



November 6, 2023

National Highway Traffic Safety Administration

Docket No. NHTSA-2023-0031

NPRM on THOR 50th Percentile Adult Male Test Dummy; Incorporation by Reference

Submitted via portal

To Whom It May Concern:

[VERITY Now](#), a coalition striving to achieve equality in vehicle safety, appreciates the opportunity to comment on this docket item.

I. Introduction.

Approximately 100 people die on America’s roads every day, and many more are seriously injured. Females are disproportionately impacted, as they are 73% more likely to suffer serious injuryⁱ and 9-28% more likely to die in a crash. These crashes leave broken families and economic devastation in their wake. VERITY Now’s mission is to improve crash testing standards to protect every body in a crash equally.

Advanced dummies have a role to play in erasing this crash safety gap. VERITY believes adopting advanced dummies – such as the THOR generation – can reduce injury and death on our roads. These sophisticated instruments introduce levels biofidelity into the vehicle safety evaluation process that have never before existed.

Once NHTSA adopts advanced dummies in crash test protocols, vehicle manufacturers will glean information that can be used to make those who travel in their vehicles safer. Once NHTSA requires automakers to use the same number and nature of tests for both males and females, employing the most advanced, biofidelic dummies in those tests, we will be well on our way to erasing the crash safety gender gap. In fact, VERITY estimates that over 1000 lives could be saved every year if the government mandated the use of advanced dummies and equal tests.

We are pleased that the language of NHTSA’s proposed rulemaking acknowledges the advancements represented by the THOR dummies – both the THOR 50th, meant to represent male physiology, and the THOR 5th, meant to represent female. This NPRM outlines how decades of research and testing have yielded dummies with “advanced capabilities and advantages” and “improved measurement capabilities”. The NPRM goes on to describe THOR 50’s “improved biofidelity,” “improved instrumentation,” “improved injury prediction,” and “improved evaluation of vehicle performance.”

But while NHTSA clearly praises the THOR generation of dummies themselves, NHTSA's comments on the government's process for mandating the use of these dummies in Federal Motor Vehicle Safety Standards (FMVSS) and its New Car Assessment Program (NCAP) leave us with questions. A lack of a plan to mandate the use of advanced dummies and equal tests makes us question whether the government will do all it can to put U.S. consumers' safety first. Absent a plan that holds all manufacturers equally accountable, and allows consumers to fairly compare vehicles, we question how consumers will be able to make reasonable evaluations regarding which is the safest vehicle choice for them.

II. Will Advanced Dummies Be Optional?

Regarding the advanced male dummy, this NPRM "proposes to amend NHTSA's regulations to include an advanced crash test dummy, the ... [THOR] 50th percentile adult male." The NPRM's Executive Summary also says "NHTSA plans to issue a separate NPRM to amend [FMVSS] 208 ... to specify the THOR 50M as an alternative (at the vehicle manufacturer's option) to the 50th percentile adult male dummy currently specified."

Regarding the advanced female crash test dummy, later in the Executive Summary NHTSA says it "anticipates completing the research and testing necessary to support a rulemaking for the THOR-05F in 2023. Possible test modes in which THOR-05F may be used include FMVSS 208 testing and NCAP frontal crash tests."

In practical terms, adding the THOR 50th to Part 572, as this NPRM proposes to do, describes the government's expectations for a dummy's specifications. Dummies – or Anthropomorphic Test Devices, as they are properly called – are highly sophisticated. Constructing a testing instrument that can accurately measure crash-level forces, over and over again, with biofidelic accuracy, repeatability, and durability, is an engineering accomplishment.

We applaud NHTSA for proposing to list THOR 50th in 49 CFR 572. We further applaud NHTSA's plan to link FMVSS Standard No. 208 with the THOR 50th. However, NHTSA's language states that they will pursue use of THOR 50th in Standard No. 208 as an option, not a requirement. This concerns us, both for what it means for the THOR 50th, and for what it may mean for the THOR 5th, which is women's current best hope to replace male-oriented dummies used to represent females in frontal crash testing, and to achieve equal tests.

In the NPRM, NHTSA praises the THOR 50th (male) testing instrument's lifesaving capabilities – including "improved injury prediction" – and outlines how the THOR 50th is currently used for testing and development of occupant protection countermeasures, particularly in Europe and Asia. (Indeed, as VERITY has pointed out in previous comments, THOR 50th crash test dummies have been in wide use all over the world for years now).

But NHTSA goes on to say "[W]e believe vehicle manufacturers would choose to certify new vehicles using the THOR-50M if given the option, because this would enable manufacturers to streamline testing by using the same dummy for research and development and to verify compliance with vehicle ratings." In this NPRM we see no further timeline for a plan to *mandate* the use of this more advanced dummy in FMVSS 208, or any mention to *mandate* its use in NCAP.

This leaves us with questions, such as:

- Is there a plan to mandate the use of THOR 50th?
- If the THOR 50th is such an advancement, and can lead directly to lifesaving innovations in vehicles, why wouldn't it be mandated?
- If there is a plan to mandate this testing instrument to save lives, what is the timeline?
- If the THOR 50th remains optional, and vehicle manufacturers don't opt to learn how their vehicle designs may cause injury or death, how will NHTSA hold them accountable?
- If some automakers use the more advanced safety testing equipment, how will they be fairly rewarded in context against those who do not? Is NHTSA saying there are multiple acceptable minimum standards for crash safety?
- If so, how is that possible, given that NHTSA's mission is to increase safety, and vehicles built with the advanced dummies clearly give more and better information upon which safety can be designed, as NHTSA itself confirms in this NPRM.
- If no one standard for safety is clearly outlined, how will consumers be able to compare one vehicle's safety against another's? How can vehicles be rated?

III. If NHTSA Won't Mandate the 50th's Significant Safety Advantages for Men, What Does that Mean for the Even More Significant Safety Advantages that Could be Realized for Women?

Potential answers to the questions about the THOR 50th become more troubling if we extrapolate a proposed optional NHTSA process to the THOR 5th. If the THOR 50th (male dummy) is optional, will the female (THOR 5th) be optional as well? Current dummies used to represent females are simply scaled-down versions of male dummies (Hybrid III). The Hybrid generation is not ideally biofidelic to males, but far less so to females, because Hybrid III 'female' dummies do not acknowledge baseline differences in female physiology. The female Hybrid III female dummy, as a scaled-down version of a male, doesn't even contemplate the idea of hips or breasts, let alone differences in arm and leg length or muscle strength.

Moving from the current male dummy (Hybrid III) to an advanced male dummy (THOR 50M) represents a significant advance in biofidelity, among other improvements, as NHTSA has outlined. But moving from the current 'female' dummy (Hybrid III female) to an advanced female (THOR 5F) is a far greater improvement in biofidelity and ability to predict female injury, which is far different from male injury, because the THOR dummies, unlike the Hybrid III dummies, acknowledge the existence of female physiology.

Females are not just smaller versions of men.ⁱⁱ Today's average American female is 5.4 inches shorter and 27 pounds lighter than the average male. Among other effects, this means women sit closer to the steering wheel in order to reach the pedals. With shorter legs, females reaching for pedals are also 80% more likely than men to suffer severe leg injuries. Females are more likely to be trapped in a vehicle.ⁱⁱⁱ

Male necks are more muscular and have greater spinal column strength; female necks use less muscle mass to support heads that are nearly as large and heavy. This means females are significantly more prone to whiplash in a crash. Pregnant women are also very vulnerable in a crash. Standard seatbelts do not fit more than sixty percent of third-trimester pregnant women.^{iv}

If NHTSA plans to allow the THORs to remain an option, and not a mandate, does that mean female safety is optional? In its March 2023 report titled, "DOT Should Take Additional Actions to Improve the

Information Obtained from Crash Test Dummies,”^v the General Accounting Office (GAO) said “NHTSA identified greater risks faced by females and older individuals at least two decades ago but has not completed actions to address those risks.” The report went on to state, “NHTSA does not have a comprehensive plan to address existing risks and limitations in the information dummies provide.”

After the GAO released its report, NHTSA issued a statement saying it would provide a response to GAO’s recommendations within 180 days. As of this writing those 180 days have come and gone, without comment from NHTSA regarding its plan to reduce inequities in crash outcomes among demographic groups. Clearly, mandating dummies that finally acknowledge female physiology would be a way to save lives and injury – well within NHTSA’s Congressional charge to improve road safety.

Failing to mandate THOR 50th for males probably forgoes significant advancements in safety. Failing to mandate THOR 5th technology for females foregoes even the baseline acknowledgement of differences in physiology of those assigned female at birth, and therefore greater advancements, because the baseline dummy being used to represent females now is ‘female in name only’ - and isn’t based on even the barest minimum of female physiology.

This NPRM leaves us the same questions about the THOR 5th as we have about the THOR 50th, but to an even more amplified degree:

- Is there a plan to mandate the use of THOR 5th?
- Since the THOR 5th is such an advancement, and can close the gender safety gap and lead directly to lifesaving innovations in vehicles, why wouldn’t it be mandated?
- If there is a plan to mandate this testing instrument to save lives, what is the timeline?
- If the THOR 5th remains optional, and vehicle manufacturers don’t opt to learn how their vehicle designs may cause injury or death disproportionately for females, how will NHTSA hold them accountable?
- If some automakers use the more advanced safety testing equipment, how will they be judged against those who do not?
- If one standard for safety is not clearly outlined, how will consumers be able to compare one vehicle’s safety against another’s?

IV. Will Equal Tests Be Optional?

Female biofidelic dummies are not the only missing element in federal crash testing. Tests meant to represent females are missing too. For instance, in the government’s five-star safety ratings (New Car Assessment Program, or NCAP) there is no test for women in the driver’s seat.^{vi} And in tests where ‘females’ purportedly are tested, the government allows scaled-down versions of male dummies to be used. As noted above, these ‘mini-males’ do not accurately reflect the most basic differences in physiology such as shorter legs, shorter arms, differences in relative neck muscle strength, etc.

NHTSA says it “anticipates completing the research and testing necessary to support a rulemaking for the THOR-05F in 2023. Possible test modes in which THOR-05F may be used include FMVSS 208 testing and NCAP frontal crash tests.”

Again, we applaud NHTSA for working toward federalizing the THOR 5th. Other entities such as EuroNCAP have announced their intentions to move toward equal testing. The advanced female

dummy has been demonstrated to be biofidelic, durable, and its readings reliably repeatable. The THOR 5th dummy, which is the first to acknowledge female physiology in frontal crash tests, should be the expectation for all federal tests as soon as possible – and its use should be mandated in all of the same tests where male dummies are used.

But again, there seems to be no plan for THOR 5th's use in equal tests as of this writing. Clearly, mandating equal tests in FMVSS and NCAP would save lives and injuries. Mandating equal tests would be well within NHTSA's Congressional charge to improve road safety. A comprehensive, timely executed plan would be an ideal place for the government to announce its intention to mandate biofidelic dummies, rid FMVSS and NCAP of gender bias, and commit to the same number of tests, and the same nature of tests as are now used to protect men.

In addition to saving lives, employing equal tests and equally biofidelic dummies in FMVSS and NCAP would serve transparency and accountability by giving consumers a view into how different automakers design vehicles and employ crash countermeasures, allowing consumers an equal baseline against which to compare products on safety. Without mandated tests and dummies, no consumers – including women, who represent the majority of household buyers – would be able to understand which vehicles are designed for their safety and which are not.

V. Will the Safety of U.S. Vehicle Occupants be Determined by Asia and Europe?

In its Executive Summary, NHTSA's NPRM outlines the many places where THOR 50th is already in use. Europe's NCAP and Japan are specifically noted by NHTSA, and public documents outline THOR's adoption by manufacturers in other Asian nations, including China.

Likewise, the THOR 5th has garnered leading interest in Europe and Asia, both because of manufacturers' desire to close the gender and sex safety gaps, but perhaps also because on average, the physiology of more Asian vehicle occupants may be accounted for by the THOR 5th.

Justifying its case for 'federalizing' the THOR 50th by citing adoption well under way for years in Europe and Asia is problematic. This NPRM seems to suggest that NHTSA is content to remain years behind European and Asian regulators and testing entities, and therefore allow U.S. vehicles to trail when it comes to safety standards.

This is a particular problem when it comes to catching up female crash test standards with male standards. U.S. women don't vote in the EU, Japan, Korea or China. Does the adoption of equal tests and dummies by other nation's manufacturers mean U.S. women must look to vehicles manufactured by non-U.S. sources if they want to be safer? Surely this is not what the President had in mind when he issued his Executive Orders aimed at capturing the benefits of U.S. funded innovations in the U.S. marketplace, or his order directing the government toward gender equity.

VI. Conclusion

It is unclear from this NPRM whether NHTSA plans to mandate safety. Perhaps there are more regulatory actions that will happen in the future. But as of this writing, there is no written, timely plan to address all of the questions listed in this comment. The lack of a plan leaves us unable to know whether or when the U.S. government will mandate equal safety, and how consumers will be able to fairly compare vehicle crash tests to make reasonably informed buying decisions. Absent a plan – which

includes timely deadlines and a clear path to equal tests and dummies – we are left with more questions than answers.

Sincerely,

Hon. Susan Molinari, Co-Chair, VERITY Now

Beth Brook, Co-Chair, VERITY Now

ⁱ <https://www.transportation.gov/sites/dot.gov/files/2022-02/USDOT-National-Roadway-Safety-Strategy.pdf>

ⁱⁱ Fryar, Cheryl D., Deanna Kruszon-Moran, Qiuping Gu, and Cynthia L. Ogden. (2018) *Mean body weight, height, waist circumference, and body mass index among adults: United States, 1999–2000 through 2015–2016*. National Health Statistics Reports; no 122. Hyattsville, MD: National Center for Health Statistics, 2018. <https://www.cdc.gov/nchs/data/nhsr/nhsr122-508.pdf>

ⁱⁱⁱ Geddes, L. (2022, May 17). *Women almost twice as likely to be trapped in crashed vehicle, study finds*. The Guardian. <https://www.theguardian.com/world/2022/may/17/women-almost-twice-likely-trapped-crashed-vehicle-study>

^{iv} See Criado-Perez, Caroline. (2019, February 23) *The deadly truth about a world built for men - from stab vests to car crashes*. The Guardian, Excerpted from *Invisible Women: Exposing Data Bias in a World Designed for Men*, by Caroline Criado Perez (Chatto & Windus). <https://www.theguardian.com/lifeandstyle/2019/feb/23/truth-world-built-for-men-car-crashes>. *Crash Report Sampling System (CRSS)*. National Highway Transportation Safety Administration. <https://www.nhtsa.gov/crashdata-systems/crash-report-sampling-system>. Forman, J., Poplin, G. S., Shaw, C. G., McMurry, T. L., Sunnevang, C., Ash, J., & Schmidt, K. (2019). *Automobile injury trends in the contemporary fleet: Belted occupants in frontal collisions*. Taylor & Francis Online. <https://www.tandfonline.com/doi/full/10.1080/15389588.2019.1630825>

^v <https://www.gao.gov/assets/gao-23-105595.pdf>

^{vi} https://www.nhtsa.gov/ratings?gclid=Cj0KCQjw2eilBhCCARIsAG0Pf8uFvEqiPMVZE1QaIV-ODMxAfcLMwofm03ZRwM9eoVrycOuYPf71xKUaAuRNEALw_wcB&gclsrc=aw.ds