



Furniture Stability

A REVIEW OF DATA AND TESTING RESULTS

A research report by:

Kids In Danger and Shane's Foundation



August 9, 2016

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Furniture Stability: A review of data and testing

Executive Summary

This report by Kids In Danger (KID) and Shane's Foundation focuses on tip-overs of dressers and chests. ASTM International, which has developed thousands of voluntary industry consensus technical standards, has a standard in place to test furniture stability. However, furniture on the market is not required to conform, resulting in widespread non-compliance. Additionally, these standards are too lenient and require reform, as testing protocols have remained virtually unchanged for over a decade, despite continuing injuries and deaths. Units may pass the standard, but still present a significant risk. KID advocates for a two-pronged approach to decreasing tip-over incidents:

- Increasing consumer awareness of the danger of furniture tip-overs and knowledge of the actions needed to keep children safe, and
- Improving furniture stability by strengthening standards, making those standards mandatory and enforceable and promoting changes in furniture design.

KID compiled data from incidents reported to the U.S. Consumer Product Safety Commission (CPSC) by various sources and from the National Electronic Injury Surveillance System (NEISS). These include reports from January 1, 2010 to October 14, 2015.

Findings of the data analysis include:

- Two-year-olds are the age group most affected by tip-overs, especially in regard to fatal incidents.
- Children age 2 to 5 accounted for 77% of total incidents.
- The age range of children injured is wider than the age range of children killed by tip-overs.
- Fatalities accounted for 12% of total incidents.
- Head injuries (37%) were the most common category of injury.
- Almost all (98.7%) of head injuries are related to a television tipping over on a child.

KID conducted performance tests on a sample of 19 dressers and chests. Testing was run at the UL Furniture Center of Excellence in Holland, Michigan. UL laboratory technicians followed a testing protocol developed by KID. The protocol included tests based on the current voluntary standard for furniture stability. KID added tests that, among other things, evaluated for tip-overs when more weight was added (simulating larger children), drawers were full of clothes, furniture was placed on carpeting as opposed to bare flooring, televisions were placed on top of the furniture, and additional drawers were opened simultaneous with weighting one drawer. These additional tests were intended to be more representative of real-world scenarios.

Test results include:

- Only nine of the 19 units passed performance tests based on the current tip-over safety standard, ASTM F2057.
- Only two units passed all tests, including the additional testing protocols added by KID.
- The weight of a television or any type placed on top of the unit did not decrease the stability of furniture.
- Furniture placed on carpet is less stable than furniture placed on hard floors.
- Many units remained stable when more than 70 pounds was placed on an open drawer, while others tipped with less than half that weight.

Based on testing and research, KID and Shane's Foundation have the following recommendations:

- (1) #AnchorIt, a safety campaign launched by the CPSC, and other educational efforts should be expanded to reach families today with the need to anchor furniture with a tip restraint. In addition, further research into tip restraints that are easier to attach, and do not require tools, should be encouraged to increase the likelihood that consumers will use them.
- (2) Furniture manufacturers should look to design solutions to tipping furniture.
- (3) A strong standard to prevent furniture tip-over should include the following:
 - All tests should be conducted on a carpet sample to correlate more closely to real-world use and worse case use.
 - Increase the weight used in testing to protect children up to and including age 5 using the most recent anthropometric data.
 - Since most dressers and chests in homes will be in use and not empty, add a requirement that furniture would remain stable when all drawers are filled to capacity with clothing, as KID did in its tests.
 - The progressive drawer-opening test should be added and units that cannot pass must include drawer interlock systems.
 - Eliminate the height restriction in the standard so that it applies to all clothing storage units.
- (4) The ASTM subcommittee on furniture should carefully review this data and consider adding these tests to the standard. At the same time, given the continued rate of injury, the noncompliance with the voluntary standard of many manufacturers and products on the market and the resistance to making substantive changes to the standard, CPSC should begin a rulemaking process with the goal of making a stronger standard mandatory.

Furniture Stability Research

Table of Contents

Executive Summary	2
Introduction	5
Hazard Patterns of Tip-over Incidents	5
Solution: A Two-pronged Approach	5
Data and Methodology	6
Analyses of Data	7
Kind of Injury	7
Chart 1: Consequences of Tip-over Incidents from January 2010 to October 2015	7
Age of Victim	7
Chart 2: Ages of Children Involved in Tip-Over Incidents from January 2010 to October 2015	8
Age in Non-fatal vs. Fatal Incidents	8
Chart 3: Ages of Children Killed in Tip-Over Incidents from January 2010 to October 2015	9
Chart 4: Ages of Children Injured in Tip-Over Incidents from January 2010 to October 2015.....	9
Head Injuries vs. Age	10
Chart 5: Head Injuries in Relation to Age from January 2010 to October 2015	10
Head Injuries vs. Presence of TV	10
Location of Incident	11
Male vs. Female	11
Chart 6: Gender of Children Involved in Tip-Over Incidents from January 2010 to October 2015. .	11
Deaths by Gender	11
Current Standard and Its Shortcomings	12
Furniture Testing	12
What KID Tested	12
How KID Tested	13
Test Results	14
Testing Conclusions	15
Recommendations for Safety	18
What Parents Can Do	19
Additional Information and Acknowledgments	19
Appendix	21

Introduction

Most families feel safest in their homes, but in fact, there are many potential hidden hazards where people least expect them. According to the U.S. Consumer Product Safety Commission (CPSC), a child is killed every two weeks when a television, appliance or piece of furniture falls on him or her. This report by Kids In Danger (KID) and Shane's Foundation focuses on furniture tip-overs – specifically dressers and chests. It aims to provide valuable analysis of tip-over incident data, offer an assessment of the current industry standard and its shortcomings, present the results of KID's own testing of furniture, and make recommendations to improve children's safety.

Hazard Patterns of Tip-over Incidents

According to the CPSC¹, children 5 and under account for 90% of children who are killed by tip-over incidents and almost half of tip-over deaths occur in a bedroom of the child's home. Often the cause of tip-overs is unknown since there is not always a witness. However, of injuries and deaths with a known cause, the largest percentage (65%) results from the child climbing the furniture. Details in incident reports gathered by the CPSC reveal that children climb onto furniture for various reasons; common ones include to reach items in higher drawers of a dresser, to reach objects placed on top of the dresser, such as toys or a TV remote control, or to turn on a TV set on top of the dresser. Other causes of injury include playing inside open drawers or simply pulling open drawers to access items inside.

There is little mystery as to why tip-overs can result in death or significant injury; the force to which a child victim of a tip-over is subjected is enormous. For example, a 36" box-style CRT (cathode ray tube) TV falling about three feet creates the same momentum as when a 1-year-old child falls 10 stories.² This forceful kind of impact causes a variety of severe injuries including lacerations, fractures, head injuries, and death. On average more than 22,000 children under 8 years are treated for injuries related to instability or tip-overs each year, and a child goes to the emergency room every 24 minutes because of a tip-over incident involving furniture or a television.³

Solution: A Two-pronged Approach

KID advocates for a two-pronged approach to decreasing tip-over incidents:

- 1) Increasing consumer awareness of the danger of furniture tip-overs and knowledge of the actions needed to keep children safe, and
- 2) Improving furniture stability by strengthening standards, making those standards mandatory and enforceable and promoting changes in furniture design.

#AnchorIt, a safety campaign launched last year by the CPSC to teach consumers to install tip restraints, aims to improve consumer awareness and motivate consumer action. The CPSC urges parents to buy sturdy furniture, secure or mount TVs, secure top-heavy furniture, and remove any objects that could tempt a child to climb onto the TV or furniture.

Some companies have argued that dressers do not need to meet safety standards if they are designed to be used only when anchored. However, to ensure adequate child safety, both anchors

¹ <http://www.cpsc.gov/en/Safety-Education/Neighborhood-Safety-Network/Posters/1-Child-Dies-Every-Two-Weeks/>

² Bernard PA, Johnston C, Curtis SE, King WD. Toppled television sets cause significant pediatric morbidity and mortality. *Pediatrics*. 1998 Sep; 102(3):E32.

³ <http://www.cpsc.gov/en/Safety-Education/Neighborhood-Safety-Network/Posters/1-Child-Dies-Every-Two-Weeks/>

and compliance with rigorous standards are needed. Industry-accepted furniture stability standards should represent the minimum requirement for an item to enter the market; tip restraints should provide an extra layer of protection rather than act as the only mechanism or design for preventing tip-overs.

Although many furniture units may comply with the current voluntary industry standard, they still may present a significant risk of tipping in foreseeable-use situations. In addition to consumer awareness and industry standards, changes in the marketplace are necessary to keep children safe. This report suggests additional performance test requirements to strengthen the voluntary standard, with the goal of ultimately making such enhanced standards mandatory.

Moreover, many units of furniture introduced into the market are not compliant with the industry standard, as it is a voluntary standard.

Under certain circumstances, the CPSC has the authority to render standards mandatory, either by adopting existing standards or by developing more effective standards as regulations with the force of law in the U.S. Code of Federal Regulations. The agency has taken such action, such as with children's bunk beds, when widespread industry non-conformance with voluntary standards for the product posed risks to children. This report recommends that the CPSC adopt and enforce a strong mandatory standard for furniture tip-overs that would include the performance testing discussed here.

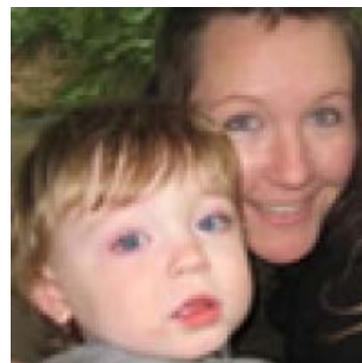
Data and Methodology

Data for this report is based on incidents reported to the CPSC by various sources and from the agency's National Electronic Injury Surveillance System (NEISS). NEISS collects patient information from each participating hospital for every emergency room visit involving an injury associated with a consumer product. Based on data analysis from NEISS reports, the CPSC makes projections regarding the number of various product-related injuries on national basis. However, for purposes of this report, KID used the actual data recoded in the NEISS system for furniture tip-over incidents, without national projections.

KID requested incident reports from the CPSC through the Freedom of Information Act (FOIA). This research covers reports issued from January 1, 2010 to October 14, 2015. KID then narrowed the universe of reports down to those involving clothing storage units only – dressers or chests of drawers. The result was 549 reports from NEISS (emergency room visits) and 270 reports from other CPSC investigations, for a total of 819 incidents.

Shane's Story

[Shane Siefert](#)-2, died in Barrington Hills, Illinois after being trapped beneath a dresser. *"Love you,' I had said to my baby boy, Shane. 'Love you,' he said back from his bed as I closed the door to his bedroom for his afternoon nap."* When his mother went to wake him up from his nap, Shane was dead under his dresser. His mother urges others to secure furniture, since neither manufacturers nor vendors are required to include a strap or anchor. She also warns that short furniture is just as dangerous as larger pieces – his dresser was only 35" tall. She started Shane's Foundation to raise awareness and improve children's safety.

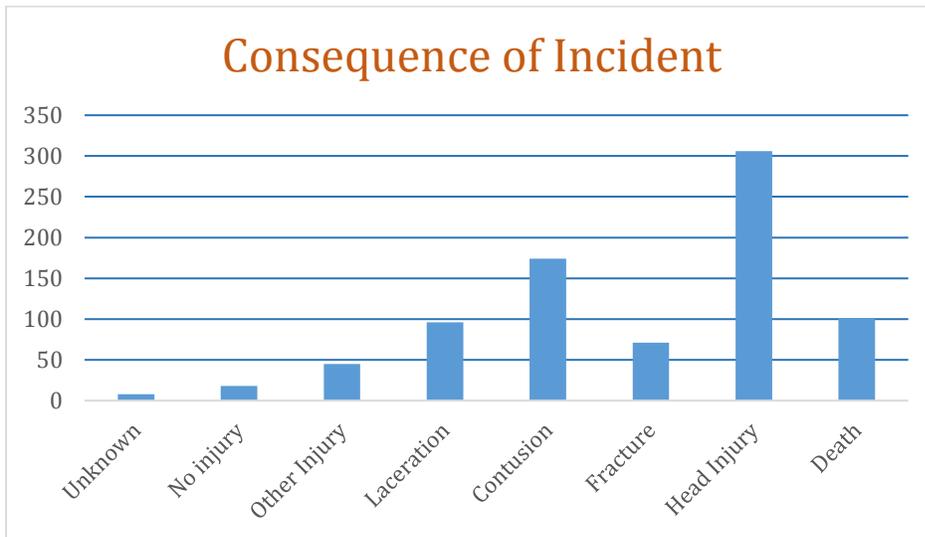


Analyses of Data

Kind of Injury

According to data from NEISS and other CPSC reports, dressers are responsible for a variety of injuries, from contusions, to fractures, to deaths. KID found that head injuries were the most common type of injury, with 306 reports accounting for 37% of total injuries. The most severe consequence was death, which constituted 101 reports, or 12% of the total.

Chart 1: Consequences of Tip-over Incidents from January 2010 to October 2015



Meghan's Story

[Meghan Agnes Beck](#) -3, died in Sterling, Massachusetts in 2004 when her dresser toppled on top of her. Her parents never thought that a well-made product from a well-known children's product manufacturer would tip or fall; for this reason, they secured other larger pieces of furniture in their home but not Meghan's dresser. *"We did not hear the dresser fall, for it fell on top of her. She did not or could not cry. She died within minutes. Suffocated under the weight of the dresser."* Her mother launched Meghan's Hope to raise awareness of tip-over safety.

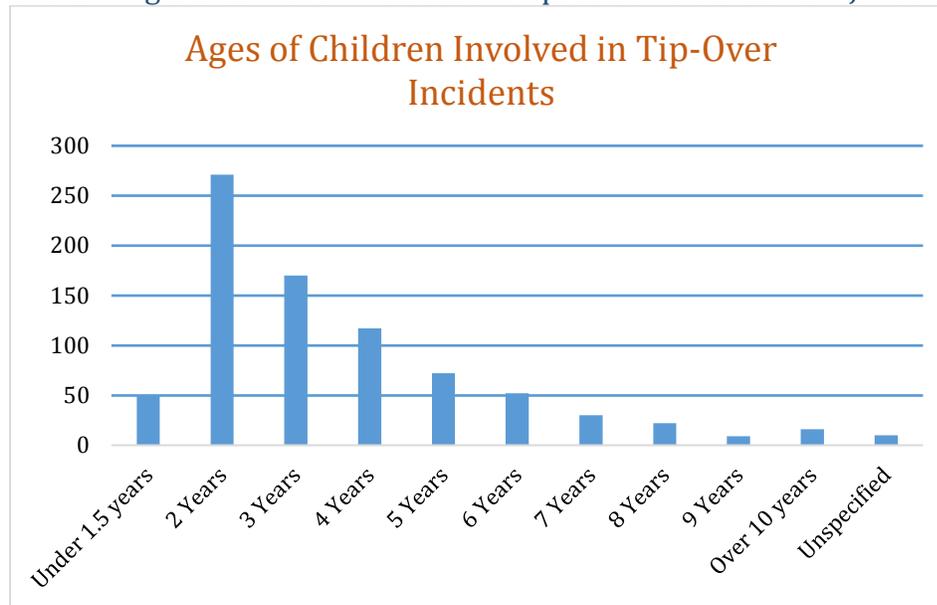


Age of Victim

Children from age 2 to 5 accounted for 77% of children involved in tip-over incidents. As evidenced by the gradual slope in the chart that follows, there is a negative correlation between age and susceptibility to tip-over injury, with the exception of children under 18 months. According to the Child Development Institute, during the toddlers/preschoolers developmental stage (2 to 5 years),

the child’s motor abilities grow and he/she is now free to roam and actively explore the environment.⁴ This stage also comes with rapid intellectual development and curiosity. Therefore, the high number of incidents involving children 2 to 5 might be explained by their greater curiosity about objects in the home, and physical capability to climb onto objects, but it is their relatively small size which makes them vulnerable to severe injury in tip-over incidents. Younger children under 18 months remain in closer parental supervision or in their cribs, and children over 5 years are taller and stronger, so they might suffer less severe injuries under similar circumstances.

Chart 2: Ages of Children Involved in Tip-Over Incidents from January 2010 to October 2015



Charlie’s Story

[Charlie Horn](#) – 2, died in Kansas City, Missouri in 2007 when he was pinned beneath a 30-inch dresser and suffocated. His mother secured tall armoires but had no idea that small items could also be dangerous. Often deaths from furniture tip-overs are “silent deaths” – the child’s body becomes a cushion for the fall of the furniture item, and the parents may not even hear the furniture’s impact on the floor.



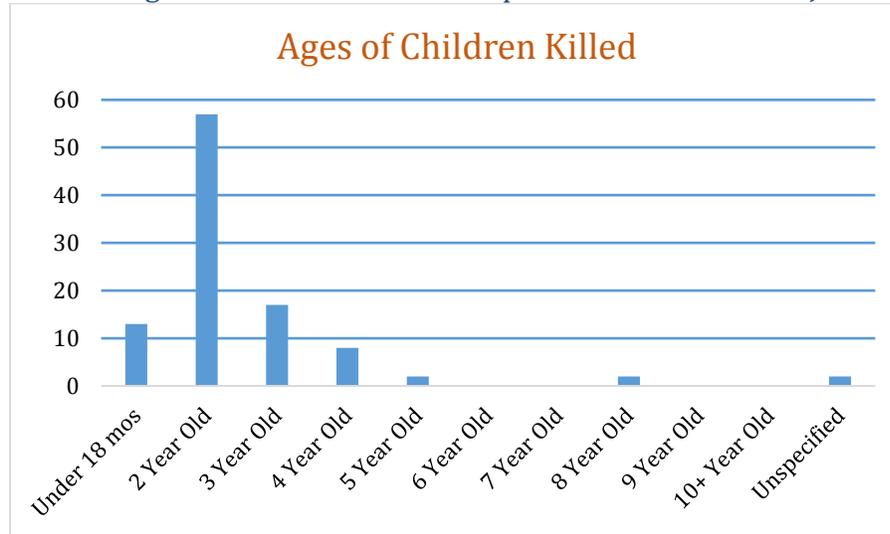
Age in Non-fatal vs. Fatal Incidents

The distribution of ages of children who were injured in tip-over incidents varied from ages of children who were killed by these incidents. Combining incidents resulting in death from both NEISS and other CPSC data, KID found that the age category that had the largest percentage by far was for children 2 years old (56%). The next two largest categories were 3 years old (17%) and under 18 months (13%). On the other hand, combined incidents causing all injuries *besides* death

⁴ <http://childdevelopmentinfo.com/ages-stages/>

from both NEISS and other CPSC data shows that although the graph was still skewed to younger ages, there was a less drastic decline. For injuries, the three largest categories were 2 years old (30%), 3 years old (21%), and 4 years old (15%).

Chart 3: Ages of Children Killed in Tip-Over Incidents from January 2010 to October 2015

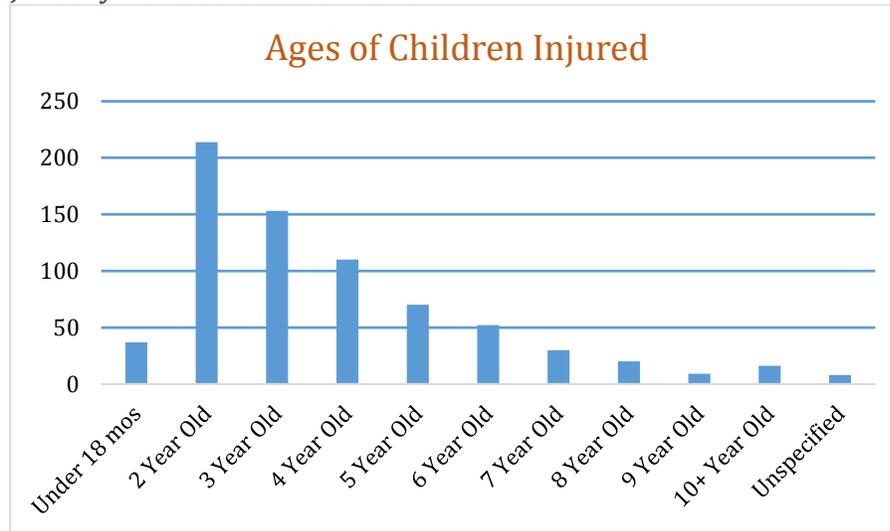


Curren's Story



[Curren Collas](#) – 2, died in 2014 after his dresser tipped over and trapped him between the dresser and the bed, suffocating him. Curren was one of three tip-over deaths caused by IKEA's MALM dresser. In 2015, IKEA, in conjunction with the CPSC, announced a recall and repair program affecting 27 million of its chests and dressers (7 million of which were MALM units). A subsequent child fatality caused by a MALM chest prompted IKEA to issue a June 2016 recall of 29 million chests and dressers (including 8 million of the popular MALM units) that had been sold in the U.S. without complying with the voluntary industry standard.

Chart 4: Ages of Children Injured in Tip-Over Incidents from January 2010 to October 2015



The overall trend in the categories for non-fatal injury and fatal injury is similar, with a sharp upward spike after 18-months, then an overall decrease after two years. However, the data show that 2-year-old children are *moderately* more vulnerable to non-fatal tip-over incidents, but are *overwhelmingly* more vulnerable to being fatally injured by a tip-over incident.

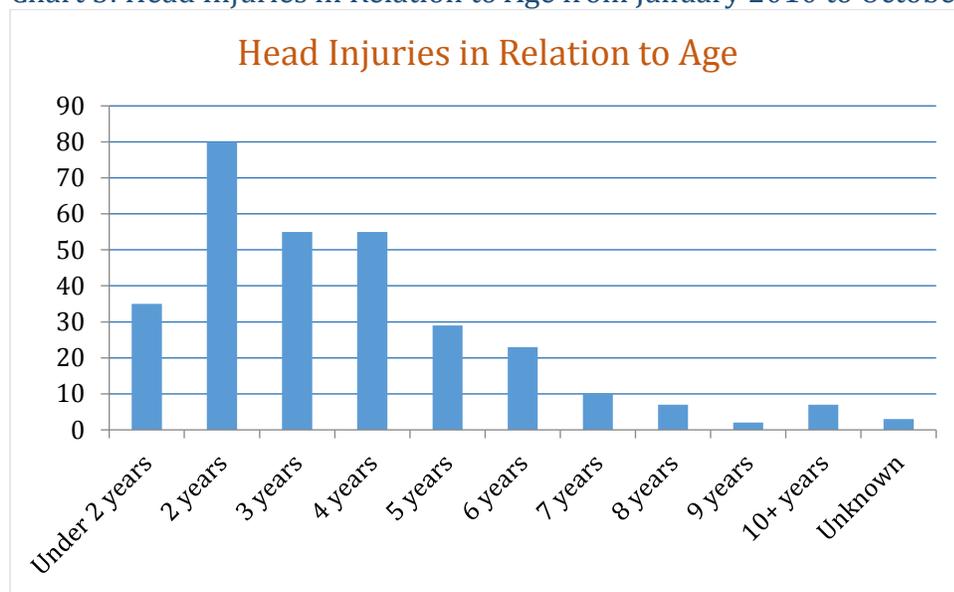
These statistics point to the necessity of targeting a wider age range of children in tip-over prevention efforts. The majority of fatal incidents affect children under five years old, but as Chart 4 illustrates, many children above that age are injured in tip-over incidents. This means that

although a standard that only tests up to, but does not include, the weight of a 5-year-old, for example, may help prevent fatalities, it would not be sufficient as a means of preventing injuries to larger or older children who are still at risk. It is also worth noting that there have been incidents reported in which an older sibling causes the tip-over, yet a younger sibling is the one injured or killed. Many injuries, such as open-head trauma, are severe and high-risk, so it is essential that safety standards encompass the differences in age distribution between fatal and non-fatal incidents.

Head Injuries vs. Age

Head injuries, which include open head injuries, closed head injuries, skull fractures, and hematomas, comprise the most severe category of nonfatal injury, as they can be life threatening. Head injuries are the most common injury type reported in NEISS incident data. This injury category has a more even distribution across ages compared to the charts for death or for total non-fatal injuries. The largest percentage is for children age two, which comprises 26% of the total number of head injury reports. Head injuries also have a higher percentage of incidents involving children under 2 years old. As with all other injuries, fatal and non-fatal, children age two are the most vulnerable to head injuries.

Chart 5: Head Injuries in Relation to Age from January 2010 to October 2015



Head Injuries vs. Presence of TV

Because televisions are such a staple of the modern American home, families often overlook the fact that they can be deadly when unstable or unsecured. Deaths involving tip-overs usually result from children climbing onto the piece of furniture or appliance, and are typically caused by the child being crushed under an item, often a TV. From 2002 to 2011, TV tip-over related injuries increased 31%, largely because of the growth in ownership of flat screen TVs. The switch to a flat screen TV can lead people to move older, heavier TVs into bedrooms and onto furniture not meant to support TVs.⁵

⁵ <https://www.safekids.org/sites/default/files/documents/ResearchReports/TV%20Tipovers%20Research%20Rpt.pdf>

Of the 306 dresser and chest incidents that resulted in head injuries, TVs were involved in 302 of them. Almost all (98.7%) of severe injuries to the head are related to a TV tipping over on a child. TVs were present in 89% of all reports.

Location of Incident

Out of the reports specifying location of incident, 91% of dresser tip-overs that caused injuries occurred in the child's home, while 7% occurred in another home such as a grandparent's or a babysitter's residence. Of all fatal incidents, 89% occurred in the child's home and 6% occurred in a hotel or motel. In addition, data show that 90% of deaths were the result of incidents in a bedroom – usually the child's own, though there are incidents in a sibling's or parent's bedroom. Other rooms that had much smaller percentages include the dining room and the garage.

Katie's Story

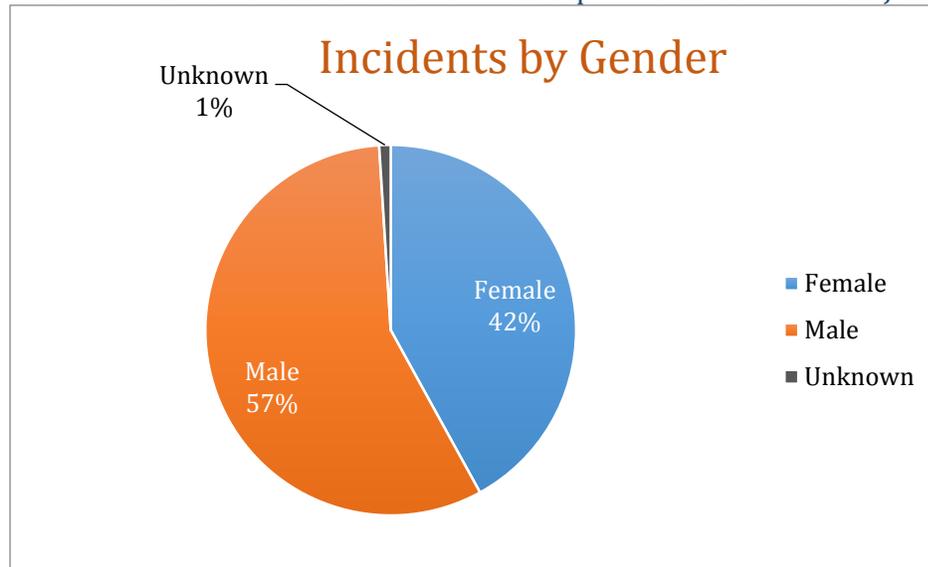
[Katie Elise Lambert](#) - 3, died in Jenkintown, Pennsylvania in 2005 when she was crushed by a wardrobe cabinet. *"Her untimely and cruel death have left us incomplete."* They launched Katie's Foundation for Child Safety to increase parents' awareness of major home hazards.



Male vs. Female

Looking at both NEISS and other CPSC incident data together, 464 (57%) involved males and 349 (42%) involved females. The percentages are almost the same in the two data sources, with differences being only in the tenths of a percent.

Chart 6: Gender of Children Involved in Tip-Over Incidents from January 2010 to October 2015



Deaths by Gender

There were 101 deaths reported in the NEISS and other CPSC data on tip-over incidents. Of these deaths, there were 43 female victims (43%), 57 male victims (56%), and one victim of unreported gender (1%). Once again, this is incredibly similar to the data above on gender of victims of all

incidents – injuries and deaths combined – and leads one to hypothesize that the distribution of male vs. female may not vary in regards to non-fatal incidents vs. deaths.

Current Standard and Its Shortcomings

Currently, there is no mandatory federal standard for furniture stability. There is a voluntary ASTM International standard. This is the result of an industry-led standard setting process, albeit with no requirements for manufacturers to comply. ASTM F2057-14 is the most recent update of the voluntary standard. It includes two performance tests. In the first one, all the drawers are opened on an empty unit and in order to pass, the unit must not tip over. In the second test, one drawer at a time is opened and weighted with a 50-pound weight – and again the unit must not tip.

The standard also includes guidelines for warnings and instructions as well as calling for inclusion of a tip restraint to affix the furniture to the wall. That restraint itself is covered by another ASTM standard, F2096-14, that tests how the restraint is affixed to the unit, but not how it is attached to the wall. The inclusion in the ASTM F2057 of a tip restraint was added in the earlier 2009 version and a change in how far the drawers are pulled out was made in the 2014 version, but the testing weight and method has remained virtually unchanged since 2000, despite the fact that the incidence of injury and death remain high.

Furniture Testing

Looking at the data is not sufficient alone to measure the effectiveness of the current standard. Given that there is no mandatory standard and that furniture makers often do not disclose whether their products meet the voluntary industry standard, independent testing of furniture on the market today can provide important additional data. Such testing could provide additional data relevant to both gauging the degree of adherence to the current voluntary industry standard, and to determining how furniture units perform when subjected to additional evaluations designed to simulate real-world conditions.

KID's testing was designed to take a snapshot of the market for children's chests and dressers and see whether red flags were raised when the units were tested based on both the current voluntary standards and according to KID's enhanced protocol designed to simulate real-world conditions and types of foreseeable use. The enhanced testing would also show the additional margin of safety some units may possess.

What KID Tested

KID's testing project evaluated one sample of each of 19 different units: 7 dressers and 12 chests. Chests are taller than they are wide, whereas dressers are shorter and some have side-by-side drawers. KID purchased the selected units on the open market from retail department and furniture stores as well as from on-line retailers.⁶ Selections were based on market research of popular brands. Prices ranged from \$88 to \$899. KID sought to have the units it tested be representative of furniture marketed for a child's room.

⁶ List of furniture and dimensions can be found in the Appendix

Assembly: Most of the furniture purchased was “Ready-to-Assemble” (RTA) requiring assembly by lab technicians. Six units came fully assembled. When assembly was required, lab technicians followed the assembly instructions provided by the manufacturer.

Date of manufacture: Most of the units tested were manufactured in either 2015 or 2016. One unit was labeled as being manufactured before 2014 when an earlier version of the ASTM F2057 standard was in effect. The date of manufacture was not indicated on four units.

Physical characteristics: All units were made of wood, typically MDF (Medium Density Fiberboard) or particleboard. The units varied widely in weight, ranging from 52 to 133 pounds. All but one unit, Unit A, were more than 30-inches high. At 28 inches high, Unit A would not be covered by the ASTM F2057 standard since the scope of that standard is expressly limited to clothing storage units over 30 inches high.

Drawer stops: All the drawers in the units tested had stops that inhibited the drawers from being unintentionally pulled out of the case. The KID testing protocol did not include a test for the effectiveness of the drawer stops.

Tip restraints: Most units came with a tip restraint; the restraint designs were varied. Some were plastic zip ties, while others were metal brackets or nylon straps. Unit J did not come with a tip restraint. The voluntary ASTM standard specifies inclusion of such tip restraints with the unit. Unit A also did not come with a tip restraint, but as noted previously, that unit would not fall under the scope of the standard due to a height of less than 30 inches.

Warning labels: All units had warning labels to alert consumers, among other things, of the risk of tip-over. Not all warning labels were compliant with all aspects of the ASTM standard in effect at the time of manufacture. In some cases, the warning labels were affixed to a place that would not be “conspicuous” during use, such as on the bottom of a drawer or on the back of a drawer or unit.

How KID Tested

Testing was conducted at the UL (Underwriters Laboratories) Furniture Center of Excellence in Holland, MI. One sample of each of the 19 models purchased was run through the various tests. UL laboratory technicians followed a testing protocol developed by KID.

The protocol first required tests based on the ASTM F2057-14 standard, with the technicians directed to use that published standard. The protocol then added more tests that KID designed to simulate additional real-world conditions. Unless otherwise noted, testing was conducted on hard, level floors on units with empty drawers.

The KID protocol included the following tests:

Stability of Unloaded Units (based on ASTM F2057-14, sec. 7.1): This test is intended to determine the stability of empty dressers and chests. Based on the procedure set forth in the ASTM standard, each unit was tested to see if it would tip if all drawers were opened fully to their stops. Failure to pass this test could indicate non-compliance with the voluntary ASTM standard.



The 50-pound weight used in the *Stability with Load Test*

Stability with Load (based on ASTM F2057-14, sec. 7.2): This test is intended to determine the stability of empty units should a child weighing 50 pounds use an open drawer of an empty chest or dresser for climbing. Based on the ASTM standard test methods, lab technicians placed a 50-pound weight across the face of each fully opened drawer, opening one at a time. Failure to pass this test could indicate non-compliance with the voluntary ASTM standard.

Tipping Point Test: For units that did not tip over when put through the *Stability with Load* test based on the ASTM standard, this additional KID-specific test was used to determine how much additional weight beyond the standard 50 pounds could be applied to each drawer before the unit tipped. This test is intended to simulate a foreseeable use, in which a child weighing more than 50 pounds climbs an empty unit. After applying the 50-pound weight placed over the face of the opened bottom drawer, a technician applied additional load on the drawer using a force gauge to press down and measure the maximum force before the unit tipped. The maximum combined force applied was 70 pounds.

This test was then repeated with the 50-pound weight and up to an additional 20 pounds of force applied on the opened top drawer of each unit.

For units that failed the *Stability with Load* test based on the ASTM standard, the technician removed the 50-pound weight and used the force gauge to push down on an opened drawer. The minimum force required to cause the unit to tip was recorded.

Progressive Drawer Opening Test: This KID-designed test simulated a climbing 50-pound child when more than one drawer is opened to assist climbing. With the 50-pound weight placed over the face of the opened bottom drawer, all other drawers were slowly opened one-by-one to determine if the unit would tip. This test was repeated with the weight placed on the opened top drawer of each unit.

TV Test: This test was designed to determine how various types and sizes of televisions placed on top of each unit would affect their stability. Four televisions were selected representing old and new technologies to place on top of each unit – a 19-inch CRT, a 27-inch CRT, a 32-inch flat panel, and a 42-inch flat panel. KID repeated the *Stability of Unloaded Units* and the *Stability with Load* tests as noted above.

Carpet Test: Each unit was tested for tip-over propensity when placed on a carpeted floor. The carpet used for testing was a cushioned, nylon cut pile carpet – the same carpeting specified in the ANSI/SOHO S6.5-2008 (R2013) Small Office / Home Office Furniture Test standard. Before testing, each carpet was allowed to compress for 15 minutes with 200 pounds of weight placed on top of each unit. KID removed the 200 pounds of weight and repeated the *Stability of Unloaded Units* and the *stability with load* tests as noted above.

Clothing Load Test: Since the ASTM standard is limited to testing on chests and dressers that are empty, the enhanced KID testing was designed to determine the stability of each unit if all drawers were filled with clothing. KID used 100% cotton children's T-shirts (boy's size medium) to fill all the drawers of each unit to capacity. Once the T-shirts were placed in the drawers, the *Stability of Unloaded Units* and the *Stability with Load* tests were repeated as noted above.

Test Results

When all the empty drawers were opened on each unit, all the models passed the *Stability of Unloaded Units Test* (based on the current voluntary ASTM F2057-14 standard). However, when a

50-pound weight was used to place load on one opened drawer in accordance with the *Stability with Load Test* (also based on the current voluntary standard), nine of the units tipped. Unit K passed when the weight was placed on the drawers, but failed when weight was placed on its opened cabinet door. The current ASTM voluntary standard is applicable to nine of the ten failing units based on the units' height. The tip-overs that were observed during the *Stability with Load Test* raise serious concerns that these units are non-compliant with the current standard. Unit A, not covered by the standard due to its height, tipped when weight was placed on its drawers.

For all units, KID determined how much load could be placed on an open drawer before the units began to tip – the *Tipping Point Test*. Some units required surprisingly little force to make them tip – in one case (Unit D) just 17 pounds. The more stable units required more than 70 pounds to make them tip (70 pounds was the maximum amount of weight applied).

When we conducted the enhanced KID *Progressive Drawer Opening Test* on units that had passed both ASTM-based stability tests, only two units passed that test – Unit P and Unit J. Unit J had drawer interlocks that prevent more than one drawer from opening at time.

The *TV Test* produced interesting results. In virtually all cases, placing a TV on top of the units increased the stability of the unit, regardless of the size or type of TV. In some cases, the stability test could not be completed with a TV on top because the drawer guides either broke or bent when heavy load was placed on the drawers.

Placing the units on carpeting, which is often found in children's bedroom, made the furniture more unstable. Only seven units passed the *Carpet Test*.

Loading the units with cotton T-shirts changed their stability characteristics due to changes in their center of gravity. When placed on carpet, all but six units tipped over when all of the T-shirt-filled drawers were opened.

Testing Conclusions

It is KID's strong belief that a failure -- that is, a tip-over -- in any of these tests raises heightened concerns about risk to children's safety and, at a minimum, warrants additional testing and awareness campaigns. The tip-overs in KID's testing are also strong arguments for improving design, and strengthening safety standards.

KID's test results, while preliminary, should be viewed in conjunction with the unacceptable number of children who continue to be injured or killed in furniture tip-over incidents every year, as well as the enormous number of chests and drawers that do not comply even with the current inadequate voluntary standards. The large number of such non-compliant furniture evidenced by recent furniture recalls affecting millions of pieces of furniture.

- Only two units, Unit J and Unit P, of the 19 selected passed all tests – passing both those tests based on the current ASTM voluntary standard and the additional KID-designed tests. Unit J did not come with a tip restraint, a component that must be included if a unit complies with ASTM F2057-14.

- KID's test sample, in which nine separate units of the type of furniture to which the ASTM voluntary standard applies failed tests based on that standard, raises the specter of widespread non-compliance among furniture offered for sale for children's rooms. Other units did not apply the warning labels specified in the ASTM standard, or affix them to "a conspicuous location when [the unit is] in use."
- The ASTM F2057-14 standard is too lenient and does not adequately test for real-world conditions, including foreseeable use. Strengthening the standard and making it mandatory is necessary to protect children from tip-over hazards.
- The scope of the ASTM standard should be amended to include all clothing storage units regardless of height. Although the height of Unit A would exempt it from the scope of the current voluntary standard, these test results indicate that it can pose a tip-over hazard. This unit was marketed as a dresser. In addition, one fatal tip-over incident involved a 30" dresser which if not slightly over 30" would be outside the scope of the standard. The standard only covers dressers over 30 inches.
- The KID *Progressive Drawer Opening Test* illustrated significant limitations in the existing standard. In most cases, opening more than one additional drawer while load was placed on another opened drawer adversely affected the unit's stability. It is foreseeable that a child will open more than one drawer at a time to facilitate climbing. The use of drawer interlocks can help prevent this problem.
- Televisions falling off the top of a tipping dresser or chest cause severe injuries and fatalities. Nevertheless, the *TV Test* appears to indicate that the TV on top may not negatively affect stability, but act to increase the likelihood of serious injury or death when it does fall.
- The ASTM standard should be amended to include testing on carpeting. Use of carpeting in children's bedrooms is common and the results from KID's testing indicate that carpeting is associated with reduced stability.
- The drawer glides on many units were particularly weak. Many broke or bent during testing, which would allow an open drawer to fall out of the case. Falling drawers may also cause injuries. Weak drawer glides will prevent completion of testing for compliance to the ASTM standard.
- There was no strong correlation between price and stability. Even some inexpensive units performed well due to their design. There was a weak correlation between weight and stability.

Market Snapshot: Full Test Results

Unit Code	AST M 7.1	ASTM 7.2	Tipping Point	Progressive Drawer	TV Test	Carpet 7.1	Carpet 7.2	Loaded ASTM 7.1	Loaded ASTM 7.1 Carpet	Restraint Included	Conspicuous Location	Compliant Text
A*	Pass	Fail	23	N/A	Fail	Pass	Fail	Pass	Fail	No	No	**
B*	Pass	Pass	62	Fail	Pass	Pass	Fail	Pass	Fail	Yes	No	Yes
C*	Pass	Pass	70+	Fail	Pass	Pass	Pass	Pass	Fail	Yes	Yes	Yes
D*	Pass	Fail	17	N/A	Fail	Pass	Fail	Pass	Fail	Yes	Yes	No***
E*	Pass	Pass	70+	Fail	Pass	Pass	Pass	Pass	Pass	Yes	Yes	Yes
F*	Pass	Pass	70+	Fail	Pass	Pass	Pass	Fail	Fail	Yes	Yes	Yes
G*	Pass	Fail	33	N/A	Fail	Pass	Fail	Pass	Fail	Yes	No	No
H	Pass	Fail	21	N/A	Fail	Fail	Fail	Fail	Fail	Yes	No	No
I	Pass	Fail	38	N/A	Pass	Fail	Fail	Fail	Fail	Yes	No	**
J*	Pass	Pass	70+	Pass	Pass	Pass	Pass	Pass	Pass	No	Yes	No***
K*	Pass	Fail	67Drw 42door	Fail	Pass	Pass	Fail	Pass	Fail	Yes	Yes	Yes
L*	Pass	Fail	30	N/A	Fail	Pass	Fail	Pass	Fail	Yes	Yes	No***
M*	Pass	Fail	29	N/A	Pass	Pass	Fail	Fail	Fail	Yes	Yes	Yes
N*	Pass	Pass	70+	Fail	Pass	Pass	Pass	Pass	Pass	Yes	Yes	No***
O*	Pass	Pass	70+	Fail	Pass	Pass	Fail	Pass	Pass	Yes	No	Yes
P*	Pass	Pass	70+	Pass	Pass	Pass	Pass	Pass	Pass	Yes	Yes	Yes
Q*	Pass	Pass	70+	Fail	Pass	Pass	Pass	Pass	Pass	Yes	Yes	Yes
R*	Pass	Fail	36	N/A	****	Pass	Fail	Fail	Fail	Yes	No	Yes
S*	Pass	Fail	22	N/A	Fail	Pass	Fail	Fail	Fail	Yes	No	Yes

* KID is not aware of any reports of injuries or fatalities associated with this model.

**Indicates units that had labels consistent with the 2009 ASTM standard but not the 2014 standard and do not provide manufacture date.

*** Indicates units that had labels consistent with the 2009 ASTM standard, but not 2014 standard and were manufactured after 2014.

**** Indicates units that passed with 50 pounds, but were not tested further as drawer glides bent or broke.

Units that failed tests based on ASTM F2057, sec. 7.2 were not tested in the *Progressive Drawer Opening Test*.

Recommendations for Safety

KID and Shane's Foundation have the following recommendations for action based on this testing and research:

#AnchorIt, a safety campaign launched by the U.S. Consumer Product Safety Commission (CPSC), and other educational efforts should be expanded to reach more families today with the need to anchor furniture with a tip restraint. In addition, further research into restraints that are easier to attach, and do not require tools, should be encouraged to increase the likelihood that consumers will use them.

Furniture manufacturers should look to design solutions for furniture that could be prone to tipping over. Three units that performed well in the testing -- Units J and P passed all testing while Unit E only failed the progressive drawer opening test when all drawers were opened. Each of these models used a design that helped stabilize the units. For example, Unit J had interlocking drawers to prevent more than one drawer open at a time. Unit P used a creative design with a wider storage bin at the bottom of the unit, greatly reducing the likelihood it would tip. Unit E added a heavier panel across the bottom half of the back to add a counterbalance weight. We believe that many other design solutions could decrease the likelihood of tipping.

A strong standard to prevent furniture tip-over should include the following:

- All tests should be conducted on a carpet sample to more closely correlate to real world use. The tests on carpet could replace the current testing on a bare floor.
- The test should require use of weight to simulate children up to and including age 5 using the most recent anthropometric data. This still leaves children over five and their siblings who might be nearby unprotected, but is a necessary step to protect the majority of children who were victims of furniture tip-over incidents.
- Since most dressers and chests in homes will be in use and not empty, add a requirement that furniture would remain stable when all drawers are filled to capacity with clothing, as KID did in its tests.
- The progressive drawer-opening test should be added and units that cannot pass must include drawer interlock systems.
- The height restriction on units should be removed so the standard will cover all clothing storage units.

The ASTM subcommittee on furniture safety should carefully review these data and seriously consider adding the tests used in this report to develop a more robust standard.

At the same time, given the continued rates of injury, existing noncompliance with the voluntary standard of manufacturers, and the resistance to making substantive changes to the standard, the CPSC should initiate a rulemaking process to promulgate mandatory tip-over safety regulations incorporating a more robust safety standard.

What Parents Can Do

When buying furniture:

- The report found that price and weight are not necessarily correlated to stability. However, consumers can look for design features that increase stability – a wider base, heavier back panel (especially towards the bottom), or interlocking drawers.
- If the furniture feels unstable in the store, it will be unstable.
- Look for proof that the furniture at least meets the current ASTM F2057-14 standard. Call the company if necessary.

Once furniture is in your home, take these additional steps:

- Anchor your furniture. None of the furniture causing injury or death in the reports had been anchored. So just do it! If your furniture did not come with a restraint, report it at www.saferproducts.gov.
- Do not put a TV on furniture not intended for that use. When you place a TV on the furniture, push it as far back as possible and anchor that to the wall as well.
- Keep TV and cables and cords out of reach of children.
- Keep remote controls and other attractive items off the furniture so children will not be tempted to climb or grab for them and risk knocking over a TV or tipping the furniture.

Additional Information and Acknowledgments

[Kids In Danger](#)

KID is a nonprofit organization dedicated to protecting children by improving children's product safety. Linda Ginzler and Boaz Keysar founded KID in 1998 after their 16-month-old son, Danny, died in a dangerous portable crib. For more information, call 312.595.0649 or visit www.KidsInDanger.org.

[Shane's Foundation](#)

Founded in February 2012, Shane's Foundation is a registered 501(c)(3) organization dedicated to child safety with an emphasis on furniture tip-over prevention. The Foundation is a leader in providing tip-over education and has raised awareness about this risk at various children's safety organizations including Lisa Madigan's Safe Home Coalition, Safe Kids Worldwide, the U.S. Consumer Product Safety Commission and ICPHSO. www.ShanesFoundation.org

[UL](#)

UL's mission is to enable safer working and living environments for all people. It does this through the facilitation of standards development, conducting research and testing, and engaging in public education. As an independent safety science organization, UL conducted the furniture tests at its Holland, Michigan location per the criteria provided by Kids In Danger.

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Appendix

Unit Code	Brand/Manu	Model #	Model Name	Style	Picture	Date of Manufacture	Price (\$)	Weight (lbs.)	H"	W"	D"
A*	Ameriwood Industries	5597026PCOM	Altra Rockbridge Ebony Ash Dresser	3-drawer dresser		N/A	106.99	52	28	27-11/16	15-11/16
B*	Ashley (Signature Design)	103-21	Leo Dresser	6-drawer dresser		2016	212.49	104	30-3/4	56-7/8	15-3/4
C*	Bassett Furniture	643983	Wakefield Chest	5-drawer chest		06/2015	899.00	133	51-1/2	38-1/2	18
D*	Coaster	400775	Ashton Chest	4-drawer chest		07/2015	368.99	67	42-1/4	30	15-3/4
E*	Delta Children's Products	76303-026	Delta Children Epic 3-Drawer Dresser	3-drawer dresser		12/2015	199.98	69	35	36-1/2	18-7/8
F*	Delta Children's Products	3200030-907	Simmons Kids Rowen Double Dresser	6-drawer dresser		09/2015	299.00	126	34-1/4	47-1/2	19-1/4
G* **	Ikea	401.598.37	KOPPANG 3-Drawer Chest	3-drawer dresser		N/A	99.00	72	32-1/4	35-1/2	17

H**	Ikea	802.145.54	MALM 4-Drawer Dresser	4-drawer chest		N/A	99.00	92	39-1/2	31-5/8	19
I**	Ikea	003.187.58	MALM 6-Drawer Dresser	6-drawer chest		N/A	179.00	123	48-3/8	31-3/8	19
J*	The Land of Nod	108874	Blake 2-Over-3 Changing Table	5-drawer chest		08/2015	699.00	120	40-3/4	36-1/2	18
K*	Magnussen	B237/10	Magnussen Home Bedroom Drawer Chest	5-drawer chest with cabinet		08/2015	899.00	127	54	40	18
L* ***	MDB Family Product	4355	DaVinci Autumn 4-Drawer Changer Dresser with Changing Tray	4-drawer dresser		11/2015	269.00	73	34-1/4	35	19
M*	MDB Family Products	555928	DaVinci Jayden 6-Drawer Tall Dresser	6-drawer chest		12/2015	299.00	89	53	28-1/4	18-3/4
N*	Pottery Barn Kids	9636234	Madeline Dresser	5-drawer dresser		01/2016	899.00	124	42-3/4	44-1/2	20
O*	Rockland	798-4411	Rockland Hartford 4-Drawer Chest	4-drawer chest		08/2013	240.00	80	41-3/4	36-1/4	17-5/8

P*	Sauder	414434	Pogo 3-Drawer White Dresser	3-drawer chest plus bottom bin		04/2015	271.99	108	47-1/4	30	16-3/4
Q*	Sauder	411197	Shoal Creek 4-Drawer Chest	4-drawer chest		06/2015	237.99	111	43	34-3/4	18-5/8
R*	South Shore	300170884	Provincetown 5-Drawer Chest	5-drawer chest		02/2016	143.99	90	44-3/8	31	16
S*	South Shore	500156180	South Shore Smart Basics 4-Drawer Chest	4-drawer chest		02/2016	88.40	78	35-1/2	31-7/16	15-5/8

* KID is not aware of any reports of injuries or fatalities associated with this model.

** These models have been recalled by the CPSC after KID purchased for the report