characteristic for descriptive and comparative analysis
H2a. Fire source	Fire characteristic descriptive analysis, + use for defining fireplay (dependent variable)
H2e. Type of building	Fire characteristic for descriptive and comparative analysis
H2f. Building's construction material	Fire characteristic for descriptive and comparative analysis
H2g. Fire started by person	Check fireplay classification

H2h. Anyone attempt to put fire out	Fire characteristic for descriptive and comparative analysis
H2k. Barriers preventing exit	Fire characteristic for descriptive and comparative analysis
H2l. Was building a rental property	Fire characteristic for descriptive and comparative analysis
H2m. Were building codes violated	Fire characteristic for descriptive and comparative analysis
H2n. Were fire extinguishers present	Fire characteristic for descriptive and comparative analysis
H2o. Was a sprinkler system present	Fire characteristic for descriptive and comparative analysis
H2p. Were smoke alarms present?	Fire characteristic for descriptive and comparative analysis

** This variable list is based on Version 5 of the NFR-CRS.

Analysis Plan. The planned analysis for each objective is described. We will use SPSS version 26 to complete all analyses.

Objective 1. Describe the circumstances of fire deaths among children ages 1-14, using the National Fatality Review-Case Reporting Data NFR-CRS.

This analysis will be conducted using descriptive statistics. Specifically, for each category of each variable the frequency and proportion of fire deaths will be presented as in the shell table "Results Table 1."

Results Table 1. Unintentional Fire Deaths, Children Ages 1-14, National Fatality Review Case Reporting System, 2004-2016.

	Fire Deaths (n=#####) # (%)
Demographic and Social Characteristics	
Child age in years	
1-4	
5-9	
10-14	
Child sex	
Male	
Female	
Missing	
Child race/ethnicity	
White, non-Hispanic	
Black, non-Hispanic	
Hispanic	
Other	
Missing	
Child history of disability or chronic illness	
Yes	
No	
Missing	
History child maltreatment	
Yes	
No	
Missing	
Open CPS case at time of death	
Yes	
No	

Missing

Incident Characteristics

Incident place
- Child's or relative's home
- Other
- Missing

Incident time of day
- 8a-1[59]p
- 2p-7[59]p
- 8p-1[59]a
- 2a-7[59]a
- Missing

Child's activity at time of incident
- Sleeping
- Playing
- Other
- Missing

Supervision at time of incident
- No, not needed
- No, but needed
- Yes
  - Supervisor/impaired/asleep
  - Supervisor/not impaired/asleep
  - Impair/asleep missing
- Missing

Supervisor relationship to deceased child
- Parent
- Other relative
- Non-relative
- Missing

Number of child deaths
- 1
- 2 or more
- Missing

CPS action because of death
- Yes
- No/Not Applicable
- Missing

Fire Characteristics

Fire Source
- Matches/lighter/cigarette
- Candles
- Stove
- Heat source[b]
- Electrical
- Other
- Missing

Type of Building
- Single home
- Apartment/Duplex
- Mobile home
- Other
- Missing

Building's construction material
- Wood
- Steel/Aluminum
- Brick/Stone

Other
Missing
Rental Property
Yes
No
Missing
Were building codes violated
Yes
No
Missing
Smoke Alarms Present
Yes
Working
Not-working
Missing
No
Missing
Fire extinguishers present
Yes
No
Missing
Sprinkler system present
Yes
No
Missing
Someone attempted to put fire out
Yes
No
Missing
Barriers prevented exit
Yes
No
Missing
Fire caused by fireplay
Yes
No evidence

Objective 2. Identify deaths related to fireplay in the NFR-CRS.

The plan for identifying and classifying fireplay deaths is described above under "Study Population."

Objective 3. Compare the social, demographic, and fire incident characteristics of children whose deaths were related to fireplay to non-fireplay-related deaths.

Demographic, social, incident, and fire characteristics will be compared for children whose deaths are related to fireplay versus children who died in non-fireplay related fires. Significant differences between the two groups will be determined using chi-squared statistics. The strength of the association will be estimated using odds ratios (OR) with 95% confidence intervals (95% CI) calculated around the OR. The results will be presented as in the shell table "Results Table 2."

Results Table 2. Unintentional Fire Deaths: Fireplay vs Non-Fireplay, Children Ages 1-14, 2004-2016.

	Fireplay Deaths (n=##)	Non-Fireplay Deaths (n=###)

	# (%)	# (%)	OR (95% CI)	*P*[a]
Demographic and Social Characteristics				
Child age in years				
1-4				
5-9				
10-14				
Child sex				
Male				
Female				
Child race/ethnicity				
White, non-Hispanic				
Black, non-Hispanic				
Hispanic				
Other				
Child history of disability/chronic illness				
Yes				
No				
Missing				
History child maltreatment				
Yes				
No				
Missing				
Open CPS case at time of death				
Yes				
No				
Missing				
Incident Characteristics				
Incident place				
Child's or relative's home				
Other				
Missing				
Incident time of day				
8a-1[59]p				
2p-7[59]p				
8p-1[59]a				
2a-7[59]a				
Missing				
Child's activity at time of incident				
Sleeping				
Playing				
Other				
Missing				
Supervision at time of incident				
No, not needed				
No, but needed				
Yes				
Supervisor/impaired/asleep				
Supervisor/not impaired/asleep				
Impaired/asleep missing				
Missing				
Supervisor relationship to deceased child				
Parent				
Other relative				
Non-relative				
Missing				
Number of child deaths				
1				
2 or more				

Missing
CPS action because of death
Yes
No/Not Applicable
Missing

Fire Characteristics
Fire Source
Matches/lighter/cigarette
Candles
Stove
Heat source
Electrical
Other
Missing
Structure
Single home
Apartment/Duplex
Mobile home
Other
Missing
Rental Property
Yes
No
Missing
Smoke Alarms Present
Yes
No
Missing
Someone attempted to put fire out
Yes
No
Missing
Barriers prevented exit
Yes
No
Missing

[a] *p* values were determined from a X^2 test.

Small Numbers and Missing Data. We are aware that a number of variables available in the NFR-CRS have high proportions of missing data, including variables of interest in this descriptive study of fire deaths among children in the US. For example, the data on income and child's health insurance are missing in more than 60% of the records. Consequently, we will not attempt to include these variables in the study. Other variables, particularly fire related variables, may have high proportions of missing data. We have requested most of the fire variables in the NFR-CRS section H2. As this is a descriptive study, we plan to report the number and proportions of missing data for each independent variable requested (Table 1.). For the comparative analysis, we will include missing as a category so we can assess whether the missing data likely had any influence on the overall findings, and if so, the direction of that influence.

Potential Limitations. Because not all states participate in the NFR-CRS and not all participating states review all child deaths, it cannot be assumed that the data are representative of all fire deaths in the US. However, although a state might not review all deaths, many states prioritize review of injury or unexpected deaths, which include deaths due to fires. In an effort to assess the representativeness of the NFR-CRS data related to fire deaths, we will examine demographic patterns of fire deaths recorded in

national mortality data relative to the demographic characteristics of the NFR-CRS fire deaths. We will note similarities and differences.

In addition, NFR-CRS data include high proportions of missing data for some variables, including some variables of interest in in this study. For example, low income is a risk factor for fire mortality but the income data in the NFR-CRS is so highly missing that we will not be able to evaluate income with respect to fire deaths in this study. Residence in a rental property, mobile home or apartment are also risk factors for fire deaths. These characteristics may be proxies for low income and this information is available in the NFR-CRS.

The absence of a specific fireplay variable is a potential limitation. The availability of the child's activity and fire source lends some confidence in identifying fireplay fires, but we will likely miss deaths where the decedent was not the child who started the fire. Consequently, the number of fireplay deaths identified in this study will likely be an underestimate of the actual number of fireplay deaths.

Finally, The NFR-CRS documents deaths, not incidents. If multiple children die in one fire (which is not uncommon) we will not be able to link the children to the single incident. This may also contribute to an underestimate of fireplay deaths as deaths were a sibling or other child was involved in fireplay but the decedent was sleeping at the time would not be included, unless there was an accompanying narrative indicating fireplay as the source of the fire.

Despite these limitations, we believe the unique NFR-CRS data will provide important insights into strategies to prevent fire deaths among children in the US.

Health Equity. Most health disparities affect groups marginalized because of socioeconomic status, race/ethnicity, sexual orientation, gender, disability status, geographic location, or some combination of these.[13] People in such groups not only experience worse health but also tend to have less access to the social determinants or conditions (e.g., good housing, good education, safe neighborhoods) that support health.[13] It is well documented that young children (< age 5) are at highest risk of dying in a residential fire. Other important risk factors include residence in a mobile home, apartment, or rental property; absence of a smoke alarm; and supervisor impaired by drugs or alcohol, all important social determinants of health that may indicate health disparities. We include all available social determinant variables in our descriptive analysis and the comparison of fireplay deaths to non-fireplay deaths. Specifically, we will include child age, race/ethnicity, sex, history of disability and child maltreatment, as well as supervisor impairment status, residence type, and presence of smoke alarms. Prevention recommendations will be based on the results and focus on potential community and social interventions rather than individual strategies.

Timeline for Completion

We anticipate completion of this research and preparing manuscripts for publication will take 18 months from the time the data are received.

Anticipated Presentations and Publications

We plan to present the findings of this research at several National conferences including the National Fire Prevention Association Conference as well as public health/injury prevention conferences such as annual meetings of the American Public Health Association and the Society for Violence and Injury Research. In addition, we will prepare at least one manuscript for submission to a peer-reviewed journal. Candidate journals include Injury Prevention and the American Journal of Public Health.

B. Investigator/researchers

1. Principal Investigator

Jane P. Doe, PhD is the Principal Investigator. Dr. Doe is an epidemiologist with 30 years of experience conducting child injury research. She will be responsible for all aspects of this project. She has conceptualized the research; will conduct the primary data analysis; draft, revise, finalize, and submit the manuscript for publication (CV attached).

2. Co-Investigator

Haley D. Day, MS is a data analyst with 20 years of experience managing and analyzing child death review data. She will assist with data management including classifying fireplay and assisting with data analysis. She will also review and contribute to manuscript preparation and approve the final version (CV attached).

C. Data Security

All users of the NFR-CRS data must have electronic security measures in place to prevent access to the data from unauthorized individuals.

ID	**Device type** Indicate workstation, laptop, server, portable media, or other device	**Internet** Does the device have access to the Internet?(Y/N)	**Electronic security measures**			
			Password login? (Y/N) The device requires a login ID and password at startup and after a period of inactivity.	**Restricted directory access? (Y/N)** The directories containing the data are restricted to authorized users who have logged in to the device.	**Virus protection? (Y/N?)** Anti-virus software is installed on the device.	**Firewall protection? (Y/N)** Firewall technology is in place for devices that are connected to the Internet.
1	Workstation at PI's office, DewDrop University	Yes	Yes	Yes	Yes	Yes
2	Workstation at Co-I's office, DewDrop University	Yes	Yes	Yes	Yes	Yes

3. Physical security: In addition to electronic security, the devices on which the data have been copied must be physically secured to prevent theft of the device. Describe below the physical security measure in place for each device.

ID	**Location of Device** Indicate building name and office number	**Description of physical security** Examples are offices are locked when unoccupied; storage in secure cabinets when the device is not in use; and monitored access to the building where the data are stored.
1	Medical Science Building, room 224. DewDrop University.	Offices are locked and located in a locked building. Keycard is required for entry. Any hard copies of data tables or printouts of results will be stored in locked file cabinets in the offices. Security patrols the buildings and grounds 24/7.
2	Medical Science Building, room 226. DewDrop University.	Offices are locked and located in a locked building. Keycard is required for entry. Any hard copies of data tables or printouts of results will be stored in locked file cabinets in the offices. Security patrols the buildings and grounds 24/7.

D. Receiving Institution

DewDrop University is a Research 1 institution of higher education. It is a private, not for profit University focused on the healing arts. It has world class researchers on faculty, including 2 Nobel Prize winners. DewDrop's primary revenue is from student tuition, research funding, private donations, and a 4 billion dollar endowment.

DewDrop U is registered with the US Office for Human Subject Protections (documentation in Appendix), maintains its own Institutional Review Board that is chaired by a ethics attorney. DewDrop has extensive safeguards and regulatory oversight in place through its research compliance program. This study has been ruled exempt from review by the IRB. There have been no breaches of sensitive research data at this institution.

Application signatures:

_____ _____

Signature of Principal Investigator Date

_____ _____

Signature of Representative of Receiving Institution Date

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Title