

BODY ARMOR: PROTECTING OUR NATION'S OFFICERS FROM BALLISTIC THREATS

BY **MARK GREENE**

NIJ creates standards for body armor, oversees compliance testing to performance standards, and funds innovative research to help safeguard law enforcement officers.



Law enforcement is a dangerous profession. The Bureau of Labor Statistics reports that in 2007, police officers and sheriffs' patrol officers in the United States experienced an on-the-job fatality rate of approximately 20 in 100,000 officers — five times higher than the overall on-the-job fatality rate of four in 100,000 workers across all U.S. industries that year.¹

Firearms continue to be one of the most dangerous threats faced by U.S. law enforcement officers. Although a majority of accidental fatalities each year are traffic related, a majority of felonious fatalities are due to assaults with firearms. The FBI's Law Enforcement Officers Killed and Assaulted (LEOKA) statistics show that from 1987 through 2015, more than 70,000 officers were assaulted with firearms. Of the 1,708 officers feloniously killed in the line of duty during that period, 1,574 were killed by firearms. This means that 92 percent of all felonious deaths of officers in the line of duty were due to firearms.²

Body armor is critical safety equipment for officers' personal protection. Although there is no such thing as *bulletproof* armor, ballistic-resistant body armor can protect against many types of handgun and rifle ammunition (see sidebar, "Different Types of Body Armor"). Since it was founded in 1987, the International Association of Chiefs of Police/DuPont Kevlar Survivors' Club has recognized more than 3,100 officers who have been saved from death or serious injury by wearing body armor.³

NIJ has been pivotal in the development of modern police body armor.⁴ NIJ establishes and updates voluntary minimum performance standards for body armor and operates a body armor certification program based on testing by accredited third-party ballistics laboratories. NIJ also sponsors research to better understand the impact of body armor and agency policies on our nation's public safety officers.

Different Types of Body Armor

Protective vests for law enforcement officers include ballistic- and stab-resistant body armor that provides coverage and protection primarily for the torso. Different kinds of armor protect officers against different kinds of threats. Ballistic-resistant body armor protects against bullet penetrations and the blunt trauma associated with bullet impacts. These vests include soft body armor that protects against handgun bullets, and less flexible tactical armor composed of soft and hard components that protect against rifle bullets. Stab-resistant body armor protects against knives and spikes. Manufacturers also make combination armor that protects against both types of threats. When purchasing body armor, law enforcement agencies must consider the kinds of threats their officers will likely face and choose body armor with suitable properties to protect officers against those threats.

Quality Assurance

NIJ's predecessor, the National Institute of Law Enforcement and Criminal Justice (NILECJ), published the first performance standard for ballistic-resistant police body armor in 1972.⁵ NIJ then funded the development of body armor to meet that standard, followed by a field test and evaluation of approximately 5,000 sets of that armor, involving 15 law enforcement agencies in geographically diverse cities in 1975 and 1976.⁶ This field test had its first recorded body armor "save" on December 23, 1975, when an assailant shot a Seattle Police Department officer during an armed robbery at a local business. Several other officers in different participating cities were also saved during the field evaluation period.

Building on that success, NIJ established body armor compliance testing in 1978.⁷ Today, the NIJ Compliance Testing Program (CTP) provides confidence that body armor for use by U.S. law enforcement officers meets minimum performance requirements through standardized ballistic testing to current NIJ Standard 0101.06, *Ballistic Resistance of Body Armor*, published in 2008.⁸ Body armor manufacturers provide samples to an NIJ-approved laboratory in the United States that is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and pay the laboratory to conduct ballistic testing. When NIJ determines that the body armor is compliant, the model is added to a publicly

available list of armor models for law enforcement use.⁹

NIJ's CTP is the recognized authority on body armor for law enforcement use — not only in the United States but across the world. Since testing body armor to the current standard began in 2009, a total of 1,194 unique armor models have been submitted for compliance testing (as of June 2018). Of these, 582 unique armor models have been found to be compliant; 114 of them are designed specifically for female officers. However, 315 unique armor models have failed compliance testing due to ballistic test failures, and more than 50 additional models have failed because of inconsistent construction, underscoring the importance of independent testing and certification.

The CTP also includes a form of market surveillance — called Follow-up Inspection Testing (FIT) — to provide confidence that NIJ-certified armor models continue to be manufactured in compliance with the current NIJ standard. Manufacturers participating in the CTP currently manufacture body armor at 87 locations in 19 countries. Independent inspectors periodically visit manufacturing facilities and select body armor units from the production line. They send the units to NIJ-approved laboratories for ballistic testing, which sometimes uncovers issues with the body armor. For example, a manufacturer recalled more than 12,000 units from the field in

2016 because of issues uncovered by follow-up testing. NIJ removed the model from its compliant list.

Researching the Impact of Body Armor

In 2012, NIJ funded the National Opinion Research Center (NORC) to provide independent, evidence-based knowledge on the impact of body armor on officer safety.¹⁰ NORC analyzed detailed information from the FBI's LEOKA data set on 1,789 officers who were assaulted with firearms or knives/other cutting instruments and consequently killed or severely injured between 2002 and 2011. The researchers looked specifically for cases in which officers were shot in the torso. They found that among the 637 officers who were shot in the torso, those who wore body armor were 76 percent less likely to be killed than those who did not wear armor (controlling for an array of individual and incident characteristics).¹¹

NORC also examined how the variation among law enforcement agencies' body armor policies may help explain the variation in officers' deaths and injuries across agencies.¹² The researchers looked at the state of body armor use policies — whether different agency profiles correlate with more or less rigorous policies, and whether these profiles can be predicted by agency characteristics and other factors. The researchers analyzed data provided by 2,719 U.S. law enforcement agencies in response to the 2013 Law Enforcement Management and Administrative Statistics (LEMAS) survey¹³ and found that agencies fall into four distinct profiles based on their body armor policies. Close to half of the agencies had comprehensive coverage of body armor policies in all aspects. Nearly one in five agencies had very weak body armor policies in all aspects. The rest of the agencies split into two groups: Half had strong body armor selection and fitting policies but relatively weak wearing, training, and inspection policies; the other half had strong wearing policies but weaker selection policies.

Finally, NORC examined trends over time in body armor wear policies and factors that predict change over time in these policies.¹⁴ Researchers analyzed

data from responses to both the 2007 and 2013 LEMAS surveys from 724 law enforcement agencies with 100 or more officers. They found that agencies have increased their use of mandatory body armor wear policies, from 57.7 percent of agencies in 2007 to 78.4 percent in 2013. It should also be noted that since 2011, the Bureau of Justice Assistance has required that all agencies applying for Bulletproof Vest Partnership (BVP) program funds must have a written mandatory-wear policy for uniformed patrol officers, a factor that likely contributed to the observed increase in the wearing of body armor over time.¹⁵

These analyses demonstrate quantitatively that body armor is an effective tool for reducing harm from ballistic threats; the observed increase in body armor wear by the law enforcement community shows continued emphasis on officer safety. Agencies should continue to require that all purchased body armor — regardless of whether it is purchased with grant funds — be in compliance with NIJ standards and should continue to have strong written policies in place that make the wearing of body armor mandatory.

Revising the NIJ Standard

NIJ is currently working with state and local practitioners and ballistic testing laboratories to revise the standard for the ballistic resistance of body armor. The revised standard — anticipated to be published in 2019 as NIJ Standard 0101.07 — will include improved test methods for female body armor and updated body armor protection levels that incorporate additional rifle threats faced by U.S. law enforcement. NIJ Standard 0101.07 for body armor will also incorporate a stand-alone specification of ballistic threats for testing ballistic-resistant equipment for U.S. law enforcement applications.

NIJ, the National Institute of Standards and Technology, and the U.S. Army have been cooperating to harmonize laboratory test procedures and practices with ASTM,¹⁶ an accredited standards development organization that has published thousands of standards across numerous industries. Unlike the

current and previous versions of the NIJ body armor standard, which have been stand-alone documents, NIJ Standard 0101.07 will incorporate, by reference, a suite of standardized test methods and practices developed through ASTM. This will harmonize laboratory test procedures and practices in the use of ballistic-resistant armor and other ballistic-resistant equipment across both law enforcement and military applications and allow these communities to have ultimate control over product specifications.

About the Author

Mark Greene, Ph.D., is the director of the Policy and Standards Division in NIJ's Office of Science and Technology.

For More Information

Read more about NIJ's body armor work at NIJ.ojp.gov, keyword: body armor.

Visit PoliceArmor.org for the latest information on how to select, wear, and care for body armor that meets the NIJ standard.

This article discusses the following grant:

- "Evaluating the Impact of the NIJ Body Armor Program," grant number 2012-R2-CX-K008

Notes

1. Bureau of Labor Statistics, "Census of Fatal Occupational Injuries, 2007," U.S. Department of Labor, www.bls.gov/iif/oshwc/cfoi/cfoi_rates_2007h.pdf.
2. Federal Bureau of Investigation, *Law Enforcement Officers Killed and Assaulted*, Uniform Crime Reports, <https://ucr.fbi.gov/leoka>.
3. "IACP/DuPont™ Kevlar® Survivors' Club®," DuPont.

4. M.E. Greene, "Current and Future Directions in Research, Development, and Evaluation in Body Armor and Body Armor-Related Topics at the National Institute of Justice," proceedings of the Personal Armour Systems Symposium, Cambridge, England, September 8-12, 2014.
5. National Institute of Law Enforcement and Criminal Justice, *NILECJ Standard on the Ballistic Resistance of Police Body Armor*, U.S. Department of Justice, March 1972, <https://www.ncjrs.gov/pdffiles1/Digitization/7037NCJRS.pdf>.
6. The Aerospace Corporation, *Body Armor Field Test and Evaluation Final Report, Volume I – Executive Summary*, report submitted to NILECJ, September 1977, <https://www.ncjrs.gov/pdffiles1/Digitization/46836NCJRS.pdf>; and Dan Tompkins, "Body Armor Safety Initiative," *NIJ Journal* 254, July 2006, https://www.nij.gov/journals/254/pages/body_armor.aspx.
7. International Association of Chiefs of Police, *Police Body Armor Testing and Summary of Performance Testing Data*, Gaithersburg, MD, December 1978, funded by NIJ grant 77NI-99-0017 from NILECJ, <https://www.ncjrs.gov/pdffiles1/Digitization/53987NCJRS.pdf>.
8. National Institute of Justice, *Ballistic Resistance of Body Armor NIJ Standard-0101.06*, U.S. Department of Justice, July 2008, <http://www.ncjrs.gov/pdffiles1/nij/223054.pdf>.
9. Justice Technology Information Center, "PoliceArmor.org," <https://www.policearmor.org>.
10. Bruce Taylor and Weiwei Liu, "Final Summary Overview Report: Evaluating the Impact of Body Armor," final report to NIJ, grant number 2012-R2-CX-K008, National Opinion Research Center, May 2017. This project builds on previous research. See Bruce Taylor, Bruce Kubu, Kristin Kappleman, Hemali Gunaratne, Nathan Ballard, and Mary Martinez, *The BJA/PERF Body Armor National Survey: Protecting the Nation's Law Enforcement Officers*, Phase II, final report to the Bureau of Justice Assistance, August 9, 2009, https://www.bja.gov/Publications/PERF_BodyArmor.pdf; Heath Grant, Bruce Kubu, Bruce Taylor, Jack Roberts, Megan Collins, and Daniel J. Woods, *Body Armor Use, Care, and Performance in Real World Conditions: Findings from a National Survey*, report submitted by the Police Executive Research Forum to NIJ, grant number 2009-SQ-B9-K112, November 2012, <https://www.ncjrs.gov/pdffiles1/nij/grants/240222.pdf>; and Bruce Taylor, Heath Grant, Bruce Kubu, Jack Roberts, Megan Collins, and Daniel J. Woods, *A Practitioner's Guide to the 2011 National Body Armor Survey of Law Enforcement Officers*, report submitted by the Police Executive Research Forum to NIJ, grant number 2009-SQ-B9-K112, November 2012, <https://www.ncjrs.gov/pdffiles1/nij/grants/240225.pdf>.

11. Weiwei Liu and Bruce Taylor, "The Effect of Body Armor on Saving Officers' Lives: An Analysis Using LEOKA Data," *Journal of Occupational and Environmental Hygiene* 14, no. 2 (2017): 73-80, doi:10.1080/15459624.2016.1214272.
 12. Weiwei Liu and Bruce Taylor, "Profiles of Law Enforcement Agency Body Armor Policies — A Latent Class Analysis of the LEMAS 2013 Data," *Journal of Occupational and Environmental Hygiene* 14 no. 11 (2017): 873-881, doi:10.1080/15459624.2017.1339163.
 13. U.S. Department of Justice, Bureau of Justice Statistics, Data Collection: Law Enforcement Management and Administrative Statistics (LEMAS), <https://www.bjs.gov/index.cfm?ty=dcdetail&iid=248>.
 14. Weiwei Liu and Bruce Taylor, manuscript submitted for publication.
 15. U.S. Department of Justice, Office of Justice Programs, Bulletproof Vest Partnership/Body Armor Safety Initiative, <https://ojp.gov/bvpbasi/>.
 16. ASTM Committee E54 on Homeland Security Applications.
-
- Image source: kali9/iStock
-

NCJ 252033

Cite this article as: Mark Greene, "Body Armor: Protecting Our Nation's Officers From Ballistic Threats," *NIJ Journal* 280, January 2019, <https://www.nij.gov/journals/280/Pages/body-armor-protecting-our-nations-officers-from-ballistic-threats.aspx>.