



DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA-2024-0056]

Agency Information Collection Activities; Notice and Request for Comment; Female Occupant Anthropometry and Seating

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT).

ACTION: Notice and request for comments on a request for approval of a new information collection.

SUMMARY: NHTSA invites public comments about our intention to request approval from the Office of Management and Budget (OMB) for a new information collection. Before a Federal agency can collect certain information from the public, it must receive approval from OMB. Under procedures established by the Paperwork Reduction Act of 1995, before seeking OMB approval, Federal agencies must solicit public comment on proposed collections of information, including extensions and reinstatement of previously approved collections. This document describes a collection of information for which NHTSA intends to seek OMB approval on Occupant Anthropometry and Seating.

DATES: Comments must be submitted on or before **[INSERT DATE 60 DAYS AFTER THE DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may submit comments identified by the Docket No. NHTSA-2024-0056 through any of the following methods:

- Electronic submissions: Go to the Federal eRulemaking Portal at <http://www.regulations.gov>. Follow the online instructions for submitting comments.
- Fax: (202) 493-2251.
- Mail or Hand Delivery: Docket Management, U.S. Department of Transportation, 1200 New Jersey Avenue SE, West Building, Room W12-140, Washington, DC 20590,

between 9 a.m. and 5 p.m., Monday through Friday, except on Federal holidays. To be sure someone is there to help you, please call (202) 366-9322 before coming.

Instructions: All submissions must include the agency name and docket number for this notice. Note that all comments received will be posted without change to <http://www.regulations.gov>, including any personal information provided. Please see the Privacy Act heading below.

Privacy Act: Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the *Federal Register* published on April 11, 2000 (65 FR 19477-78) or you may visit <https://www.transportation.gov/privacy>.

Docket: For access to the docket to read background documents or comments received, go to <http://www.regulations.gov> or the street address listed above. Follow the online instructions for accessing the dockets via internet.

FOR FURTHER INFORMATION CONTACT: For additional information or access to background documents, contact Elizabeth Lafferty, Office of Vehicle Safety Research, Human Injury Research Division NSR-220, West Building, W46-311, 1200 New Jersey Ave, SE, Washington, DC 20590; Email: Elizabeth.lafferty@dot.gov; Phone: 202-366-6222.

SUPPLEMENTARY INFORMATION: Under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.), before an agency submits a proposed collection of information to OMB for approval, it must first publish a document in the Federal Register providing a 60-day comment period and otherwise consult with members of the public and affected agencies concerning each proposed collection of information. The OMB has promulgated regulations describing what must be included in such a document. Under OMB's regulation (at 5 CFR 1320.8(d)), an agency must ask for public comment on the following: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the

information will have practical utility; (b) the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; (c) how to enhance the quality, utility, and clarity of the information to be collected; and (d) how to minimize the burden of the collection of information on those who are to respond, including the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g. permitting electronic submission of responses. In compliance with these requirements, NHTSA asks for public comments on the following proposed collection of information for which the agency is seeking approval from OMB.

Title: Occupant Anthropometry and Seating

OMB Control Number: New

Form Number(s): NHTSA Form 1824, NHTSA Form 1825, NHTSA Form 1826, NHTSA Form 1827, NHTSA Form 1828, and NHTSA Form 1848

Type of Request: New information collection

Type of Review Requested: Regular

Requested Expiration Date of Approval: 3 years from date of approval

Summary of the Collection of Information:

NHTSA proposes to collect information from the public as part of a study to collect detailed information on current body size and shape, posture, and motion of vehicle occupants. This research will support NHTSA in the development of tools used for occupant protection during crashes, particularly in the context of equity in crashworthiness. This research will add to the body of knowledge and is not immediately intended to inform regulations or policy.

The designs of anthropomorphic test devices (ATDs, commonly known as crash test dummies) are based on measurements of volunteers sitting in vehicle and laboratory seats. The current generation of ATDs is based on data gathered at University of Michigan Transportation Research Institute (UMTRI) in the 1980s. Since that time, the U.S. population has change

substantially, most notably due to the large increase in body mass. Measurement technologies have also improved dramatically with the development of fast three-dimensional surface measurement systems. Seating configurations have also expanded from the traditional seat posture collected in the 1980s with increased recline angles in modern vehicles. This combination of a population size shift and more variable seat configurations presents a clear need for updated seated anthropometry to be collected with new advanced anthropometry measurement capabilities.

The data collections, approved by the Institutional Review Board at the University of Michigan, will be performed once to obtain the target number of valid test participants. Study participants will be male and female licensed adult drivers from the general public, and participation will be voluntary with monetary compensation provided. Participants are recruited using University of Michigan's Health Research portal, <https://umhealthresearch.org/>. The voluntary study would involve recruiting licensed drivers for two studies (in-lab and in-vehicle). For the in-lab study, the following information collections include: (1) an online screening questionnaire; (2) an eligibility phone call to confirm eligibility, interest, and schedule a time in the lab; (3) informed consent for the in-lab study and anthropometric measurement. A subset of the in-lab participants will be asked to participate in the in-vehicle study and the following information collections include: (1) a pre-drive questionnaire for the in-vehicle study; (5) informed consent and anthropometric measurements for the in-vehicle study; and (6) a post-drive questionnaire for the in-vehicle study.

In this study, 3D surface scan data quantifying body size and shape in a range of postures will be obtained. Posture, position, and belt fit in driver and passenger seating mockups that are adjusted to a wide range of vehicle configurations and using multiple seats will be measured. The participants will be selected to span a wide range of stature and weight, spanning the 5th percentile female to 95th percentile male values. Individuals with high body mass will be preferentially selected to address the current lack of data from that cohort. An in-vehicle study will be

conducted using participants recruited from among those participating in the laboratory study. Participants will be provided an instrumented vehicle to drive in place of their own for a 7-to-10-day period. Given unknown budget appropriations the drive time may be reduced from 7-to-10-days to two hours. Independent of budget appropriations the burden to the public is two hours. The two hours will either be spent as more detailed check in/check out time for the 7-to-10-day plus questionnaire post-drive or as a 2-hr drive starting and ending at the lab. The goal of the in-vehicle study is to validate the driver postures measured in the laboratory and to obtain high-resolution 3D data on postures and movements during driving. A particular focus is on the lower extremities, where crash injury data have indicated a large difference in risk between male and female drivers. Body scans, measurements, and any video will be de-identified prior to submission to NHTSA. Statistical models will also be developed from de-identified data and made available to the public through a software tool.

This research study will gather a new database of information on adult body size, shape, posture, and motion to support advancement in these safety applications. This study will add to the body of the knowledge on motor vehicle anthropometry and will support female crash safety and equitable occupant protection through the development of human body models (HBMs) and anthropomorphic test devices (ATDs).

Description of the Need for the Information and Proposed Use of the Information:

Early ATDs, including the Hybrid-III family that was initially designed in the 1970s, were constructed using manually gathered anthropometric data, such as segment lengths and circumferences. Minimal 3D information was available, and seated postures were approximated. In 1980, NHTSA funded a large-scale study at UMTRI to develop anthropometric specifications for a new generation of ATDs. The Anthropometry of Motor Vehicle Occupants (AMVO) study gathered data and developed detailed 3D body shapes for small female, midsize male, and large male occupants, using 5th percentile female, 50th percentile male, and 95th percentile male stature and body weight as the target reference values. Drawing packages were developed

detailing landmark and joint locations, and physical 3D surface shells were constructed using landmark data and minimal 3D contour information. These data have formed the anthropometric basis for most adult ATDs developed since that time, including the THOR family.

AMVO had some limitations, however. Due to the limits of the technology available at the time, a small number of participants were measured (25 per size bin were used to create the final specifications), and no 3D surface information was collected. Moreover, the analysis was based on simple averaging per size bins, so no information was provided for other occupant sizes. Most importantly, the midsize female was dropped for cost reasons, so the only female data were gathered from very small individuals.

Over the past 20 years, HBMs have become an important addition to the biomechanics toolkit. Using the same logic that was applied to selecting body sizes for ATDs, the HBMs have typically been targeted to the same stature and body weight reference values as were used in AMVO. However, unlike the averaging process used in AMVO, most HBMs have developed using data primarily or entirely from a single individual. A consequence of this approach is that HBM development has not provided meaningful additions to the anthropometric data available to characterize vehicle occupants.

In the decades since AMVO, UMTRI has conducted a large number of studies of occupant posture and body shape and has developed advancements in both measurement and analysis methodology. Of particular importance, rather than averaging data to create a representation of a single body size, UMTRI has developed continuous statistical models that can generate accurate specifications for a wide range of sizes and shapes (for examples, see <http://HumanShape.org>). Simultaneously analyzing both landmark locations and 3D body shapes has enabled the development of parametric human body modeling, in which HBMs are morphed to represent people with widely varying size and shape.

Concurrent with the development of parametric HBMs, crash injury data analyses have highlighted the potential benefits of these new tools. In particular, the field data indicate that

female occupants experience higher risks of some injuries in certain types of crashes. Notably, lower-extremity injury risks are markedly higher for female drivers than for male drivers in frontal impacts. Detailed anthropometric and posture data for female drivers could help to elucidate the causes of this difference. Crash injury data also show that individuals with high body mass are at higher risks of some injuries, possibly due to differences in the interaction with the restraint systems. Minimal data are available to describe the seated postures and body shapes of this cohort, which is increasingly important in the U.S.

Affected Public:

Respondents will be licensed drivers, ages 18+, in the Ann Arbor, MI region and willing to travel to UMTRI. Study participants will be male and female licensed adult drivers from the general public, and participation will be voluntary with monetary compensation provided. Participants are recruited using University of Michigan's Health Research portal, <https://umhealthresearch.org/>. Prospective participants will respond to the U-M Health Research posting by completing a screening questionnaire on a Google Form. Eligible participants are those whose answers to the Google Form questions are consistent with the inclusion and exclusion criteria.

Eligibility requirements include the ability to read and speak English, ability to drive for two hours continuously, hold a current and unrestricted U.S. driver's license, have been a licensed driver for at least one year, drive a car daily for an average of at least 15 minutes, and comfortable driving on the highway and local roads. Exclusion criteria include individuals with musculoskeletal ailments impeding the ability to walk or sit comfortably or musculoskeletal deformities such as scoliosis or amputations.

Estimated Number of Respondents: 2000

We estimate that 2000 screening questionnaires will be filled out to obtain the needed number of subjects. The form has 23 questions, including name, address, and time slots available. We estimate that up to 600 individuals will need to be contacted to obtain the needed number of

300 subjects for the lab study. This considers that some people's schedules may not match up with lab openings or they may not show up for their scheduled appointment. A subset of the in-lab study participants will be asked to participate in the in-vehicle study with the targeted 100 participants.

Frequency: Once

This is a one-time collection of information with two studies: in-lab and in-vehicle. A subset of the in-lab participants will be asked to participate in the in-vehicle study. The initial pre-screening time is roughly 5 minutes and can be done at the respondents' convenience using a device of their choosing. The only requirement is an internet connection to access the online pre-screening. Not all who begin this pre-screening will complete the form in its entirety, and not everyone will meet study criteria. Those who meet study criteria could be contacted for an eligibility phone call prior to study enrollment.

Estimated Total Annual Burden Hours:

The annual estimated time burden to complete the collection of information is 347 hours and an annual opportunity cost of \$16,373.05 over the study period. To minimize the burden of the screening questionnaire and eligibility phone call, individuals for the in-vehicle study will be selected from the in-lab study pool. An estimate of up to 2000 individuals will initiate a response to the online screening questionnaire due to the broad range of inclusion criteria. Of the screened individuals we anticipate that up to 600 will need to be contacted for an eligibility phone call to obtain the needed number of 300 participants scheduled for the in-lab study. Scheduled participants that do not show up will be replaced from the remaining pool of screened participants and eligibility phone call to ensure 300 individuals arrive for in-lab measurements. After completion of the 2-hour process for informed consent and in-lab data collection, some participants will be asked if they are interested in the in-vehicle study. From the 300 in-lab participants, 100 will be scheduled to return to the lab for the in-vehicle study. The in-vehicle pre-drive and post-drive questionnaires will each take 5 mins, the informed consent, vehicle

check-out, and vehicle check-in processes will take 110 min. totaling 2 hrs. for all of the in-vehicle study.

To calculate the opportunity cost associated with the forms and other relevant activities necessary for this collection of new information, NHTSA looked at average hourly earnings for employees across all occupations in the Ann Arbor, MI area. The Bureau of Labor Statistics (BLS) estimates that the average hourly wage for this group is \$33.43, thus serving as the opportunity cost per hour. The Bureau of Labor Statistics estimates that private industry workers' wages represent 70.3% of total labor compensation costs. Therefore, NHTSA estimates the hourly labor costs to be \$47.55. NHTSA estimates the total opportunity cost associated with the 1033 burden hours to be \$49,119.15. Annual burden cost is estimated to be \$16,373.05, and annual burden hours is estimated to be 347. There may be a slight variation in the comparison of total to annual burden over the three years due to rounding. The annual burden figures will be those represented in ROCIS.

Table 1. Burden Estimates

NHSTA Form No.	Information Collection	Number of Respondents	Time per response (min)	Cost per Response	Frequency of Response	Burden Hours	Burden Cost (dollars)
		Total/ Annual				Total/ Annual	Total/ Annual
1824	Online Screening questionnaire	2000/	5	\$3.96	1	167/	\$7,940.85/
		667				56	\$2,646.95
1825	Eligibility Phone Call	600/	5	\$3.96	1	50/	\$2,377.50/
		200				17	\$792.50
1826	Informed Consent, In-Lab	300/	120	\$95.10	1	600/	\$28,530.00/
		100				200	\$9,510.00
1827	In-Vehicle Pre-Drive Questionnaire	100/	5	\$3.96	1	8/	\$380.40/
		34				3	\$126.80
1828	Informed Consent, In-Vehicle	100/	120	\$95.10	1	200/	\$9,510.00/
		34				68	\$3,170.00

1848	In-Vehicle Post-Drive Questionnaire	100/ 34	5	\$3.96	1	8/ 3	\$380.40/ \$126.80
	Total Burden/ Annual Burden					1033/ 347	\$49,119.15/ \$16,373.05

Estimated Total Annual Burden Cost:

NHTSA estimates that the total travel costs to all respondents will be no more than \$10,720. The total estimated cost to the Government for this one-time information collection is \$49,119.15 plus \$10,720 totaling \$59,839.15 where the annual estimated cost is \$19,946.38.

PUBLIC COMMENTS INVITED: You are asked to comment on any aspects of this information collection, including (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Department, including whether the information will have practical utility; (b) the accuracy of the Department's estimate of the burden of the proposed information collection; (c) ways to enhance the quality, utility and clarity of the information to be collected; and (d) ways to minimize the burden of the collection of information on respondents, including the use of automated collection techniques or other forms of information technology.

AUTHORITY: The Paperwork Reduction Act of 1995; 44 U.S.C. Chapter 35, as amended; 49 CFR 1.49; and DOT Order 1351.29A.

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