



Pediatric Vehicular Heatstroke Report

Kids in Hot Cars

One Child Is Too Many;
A Legislative Look Across the U.S.

Eliminating Preventable Deaths™

On average,
37 children die each year in the U.S.
as a result of
pediatric vehicular heatstroke
(PVH).

42 children died during 2017.

**All of these deaths
could have been
p r e v e n t e d.**

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Executive Summary

It takes only 10 minutes for the temperature inside a vehicle to rise 20 degrees.¹ For children in particular, this increase is enough to result in death.²



Sadly, children are dying in hot cars at an alarming rate, as vehicular heatstroke - also known as hyperthermia - continues to be one of the leading causes of non-crash vehicular fatalities for this age group.³ Between 1998 and 2017^a, 742 children reportedly died due to pediatric vehicular heatstroke (PVH). On average, 37 children die each year in the U.S. as a result of PVH. However, 42 children died during 2017 – up from 39 the previous year.⁴ All of these deaths could have been prevented.

The National Safety Council (NSC), whose mission is to eliminate preventable deaths, has focused on PVH for many years. In an effort to better understand and document this risk area, NSC works in collaboration with partners such as Jan Null, a certified consulting meteorologist (CCM)⁵ and Adjunct Professor in the Department of Meteorology & Climate Science at San Jose State University. Mr. Null has been tracking child deaths resulting from vehicular heatstroke since 1998, and his

work provides the basis for data and information in this report, which builds on information NSC released last year.

In 2017, NSC unveiled *The State of Safety: A State-By-State Report* that provides a bird's eye view of where states rank on safety-related actions and policies that can remedy preventable deaths and injuries across our roadways, in homes and communities, and in workplaces. The *State of Safety* report also outlines recommended policy actions and examples of promising practices that can help save lives, and it specifically evaluated PVH laws. This report is a more detailed review on the topic of pediatric vehicular heatstroke. At a time when numbers are rising, so is the need to take action.

With support from the National Highway Traffic Safety Administration (NHTSA), NSC conducted an analysis of state unattended child laws in combination with a review of sentencing and prosecutions of caregivers over the past 10 years,

^a All years with tracked PVH fatality data in the states of the U.S. - not including U.S. territories. A more detailed description about the data utilized for this report is found in the Project Description on page 15.

from 2007 through 2017. According to NSC analysis of a report from the National District Attorneys Association (NDAA),⁶ only 21 states^a and Guam have laws in place to address children left unattended in vehicles. In addition, NSC and Jan Null⁷ each conducted reviews to confirm any changes to state unattended child laws in comparison to those reported in the 2014 NDAA report.^b The pages that follow outline prevention strategies and state legislative recommendations^c, while also educating people about why our children are at risk.

The basic strategies for saving lives remain consistent. Robust documentation and research of the problem must continue to be the cornerstone of any campaign to reach the public – everyone from parents and caregivers to safety professionals, health care providers, policy makers and developers of new technologies. It takes all of us working together and paying attention to this issue through education and legislation in order to save lives.

Objectives

- 1 **Support stronger laws to protect children from being *knowingly*^d left unattended in vehicles for any amount of time**
- 2 **Increase awareness and understanding about vehicle heating dynamics**
- 3 **Increase awareness about the risk of children gaining access to vehicles on their own**
- 4 **Encourage policies for child care providers to ensure all children have exited a parked facility vehicle**
- 5 **Recommend study of factors that contribute to unknowingly leaving a child unattended in a motor vehicle**

U.S. Pediatric Vehicular Heatstroke Deaths (1998 - 2017)



^a Includes Missouri - which addresses if an unattended child in a motor vehicle injures another person, but does not address if the unattended child is injured.

^b Since the time of the 2014 NDAA report, the state of Missouri enacted legislation to address leaving a child unattended in a motor vehicle - effective January 1, 2017.

^c State legislative recommendations outlined in this report are the result of NSC analysis of the components of existing state laws pertaining to children left unattended in motor vehicles, in combination with best practice recommendations made available by multiple safety organizations in efforts to prevent PVH deaths. (See additional resources list at the end of this report.) The opinions, findings, and conclusions expressed in this publication are those of NSC and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration.

^d The term "knowingly left" is used in this report to describe when a parent or caregiver knowingly leaves a child in a vehicle. This is typically not with the intention to cause harm to the child. This topic is addressed further later in this report.

Survivor Advocate Story: by Reginald McKinnon

Vehicle Hyperthermia – Promise to Payton

March 8th of 2010 may seem like a long time ago, but I can return to that day in a split second. That morning, before work, I took my daughter to a doctor's appointment. After the appointment I was going to drop her off at daycare and then head to my office. But unfortunately that didn't happen. What started off as a normal day for me turned into the worst nightmare any parent or caregiver could imagine.

My daughter's daycare was just a block away from my office. For reasons I still cannot comprehend, even today, I returned to work after the appointment and forgot my daughter was sleeping in my vehicle. The nightmare that followed will haunt me and my family for the rest of our lives. I lost my beautiful, blue-eyed daughter Payton Lyn to hyperthermia (heatstroke) after leaving her in her car seat.

Most parents and caregivers can never imagine this type of horror. But unfortunately for me, my family and friends, it is something we now deal with every day. Prior to losing Payton Lyn, I was unfamiliar with the effects of hyperthermia. From time-to-time, I would read about it occurring, but I thought it was caused by parents who were just bad people. Today, I know that it can happen to loving and caring parents and caregivers.

Since 1998, there have been more than 742 reported hyperthermia deaths related to vehicles. This total breaks out as follows: 54% of children inadvertently forgotten by parents/caregivers; 27% from children playing in or gaining access to cars; 18% when the child was intentionally or knowingly left in a vehicle; and 1% of

circumstances that are unknown. "All" situations were preventable.

My state of Florida, due to its many months of hot weather, ranks second in the country when it comes to hyperthermia-related deaths (Texas leads all states). However, it can happen anywhere due to how fast temperatures rise within a vehicle on just an average sunny day. A mild day of just 70 degrees can turn deadly very quickly. In as little as 20 minutes, the temperature inside a vehicle can rise over 30 degrees. That, coupled with the fact that children's bodies tend to heat up three to five times faster than that of adults is a deadly combination.



But how could I have forgotten my child? That is the question that has haunted me. I am an attentive father who does everything I can for my children. No matter how hard I tried, I just couldn't rationalize my actions. How could I have forgotten my child? My doctor/therapist tried to help me understand how it could be possible. He said: often in haste, our minds often go into "autopilot," mechanically following our normal routine. In my

mind's eye I had taken her to daycare. But that wasn't the case.

As my family and I endured the agony of her funeral, I made a promise to my baby Payton Lyn that her death would not be in vain. I would do everything in my power, no matter how painful and difficult, to make as many people as I could aware of hyperthermia vehicle deaths. I've presented programs to whoever would listen. I have received ridicule and accusations from audiences, but I have also received positive receptions. I have cried with parents who suffered the loss of a child from hyperthermia. My only hope is to spare a parent/caregiver the pain and anguish that my family and I must bear.

Today, I continue telling my story in articles, press releases, safety events and interviews. I do so to keep my promise to Payton Lyn, not only keeping her memory alive, but also striving to prevent hyperthermia-related deaths in vehicles. Sadly, since losing Payton Lyn in 2010, there have been more than 295 additional innocent children's lives lost to hyperthermia in cars. I have met and cried with some of these families. Every case is heart wrenching and takes me right back to March 8, 2010.

What can you do? First, never leave your child alone in a vehicle - not even for a second! Create reminders and habits. Place your purse or cell phone in the back seat – something that will help remind you to open that back door on your next stop. Take action if you see a child unattended in a car. Share this story with everyone. One more tragic death is one too many.

Call to Action

The National Safety Council Is Calling for the Following Actions:

For Lawmakers

- Eliminate “safe” time periods from legislation
 - Expand laws to pertain to any person providing supervision of any child who knowingly leaves a child unattended in a motor vehicle
 - Clearly define the age of responsible or supervising individuals
 - Clearly define and/or increase the age of persons that should not be left unattended
 - Include protection for vulnerable individuals left unattended in motor vehicles
 - Protect “any person” who acts to rescue a child in good faith
 - Expand scope to allow individuals to take action if a child is in physical danger or “poses a danger to others”
 - Direct funds received from fines to support education programs for parents, caregivers and offenders
-

For Parents and Caregivers

- Never leave a child unattended in a vehicle, even for a minute
- Educate everyone who cares for your child about vehicle heating dynamics
- Make “Look Before You Lock” a routine
- Place a reminder in your vehicle to check the back seat at your destination
- Reduce risk by sticking to a routine and avoiding distractions
- Schedule a call as a reminder to ensure your child arrives at their destination, especially if your routine changes
- Ask your child care provider to call you if your child does not arrive as expected^a
- Ensure children do not have access to keys or key fobs
- Teach children vehicles are not play areas
- Immediately check vehicles if a child is missing^b

For the Public

- Take action immediately if you see an unattended child in a vehicle
- Be an ambassador for child safety
- Child care providers should implement policies to ensure all children exit a facility vehicle upon arrival at their destination
- Workplace prevention measures should be implemented

^a This recommendation is not intended to place responsibility on child care providers. Responsibility remains with the caregiver or responsible person caring for the child at the time they are left unattended in a vehicle. As such, this recommendation is included with recommendations for parents and caregivers, and provides an additional layer of protection to prevent PVH.

^b If there is a pool or body of water nearby, check the water first, then immediately check vehicles, including trunks. Visit <https://www.healthychildren.org/English/safety-prevention/on-the-go/Pages/Prevent-Child-Deaths-in-Hot-Cars.aspx> for more information.

How does this happen?

What is Heatstroke?

Also known as hyperthermia, according to the American Academy of Pediatrics (AAP)⁸, a child's body heats up three to five times faster than an adult's. When left in or gaining access to a hot car, a child's major organs begin to shut down when his or her body temperature reaches 104 degrees Fahrenheit (F).

A child can die when his or her temperature reaches 107 degrees F. The AAP also warns that vehicular heatstroke can happen when outside temperatures surrounding the vehicle are as low as 57 degrees F.



It Can Happen to Anyone, Anywhere

Pediatric vehicular heatstroke fatalities can happen to anyone, anywhere and from any socioeconomic class, and they have – even with loving and attentive parents and caregivers. Articles have been written asking the question, “How is it possible to forget a child?”⁹ Often it happens when parents or caregivers are especially busy^a or tired^b, or there is a change in the responsible adults' regular routine – all of which increase the risk of making a potentially fatal mistake. Further study and documentation of PVH deaths would need to be conducted in order to clearly identify factors that may have contributed to known PVH deaths.

In addition, almost half of all PVH deaths are not related to a caregiver unknowingly leaving their child in a vehicle. Twenty seven percent of children gained access to a vehicle on their own,

and 18 percent died after knowingly, or intentionally, being left inside a vehicle.

In incidents where children reportedly gained access to vehicles on their own, locking vehicles is an important barrier to prevent children from gaining access to the inside of vehicles. Teaching children cars are not play areas, and that keys and key fobs are not toys provide additional protection.

Furthermore, *knowingly* leaving a child unattended does not typically equal malintent. Parents and caregivers have been known to leave children unattended in a car as they intend to do something quickly. In some cases, vehicles have served as a substitute for childcare. In general, a better understanding by caregivers of the risks involved due to vehicle heating dynamics is needed.

^a More information about the human brain and multitasking can be found at <http://www.nsc.org/DistractedDrivingDocuments/Cognitive-Distracted-White-Paper.pdf>

^b Additional information about the general affects of fatigue can be found at nsc.org/fatigue.

Vehicle Heating Dynamics

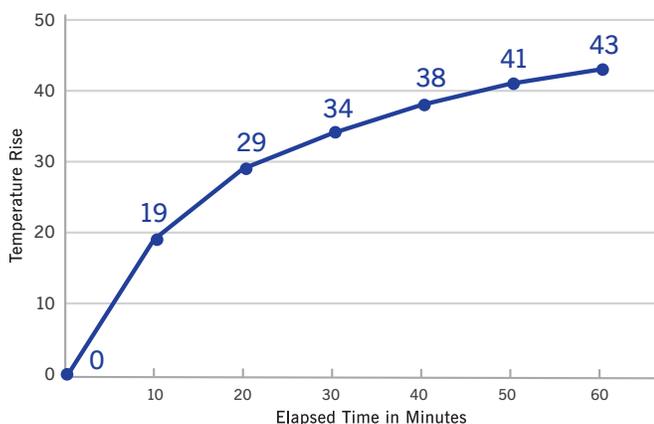
Vehicles Quickly Become Too Hot

Vehicular heatstroke can occur any time of the year, in any state or community, and to any parent or caregiver. Even on relatively mild days, vehicles can reach life-threatening temperatures quickly.

Leaving windows open does not prevent heatstroke from occurring, nor do particular vehicle exterior colors lessen the sun's heating effects. What does matter is how the rays from the sun interact with vehicle windows, creating a greenhouse effect.

Studies have found that - on days when temperatures exceeded 86 degrees - the temperatures inside of vehicles quickly reached 134 to 154 degrees Fahrenheit. On average, in the first 10 minutes, the temperature inside a vehicle rises by 19 degrees. This quick rise in temperature inside a car can become fatal for children living anywhere. In areas where outside temperatures are at 90 degrees, however, temperatures inside of vehicles can become fatal for children in just 10 minutes.

One such observational study published in *Pediatrics*¹⁰ in 2005 measured the rise of temperatures during a 60-minute period over 16 different days. During each observation, the starting outdoor temperatures ranged between 72 and 96 degrees. On two of these days, observations were documented while the vehicle windows were open 1.5 inches.



The study found that regardless of the starting temperature, the rate at which temperatures increased inside the vehicles were consistent. Eighty percent of the overall rise in temperature occurred within 30 minutes. On average, the temperature inside the vehicle rose more than 40 degrees during the 60 minute period of observation. The study also found that “cracking” windows open did not reduce the rate of temperature rise inside of the vehicle. The study concluded that vehicles heat up quickly, with most of the temperature increase occurring in the first 15 to 30 minutes.

On an 80 degree day



Temperature Outside	Temperature Inside
80 F	99 F



Temperature Outside	Temperature Inside
80 F	109 F

National Safety Council

Recommendations

Unattended children cannot be left in vehicles, or allowed to gain access to them, due to the nature of vehicle heating dynamics. In order to prevent pediatric vehicular heatstroke, there are many safety recommendations that must be conveyed clearly, consistently and proactively.

Recommendations for Lawmakers

1. Eliminate “safe” time periods from legislation

- Some states define a time period before a person can act to rescue a child from distress. For example, Florida allows for 15 minutes, Louisiana 10 minutes, and Hawaii and Texas specify that bystander action can be taken if the driver or adult passenger leaves a child unattended in a vehicle for five minutes or longer. Some include language such as “reasonable time,” “significant risk,” “unreasonable risk,” and “substantial risk.”^a
- All language relating to “safe” time periods should be struck from laws. Children should not be left unattended, even for a minute.¹¹ Temperatures inside a vehicle rise to lethal levels quickly, and the public is generally unaware of this danger. Safety of children should be the priority.

2. Expand laws to pertain to any person providing supervision of any child who *knowingly* leaves a child unattended in a motor vehicle and clearly define the age of responsible individuals

- Emphasis is placed here on individuals who *knowingly* leave a child unattended in a motor vehicle. Typically, a parent or caregiver who knowingly leaves a child unattended does not intend to harm the child. In general, continued education and increased awareness are needed to help parents and caregivers understand vehicle heating dynamics and why our children are at risk, even if they plan to leave the child unattended for a few minutes.

- Some states have enacted unattended child laws pertaining only to child care providers, centers and facilities. Meanwhile, other states cite responsible parties as any person providing supervision of any child. Guam goes so far as to specify responsible persons over the age of 12 years, and Hawaii includes responsibility for adults even if they were not charged with the care of the child.
- NSC supports requirements to ensure child care providers implement policies and procedures to confirm all children have exited a parked facility vehicle driven by child care personnel.

3. Clearly define and/or increase the age of persons that should not be left unattended

- States vary on what age they define as “child.” State definitions range from 6 years old or younger^b to anyone younger than 18. While some may consider protection to everyone younger than 18 extreme, a 14-year-old died from heatstroke inside of a vehicle in 2013.¹² While vehicle features may have played a role in that case, education, awareness and legislation could prevent individuals from remaining in a vehicle, thus averting similar future scenarios.
- NHTSA defines a child as age 14 and younger.¹³ At a minimum, laws should take this definition in to account. Some states already define a child as older than 14. In this case, that is an option for stronger protections.

^a A chart is provided on pages 12 and 13 to reference which states include components of each recommendation.

^b Guam defines an unattended child as 5 years of age or younger.

4. Include protection for vulnerable individuals

- Like children, vulnerable individuals may not be able to remove themselves from a hot vehicle and increasingly dangerous situations. Alabama has incorporated language pertaining to “incapacitated” persons, and Oklahoma’s law includes protections for “vulnerable adults.” Likewise, Oklahoma specifies that a supervising person should not be mentally incompetent as defined by state statutes.

5. Protect “any person” who acts to rescue a child in good faith

- Several states have language to protect only law enforcement officers from being held liable in any civil action for any act performed in good faith. Some states expand this protection to include law enforcement and emergency personnel. NSC supports this protection and recommends expanding it to all persons acting in good faith, as is currently the situation in a number of states.

6. Expand scope to allow individuals to take action if a child is in physical danger or “poses a danger to others”

- Hawaii’s unattended child law directs law enforcement or rescue team personnel to take action if they observe a child left unattended in a motor vehicle and determine “that the unattended child is in physical danger, or poses a danger to others...” Inclusion of similar language could lead to opportunities to educate people about the dangers of leaving children unattended beyond heatstroke. These dangers include, but are not limited to, abduction, strangulation with seat belts or power windows, and shifting a vehicle out of park, whether the engine is on or not.¹⁴

7. Direct funds received from fines to support education programs for parents, caregivers and offenders

- Several state laws include the option to sentence offenders to participate in training courses about the dangers of vehicular heatstroke and leaving children unattended in vehicles.
- California allows the court to waive the \$100 fine if the defendant establishes to the satisfaction of the court that he or she is economically disadvantaged. In lieu of this fine, offenders can be required to attend an education program.

- Tennessee provides additional information about which agencies can operate and conduct these education programs, and even outlines allowable registration fees (\$50.00 - \$175.00).

Additional Considerations

Policymakers should take the following actions into consideration when drafting new legislation or amending existing laws:

- Clearly define “unattended” as the act of knowingly leaving a child unsupervised and alone in a motor vehicle for any period of time
- Clearly define “unsupervised,” “child” and age of responsible person; states that include such definitions are identified in the following section, *Components of Existing State Unattended Child Laws*
- Include language to clarify that an enclosed compartment means any enclosed area of a motor vehicle, including the passenger compartment, regardless of whether a door, window, sunroof/moonroof or hatch is left open
- Clearly state that persons are breaking the law whenever a child is knowingly left unattended inside of a motor vehicle, regardless of whether the vehicle is running and/or the keys are in the ignition
- Make it a separate offense for each child knowingly left unattended – not a single offense regardless of the number of children
- Punishments should increase for second and subsequent convictions, such as fines or license revocation
- Consider specifying separate punishment if a child is left unattended in a place that sells alcohol
- Provide guidance about how to involve child protective services agencies or whether law enforcement will hold a child until a caregiver returns

Components of Existing State Unattended Child Laws

Does the state unattended child law address the following components?^a

AK – MD

	AK	AL	AR	AZ	CA	CO	CT ^b	DC	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA	MA	MD	
Unattended Child Law (21)		x			x		x			x		x			x			x	x			x
Allowable time period										x		x			x					x		
Define “Unattended”												x			x					x		
Define “Unsupervised”																				x		
Define “Child”												x										
Age of child		<7			≤6		<12			<6		<9			<18			<8	<6			<8
Includes vulnerable individuals		x																				
Define “Responsible Persons” ^c		x			x		x			x		x								x		
Age of Responsible Persons					≥12							≥12			≥14					≥10		≥13
Addresses Child Care only		x																				
Protection for acting in good faith ^d																						
Law Enforcement										x		x								x		
Firefighters & emergency personnel												x										
Any person																						
Punishment																						
Verbal Warning																						
Fine		x			x					x										x		x
Charges																						
Education program					x																	
Community Service					x																	
Misdemeanor		x					x			x					x							x
Felony		x					x			x					x			x				
Increased penalty for subsequent incidents		x					x								x					x		
Good Samaritan Laws ^e (16)		x		x		x				x						x		x				

^a These tables reference language in laws considered “Unattended Child” laws, and are separate from information included in state Good Samaritan laws.

^b The law in highlighted states specifically reference “Responsible Persons” who “knowingly” or intentionally leave children unattended.

^c “Responsible Persons” refers to the individual responsible for the child at the time they were knowingly left unattended in the vehicle.

Components of Existing State Unattended Child Laws

Does the state unattended child law address the following components?

ME – WY

ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH	OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY
	x		x					x				x			x		x	x			x	x	x			x	x		
																						x							
	x		x												x							x							
	x																						x			x			
	<6		<11					≤6				≤7			≤6		<6	<7			<7	<7	<9			<16			
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	≥13		≥14									≥12			≥12							≥13	≥14	≥9					
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			x											x	x	x				x		x	x		x	x		x	

^d This chart references language in laws considered "Unattended Child" laws, and are separate from information included in state Good Samaritan laws.

^e This row references states with Good Samaritan laws, separate from unattended child laws, with specific language that protects persons who see a child in a motor vehicle and take action to render assistance. Additional states do have Good Samaritan laws providing basic legal protection for those who assist a person who is injured or in danger. These laws protect the "Good Samaritan" from civil and/or criminal liability if unintended consequences result from their assistance. For more information visit http://www.noheatstroke.org/good_sam_laws.htm.

Recommendations for Parents and Caregivers

Parents and caregivers are the first line of defense in efforts to end PVH deaths. Recommendations for keeping children safe and avoiding tragedy include:

1. Never leave a child unattended in a vehicle, even for a minute
 - An enclosed compartment means any enclosed area of a motor vehicle, including the passenger compartment, regardless of whether a door, window, moonroof/sunroof or hatch is left open
2. Make “Look Before You Lock” a routine
 - Look: Be sure that all occupants leave the vehicle when unloading; above all, do not overlook sleeping babies who are the most frequent vehicular heatstroke victims
 - Lock: Always lock your vehicle so children cannot climb in and unknowingly lock themselves inside
3. Educate everyone who cares for your child about how quickly parked vehicles can reach life-threatening temperatures even on a relatively mild day
4. Reduce risk by sticking to a routine and avoiding distractions
5. Schedule a call and set a reminder on your cellphone to make sure that all child passengers arrive as planned at child care, school or other destination, if your routine changes
6. Ensure that children do not have access to keys or remote entry devices such as key fobs
 - These devices should not be used as toys
7. Teach children that vehicles are not a play area
8. Immediately check nearby vehicles, including vehicle trunks^a, if a child is missing
9. Place your cell phone, purse or briefcase in the back seat so you are forced to check the back before you leave the car^b
10. Keep a stuffed animal in the car seat when it is empty. Place the stuffed animal on the front passenger seat when a child is in the back.

11. Ask your child care provider to call you as soon as possible if your child does not show up for child care¹⁵
 - Responsibility to deliver a child safely to child care remains with the responsible person. However, this practice adds a layer of protection to prevent PVH.

Public Recommendations

1. If you see an unattended child in a vehicle, take action immediately!¹⁶
 - Immediately call 9-1-1
 - Get the child out of the car and spray the child with water to help cool them down, if the child appears in distress
 - Stay with the child until help arrives
 - Ask someone else to search for the driver
2. Be an ambassador for child safety
 - Educate others about the dangers of vehicular heatstroke
 - Contact lawmakers for improved legislation around PVH
3. Workplace prevention measures should be implemented through an employer’s health and safety or employee wellness programs
 - Raise awareness that when routines change children are at increased risk
 - Ask all employees to watch for children in vehicles while in parking lots
 - Implement policies to educate customers, or those served, that leaving children unattended in a parked vehicle is not permitted on business premises for any length of time
4. Child care providers should implement policies and procedures to ensure all children exit a facility vehicle upon arrival at a destination

^a If there is a pool or body of water nearby, check the water first, then immediately check vehicles. Visit <https://www.healthychildren.org/English/safety-prevention/on-the-go/Pages/Prevent-Child-Deaths-in-Hot-Cars.aspx> for more information.

^b Secure reminder item with a seat belt or vehicle pocket to prevent it from becoming a projectile in the event of a motor vehicle crash.

Project Description

Prosecutions and Sentencing

For the purpose of this report, a review of prosecutions and sentencing related to child hot car deaths in the U.S. was conducted through a search of electronic media and Lexis-Nexis. A baseline set of data has been provided by Jan Null at San Jose State University and may be viewed at www.noheatstroke.org. While Mr. Null's research and documentation utilized for this report spans the time period of 1998 through 2017, this review of prosecutions and sentencing focuses on child deaths that occurred during the last 10 years, 2007 through 2017.

Mr. Null primarily collects data through customized online news searches of electronic media using tools such as Lexis-Nexus and Google News. While somewhat labor intensive, electronic news sources yield nearly twice as many reported heatstroke deaths of children in vehicles as do "official sources" such as death certificates. For example, the latest NHTSA Not-in-Traffic Surveillance: *Non-Crash Fatalities and Injuries* report,¹⁷ estimated an annual average of only 19 fatalities of children (i.e., <14 years) due to hyperthermia in vehicles. The report is based on death certificates from the special mortality files of the National Vital Statistics System. Mr. Null's research indicates this is only about half the average number of deaths.

While comparatively rare, Mr. Null occasionally learns of PVH deaths through local authorities or the families if the death was not covered by local media. These deaths are only included in the overall count if they can be verified through a second source such as police reports, autopsies or court documents. Even with an anecdotal piece of information, Mr. Null has found a secondary source to verify the fatality.

NSC conducted an inquiry into what patterns exist in prosecutions and sentencing nationally. The state laws addressing unattended children in motor vehicles vary widely in their definitions and provisions, yielding little consistency in how this issue is treated by the criminal justice system.

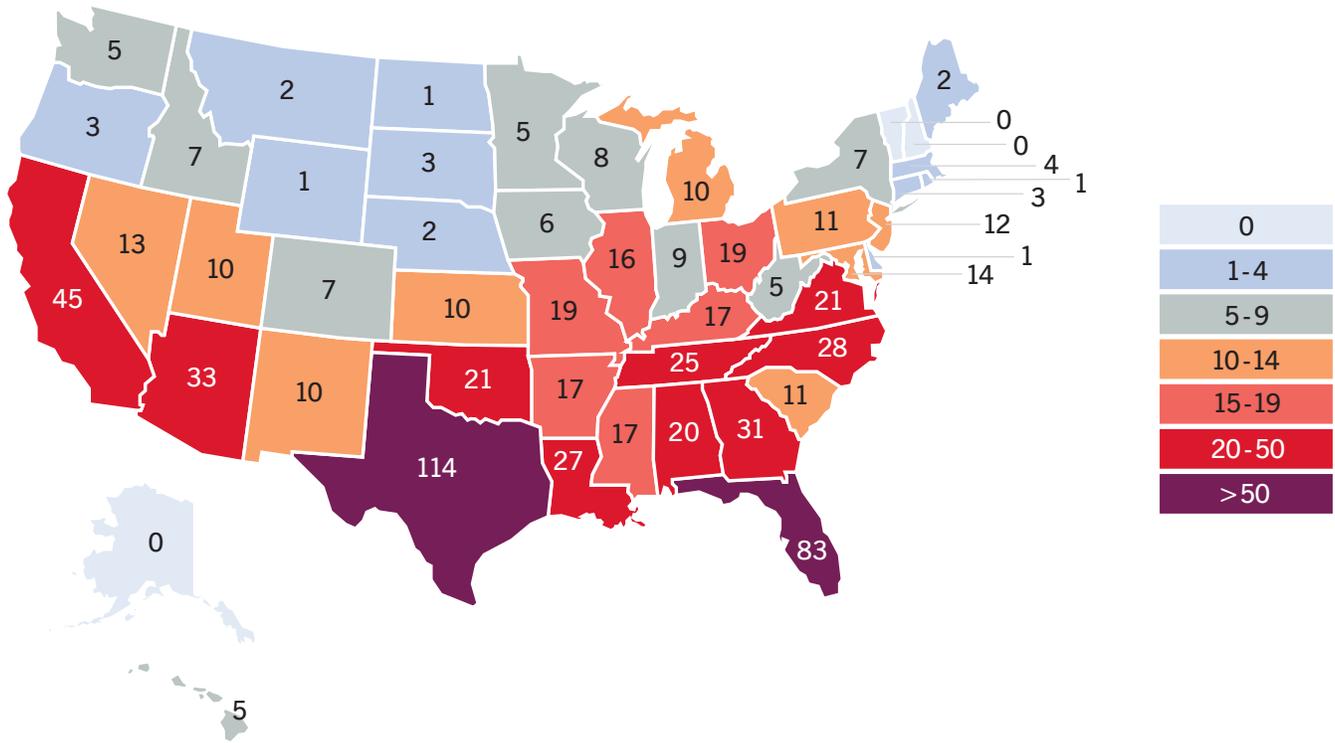
In addition, the legal aspects of pediatric vehicular heatstroke have two separate paths that do not necessarily intersect. The first has to do with states that have enacted "unattended" child laws, while the other involves prosecution after a child has died in a hot car.

The majority of the state laws that relate to leaving a child unattended in a vehicle are misdemeanors, with a few being only fineable offenses, similar to a traffic citation. Some states are even more lax. In Rhode Island, for example, the punishment for leaving a child unattended in a vehicle is a verbal warning from a law enforcement officer.

However, district attorneys may bring and have brought child endangerment, neglect, manslaughter or homicide charges against caregivers who have left an unattended child in a vehicle who died. Enforcement of these laws varies greatly between jurisdictions, and NSC recommends legislatures clarify indictment guidelines between intentional and unintentional PVH deaths.

Pediatric Vehicular Heatstroke Deaths

(1998 - 2017)



Legal Actions and Findings by State

A review conducted by NSC of 408 fatal cases that occurred between 2007 and 2017 found the following:

Confirmed, no charges were filed: **68** (16.7%)

Went to jail: **71** (17.4%)

Plea deal or conviction with probation (no jail time): **52** (12.7%)

Charges were dropped or suspect was acquitted: **16** (3.9%)

No charges filed^a: **80** (19.6%)

Suspect charged but result is not known: **60** (14.7%)

Unknown outcome: **61** (15.0%)

^a Upon review of case material it appears no charges were filed, although it should be noted a definitive confirmation was not found.

	Confirmed: No filed charges: 68	Jail time: 71	Plea deal or conviction with probation (no jail time): 52	Dropped charges or acquitted suspect: 16	No filed charges: 80	Suspect charged but unknown result: 60	Unknown outcome: 61
AK							
AL	3	2	1		2	2	5
AR	2	4	1	1		2	
AZ	3	3	1		3	5	4
CA	5	2	2		4		2
CO		2	2				
CT			1				
DE					1		
DC							1
FL	6	12	10	3	8	3	5
GA	1	5	3		6	6	
HI	1				1	1	
IA	1			1			
ID			3			2	
IL	1	1	1		1		
IN			1	2	2		
KS	1	1			1	1	2
KY	4			1	5	1	
LA	3	1	1		7	5	3
MA	1				1		
MD	2	2	2		2		
ME					1		
MI		1	1		2		1
MN			1				
MO	3	1			1		4
MS	2		1	1	2	2	3
MT		1					
NC	4	1	2		1	3	3
ND							
NE							
NH							
NJ					1		
NM			2			1	
NV	1	1			1		
NY	3	1				1	
OH	3		1		3		3
OK	1	3	2		1	1	2
OR	1						
PA			1	1	1	1	1
RI	1						
SC	1	3			1	3	1
SD					1		1
TN	1	6	1	1		3	1
TX	8	10	4	2	20	13	15
UT	2		1				1
VA	2	4	3	3			1
VT							
WA						1	2
WI	1	3	2				
WV		1	1			2	
WY						1	

Trends and Patterns

History

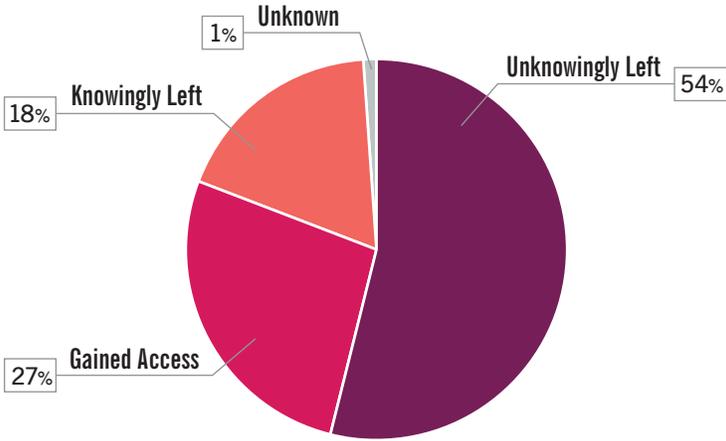
742 children died of heatstroke inside motor vehicles between 1998 – 2017.^a

Just over half (54%: 400 children) were unknowingly left by a parent or other caregiver. Twenty-seven percent (200 children) gained access to a vehicle on their own, and 18% (137 children) died after being left knowingly, or intentionally, inside a

vehicle. The circumstances for 1% (five children) are unknown. A breakdown of the relationships between the children, circumstances and the responsible persons at the time of death are provided below.

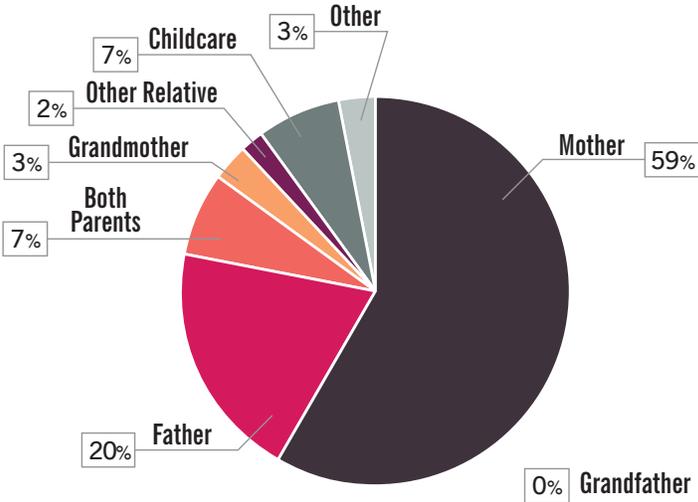
Circumstances Resulting in PVH Deaths

(1998 – 2017)



Relationship Between the Responsible Persons and the Children

(1998 – 2017)

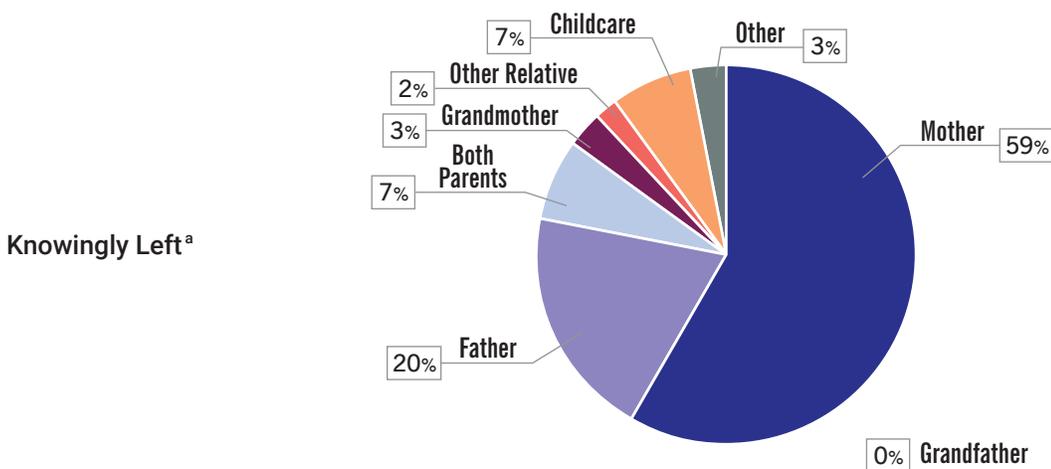
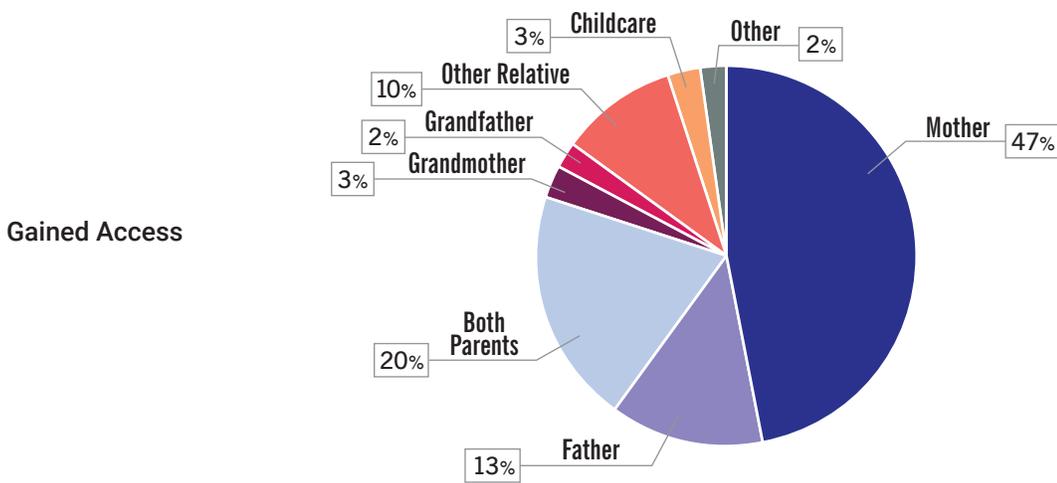
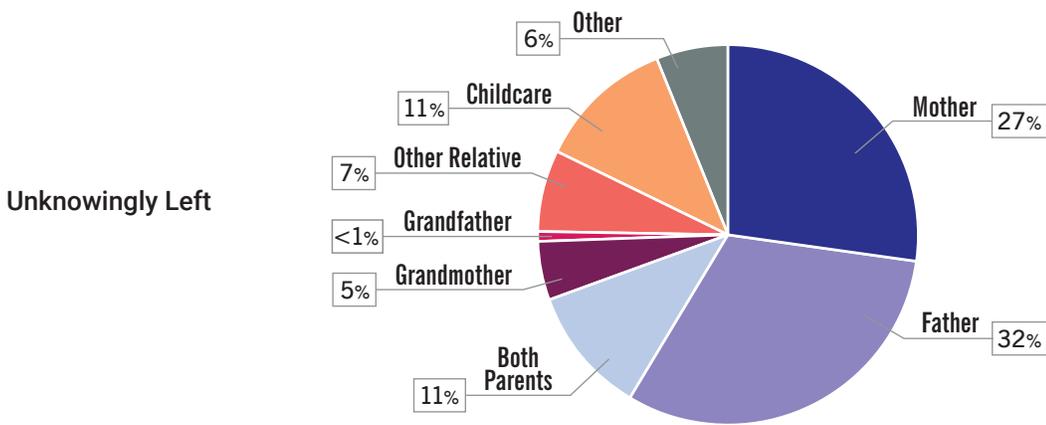


NOTE: Due to rounding, figure percentages may not add up to 100%. Numbers were provided to the fourth decimal place and then summed.

^a All data and pie charts represent data from 1998 - 2017 in U.S. states and can be found at http://noheatstroke.org/Heatstroke_Trends.pdf.

Relationship Between the Responsible Persons and Circumstances

(1998 – 2017)

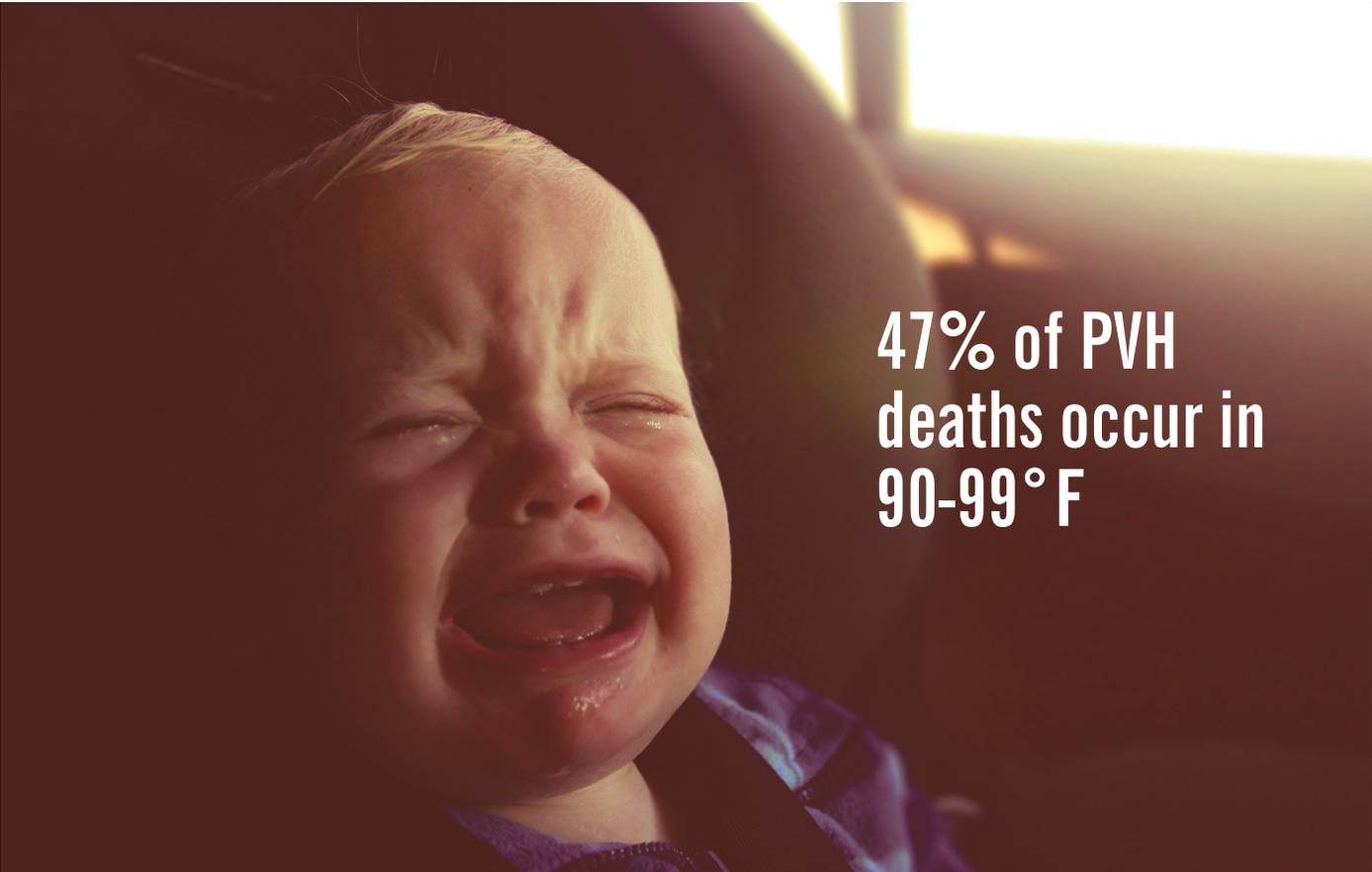
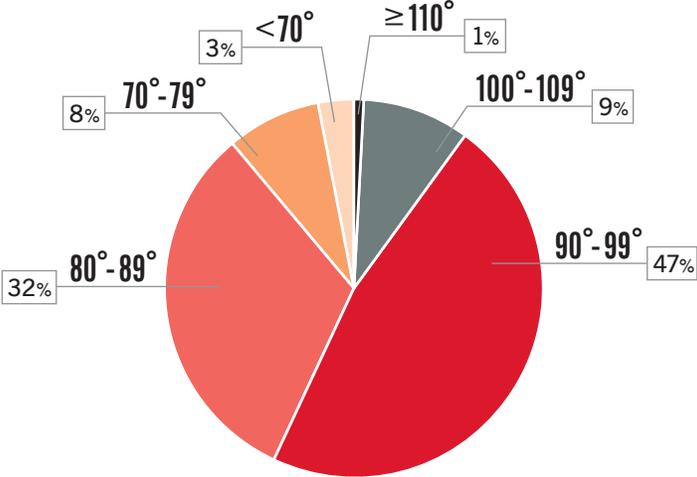


^a Knowingly left is not equal to malintent.

Temperatures

Percentage of PVH Deaths by Starting Ambient Temperatures

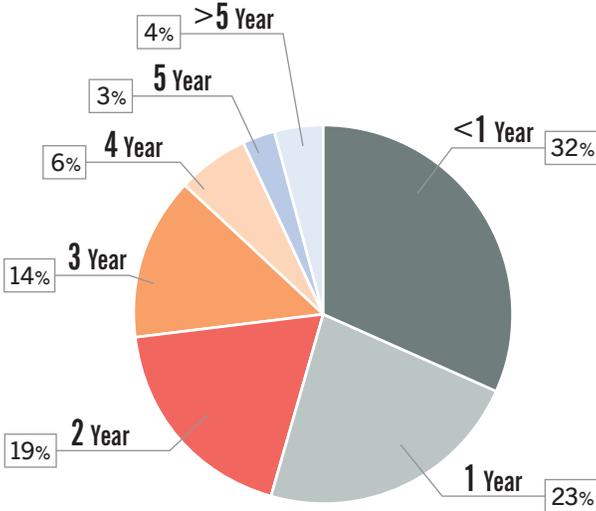
(1998 - 2017)



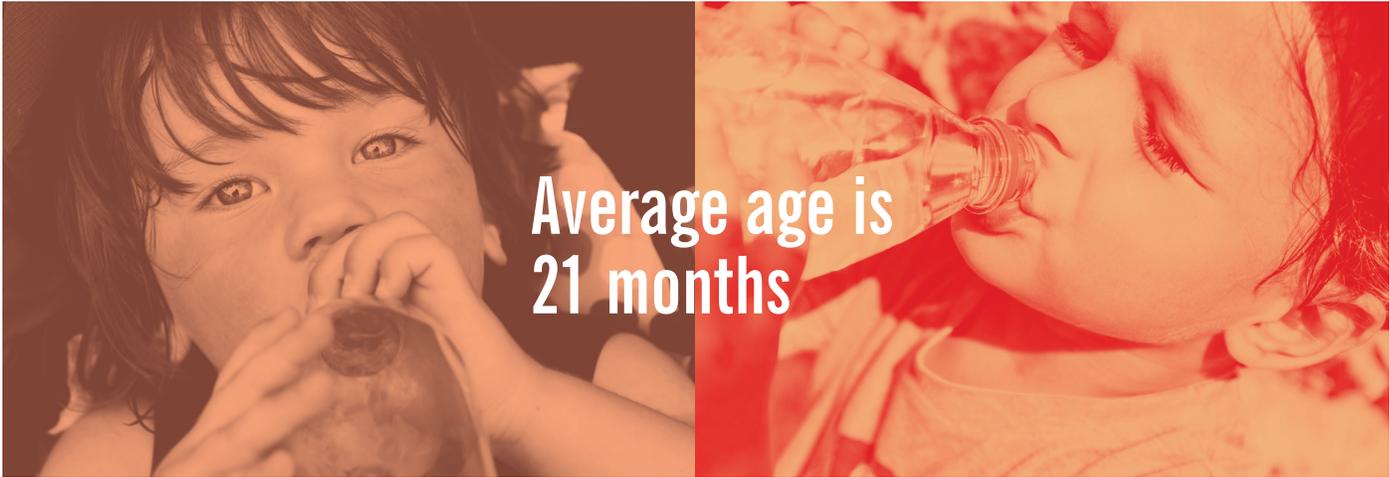
Age Distribution

Age Distribution of Children Who Have Died From PVH

(1998 – 2017)



NOTE: Due to rounding, figure percentages may not add up to 100%. Numbers were provided to the fourth decimal place and then summed.



Location of Vehicles

The location of vehicles at the time of PVH varies. For example, while 56% of all child heatstroke deaths between 1998-2017 in U.S. states have occurred at home, 25% occurred while the parent or caregiver was at work.

Workplace

Employers have a responsibility to ensure the safety and health of their workers on the job and have a vested interest in the wellbeing of their employees and their families off-the-job as well.

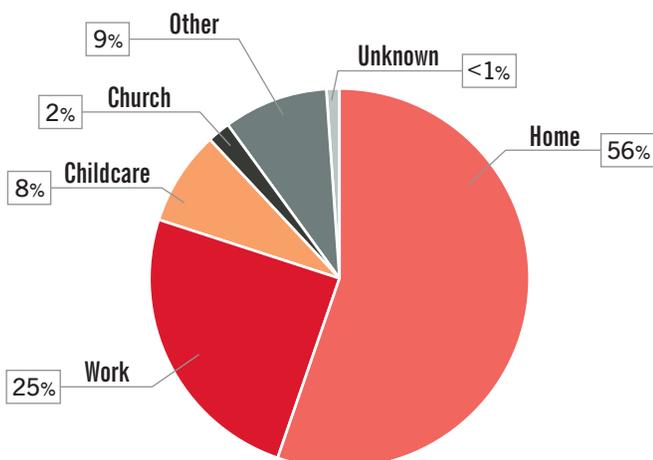
PVH prevention measures in the workplace should be implemented through an employer's health and safety program and/or their employee wellness programs.

Employers should share information with their employees about how PVH can occur and preventative measures an employee can take each time they leave their vehicle. Employers should ask all employees, as they walk through the employee parking lot, to watch for children left unattended in vehicles.

In addition, all employers are encouraged to implement policies to inform and educate customers, or those served by the organization, that unattended children are not permitted in parked vehicles on business premises for any length of time. This includes schools and early childhood education centers where younger children might be left in vehicles while older siblings are dropped off.

Location of Vehicle in PVH Deaths

(1998-2017)



How Can a Child Be Forgotten?

Understanding the Distracted Brain



Multitasking is a myth

Human brains do not perform two tasks at the same time. Instead, the brain handles tasks sequentially, switching between one task and another. Brains can juggle tasks very rapidly, which leads us to mistakenly believe we are doing two tasks at the same time. In reality, the brain is switching attention between tasks – performing only one task at a time.

In addition to “attention switching,” the brain is constantly processing the information it receives:

- 1 Select the information the brain will attend to
- 2 Process the information
- 3 Encode, a stage that creates memory
- 4 Store the information

Depending on the type of information, different neural pathways and different areas of the brain are engaged. Therefore, the brain must communicate across its pathways. Then, the brain must go through two more cognitive functions before it can act on saved information. It must:

- 5 Retrieve stored information
- 6 Execute or act on the information

When the brain is overloaded, all of these steps are affected and people may not realize their brains are struggling to juggle all of the information. Moreover, the brain not only juggles tasks, it also juggles focus and attention. When people try to do two thinking tasks at the same time, the brain shifts its focus and drivers develop “inattention blindness.” When this happens, important information falls out of view and is not processed by the brain. Because this is a process people are not aware of, it makes it difficult for people to realize they are mentally taking on too much. And, the workload of information processing can bring risks.

Additional Considerations

Child Passenger Safety

While PVH continues to be one of the leading causes of non-crash vehicular fatalities for children, motor vehicle crashes are a leading cause of death for children ages one to 13.¹⁹

It is important to note children are at a much higher risk of being killed as a passenger in a motor vehicle crash than being a victim in a PVH incident. All children under the age of 13 should remain properly restrained in appropriate car seats, booster seats or seat belts (once seat belts fit correctly) in the back seat during transportation in motor vehicles.²⁰ To save more lives, however, additional care must be taken not to leave children unattended in any vehicle.

Transporting infants and toddlers in rear-facing car seats is strongly recommended for safety reasons. Parents and caregivers transporting rear-facing infants and toddlers need to be especially conscious of their children in rear seating positions because rear-facing children cannot be seen. These children might also fall asleep during transport and be silent when the driver arrives at his or her destination.



Technology as Part of the Solution

NSC²¹ supports efforts to use technology to prevent children from being forgotten in vehicles. Without offering an endorsement of any vehicle or product, NSC provides the following information to help parents and guardians protect their children.

In 2012 researchers at the Children’s Hospital of Philadelphia (CHOP) evaluated products designed to prevent children 0 to 24 months of age from being left behind in closed, parked vehicles, potentially leading to pediatric heatstroke.²² This study determined at that time that none of the devices tested were completely reliable or consistent in their ability to detect children.

Since then, these technologies have continued to evolve. Vehicle and child restraint manufacturers have begun incorporating technology to alert drivers when a passenger might remain in a rear seating position. However, it is important for consumers to understand the difference between “alert” and “detection” systems. Alert systems will provide a reminder to check the back seat, while a detection system would identify that someone or something remains in the back seat.

As an example, in several 2017 GM vehicles, if a rear door is opened and closed within 10 minutes before the vehicle is started, or is opened and closed while the vehicle is running, five chimes will sound and a message will display on the instrument panel when the vehicle shuts off to remind the driver to check the rear seat. This is an example of an “alert” system.

Likewise, reminder technology is available in some car seats. As an example, Evenflo incorporates technology that generates a series of tones activated through a “smart” chest clip, which is part of the car seat, and wireless receiver connected inside of the vehicle to remind the driver that a child is in the rear seat within two seconds of turning off the vehicle. This is a reminder or alert system, not a detection system.

With any new technology, it is important to follow all manufacturer instructions and understand how the technology works.²³ Technology is one layer of protection that should complement continued education and awareness about the dangers of heatstroke and leaving children unattended in vehicles.



What you can do

Take Action

If you see an unattended child in a vehicle, take action! Immediately call 9-1-1. If the child appears to be in distress, get the child out of the car; break a window if necessary. Stay with the child until help arrives and ask someone else to search for the driver.²⁴

The American Academy of Pediatrics also recommends if the child is not responsive or is in pain, spray the child with cool water as you wait for help to arrive.²⁵

Always be sure to lock your vehicle so children cannot unknowingly gain access, and make it a habit to look in the back seat before leaving your vehicle – even when you don't transport your child.

Proactively discuss with your friends and family members the importance of “Look Before You Lock.” Make sure everyone who cares for your child knows how quickly vehicles reach

life-threatening temperatures. If someone else provides transportation for your child, ask them to reduce risk by sticking to a routine and avoiding distractions. Also, schedule a call at the time they should be dropping off your child, for example at daycare, to touch base and check that the drop off went smoothly.^a Share some of the reminder ideas such as putting their phone in the back seat, or even their left shoe.

Finally, be an ambassador for child safety. Contact your state lawmakers and advocate they improve or pass legislation around pediatric vehicular heatstroke.

Advocate

There are many ways to advocate for better policies to prevent PVH. Some require more time and resources than others, but even taking small steps can lead to substantial change. The first and most important action people can take is to get to know their own legislative representatives and educate them on the issue and why it matters. Building a relationship with a legislator is just like building and maintaining any other relationship – it takes time, repeated respectful contacts and consistent attention. In addition to focusing on this process, there are other activities a person can take to move this issue forward, including the following:

- Calling or writing/emailing elected officials

- Meeting with the elected officials and their staff (these individuals are also very influential)
- Inviting elected officials to community events or gatherings addressing child safety or PVH
- Writing op-eds or letters to the editor of your local newspaper
- Engaging with elected officials on social media, through such platforms as Twitter and Facebook
- Participating in an advocacy coalition in your state
- Leading an advocacy coalition in your state

^a Inform caregiver you do not want them to answer the phone while driving. They can return the call after the vehicle is parked.

Conclusion

Recommended Next Steps

The information in this report provides a basis for consistent public messaging available to individual advocates and agencies. It is important for everyone to work together to increase awareness and understanding about pediatric vehicular heatstroke as we all collectively strive to eliminate preventable deaths.

- 1 Convene an expert panel to include child development specialists, health care professionals, lawmakers and safety advocates in an effort to determine appropriate ages for legislation to define child and responsible persons, and other recommended provisions
- 2 Convene an expert panel to determine if cognitive distraction contributes to pediatric vehicular heatstroke
- 3 Continue researching cases that led to current legislation in each state, as well as new cases as they occur
- 4 Monitor technology and how it can assist in the solution to PVH
- 5 Increase outreach efforts through employers for increased education and awareness
- 6 Advocate for child care providers to implement policies and procedures to ensure all children exit a facility vehicle upon arrival at a destination
- 7 Advocate for stronger state legislative protections for children knowingly left unattended in motor vehicles due to the danger of vehicle heating dynamics
- 8 Advocate for Legislatures to clarify indictment guidelines between intentional (knowingly left) and unintentional (unknowingly left) PVH deaths



Additional Information and Resources

National Safety Council

nsc.org/learn/safety-knowledge/Pages/Kids-and-Hot-Cars.aspx

National Highway Traffic Safety Administration:

<https://www.nhtsa.gov/child-safety/tips-avoid-child-heatstroke>

San Jose State University

[NoHeatstroke.org](https://www.noheatstroke.org)

American Academy of Pediatrics

[HealthyChildren.org](https://www.healthychildren.org)

<https://www.healthychildren.org/English/safety-prevention/on-the-go/Pages/Prevent-Child-Deaths-in-Hot-Cars.aspx>

Safe Kids Worldwide

<https://www.safekids.org/take-action-prevent-heatstroke>

KidsandCars.org

<https://www.kidsandcars.org/how-kids-get-hurt/heat-stroke/>

Rayrayspledge.com

<http://www.rayrayspledge.com/Ray-Ray-s-Call-to-Action.html>

Road to Zero

[nsc.org/RoadtoZero](https://www.nsc.org/RoadtoZero)

Special Thanks

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NHTSA.gov

The opinions, findings, and conclusions expressed in this publication are those of NSC and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration.

Key Report Contributors

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Amy Artuso is a senior program manager in Advocacy with the National Safety Council. For the past 22 years, she has dedicated her career to supporting the overall health and wellness of children. In her role at



NSC, Ms. Artuso serves as a subject matter expert and manages federally funded programs supporting the safety of children in and around vehicles. She is a nationally certified child passenger safety technician instructor, and is a past-chairperson of the National Child Passenger Safety Board.

Prior to joining NSC, Ms. Artuso worked in pediatric injury prevention for All Children's Hospital, part of Johns Hopkins Medicine. In this role, she worked extensively with extramural funding provided by the Florida Department of Transportation. Programs included, but were not limited to, child passenger safety and bicycle and pedestrian safety on the West Coast of Florida. During this time, she also worked as a multi-county Safe Kids Coordinator, focusing on a variety of childhood injury prevention topics.

Ms. Artuso has served as a civilian training and curriculum specialist in child and youth services for the U.S. Department of the Army, stationed in Germany. She was a certified child life specialist for 16 years, working at Yale-New Haven Hospital and All Children's Hospital. Most importantly, she is a proud mom who credits her children for bringing relevancy and life to her work.

Sharon Hower

Sharon Hower conducted a review of prosecutions and sentencing to support the information in this report. Hower is a paralegal with over 30 years experience in the legal field, the majority of her career involving litigation with a focus on asbestos defense. She has a bachelor's degree from the University of Illinois in Champaign-Urbana, and paralegal



training from Mallinckrodt College. At home, she is the mother of 3 active, now grown, boys. She also founded a charity called InGENEus Project which provides funding through Stroger Hospital for breast cancer patients needing genetic testing. She and her husband enjoy Fighting Illini sports, reading, attending their sons' sporting events, and traveling.

Jan Null, CCM

Jan Null has been a meteorologist in the San Francisco Bay Area for four decades and is frequently seen on television and heard on the radio.



Eighteen years ago, he founded a consulting firm, Golden Gate Weather Services, after a 24-year career with the National Weather Service. He has also been an Adjunct Professor of Meteorology at San Francisco and San Jose State Universities since 1987.

Null has become an internationally recognized expert on the sad topic of heatstroke deaths of children in vehicles. After the death of a child left in a vehicle in San Jose in 2001 he did a comprehensive study of vehicle temperatures that was ultimately published in *Pediatrics* in 2005. Since that time he has tracked cases and continued his research. He has spoken at numerous national conferences and worked with a wide variety of child safety advocacy groups and agencies to raise awareness about the dozens of children who die from heatstroke in hot vehicles each year. Related to these activities in 2011 he received the Public Education Award from the National Weather Association and in 2013 a Public Service Award from the National Highway Traffic Safety Administration.

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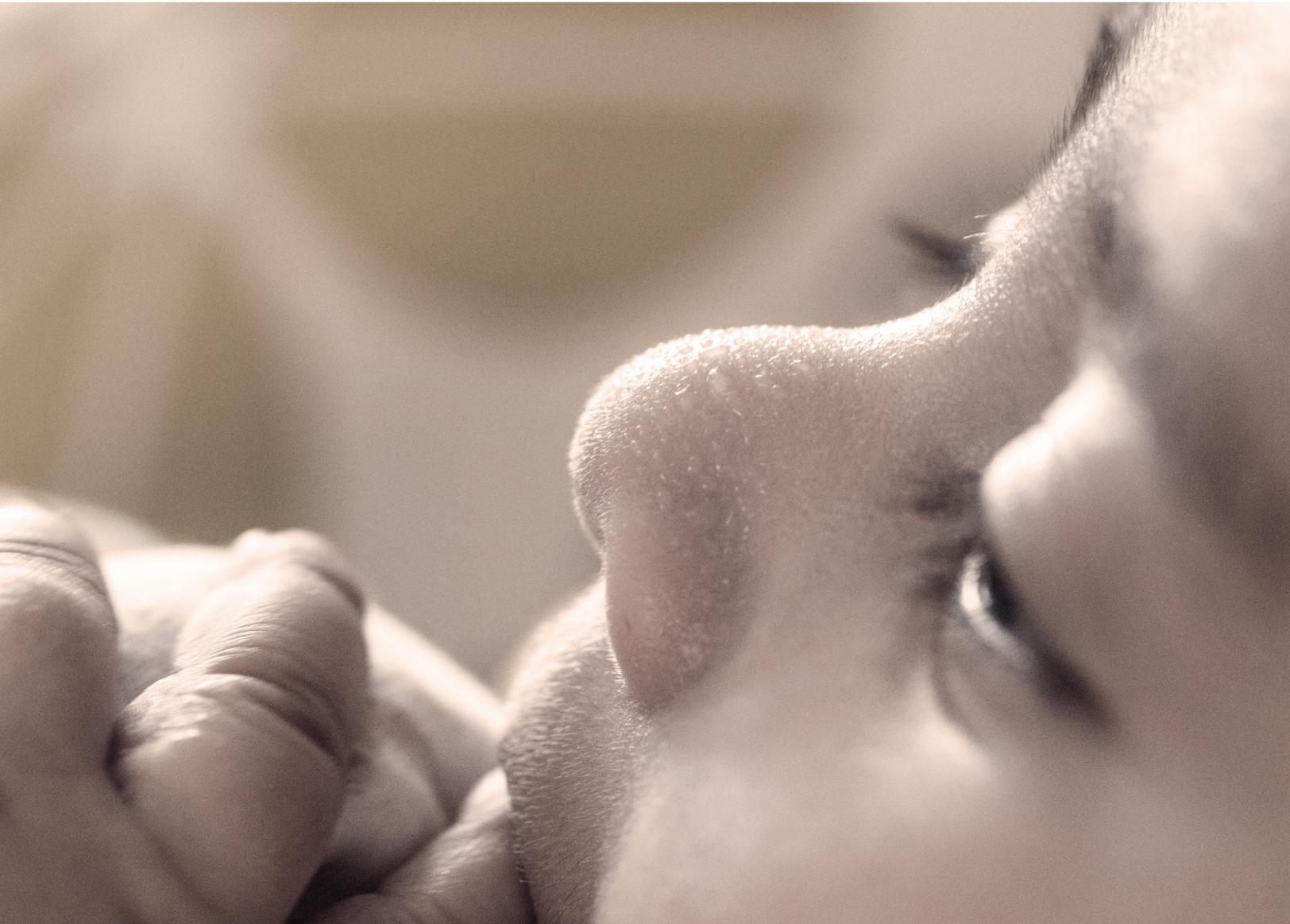
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Advocate

for stronger state legislative protections
for children *knowingly left unattended*
in motor vehicles due to the danger of
vehicle heating dynamics



About the National Safety Council

The nation's leading safety advocate for more than 100 years, the National Safety Council is a nonprofit organization with the mission of eliminating preventable deaths at work, in homes and communities, and on the road through leadership, research, education and advocacy. NSC advances its mission by engaging businesses, government agencies, elected officials and the public to help prevent the third leading cause of death in the U.S. – preventable injuries.

Media questions can be directed to media@nsc.org



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