

Research In Focus: A Weekly Digest of New Research from the NIDILRR Community

Passengers Who Use Wheelchairs or Scooters May Not Always Be Properly Secured While Using Paratransit Services

A study funded by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR).

People with mobility disabilities may use paratransit services to get around. Paratransit provides door-to-door or curb-to-curb (depending on transit agency) rides for people with disabilities, using wheelchair-accessible vans or mini-buses. While riding in these vehicles, it is important for all paratransit passengers to wear appropriate safety belts to avoid injury during a crash, or if the vehicle has to brake suddenly. For passengers who use wheelchairs or scooters, paratransit vehicles are equipped with wheelchair tie-down and occupant restraint systems (WTORS) to secure the passenger in their wheelchair or scooter. A WTORS consists of four straps or “tie-downs” to secure the wheelchair or scooter to the floor of the vehicle. Then a lap belt and a shoulder belt are used to secure the passenger in the chair. Although paratransit drivers are required to use the WTORS with all passengers who use wheelchairs or scooters, the WTORS may not always be used properly. In a recent NIDILRR-funded study, researchers looked at WTORS practices of paratransit drivers in one transit company to find out how often the drivers used the WTORS correctly, as well as the most common errors they made when securing passengers using wheelchairs or scooters.

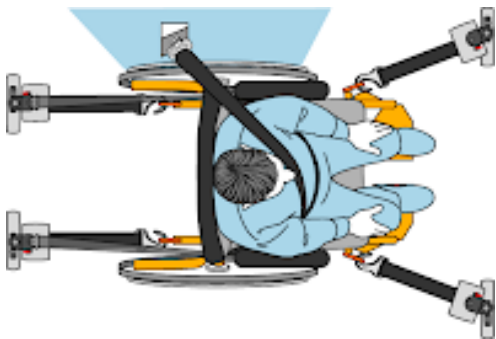


Figure 1: An overhead view of a passenger in a wheelchair properly secured using tie-down straps and a lap and shoulder belt. See attribution below.

Researchers of the research project, [In-Depth Investigation of Wheelchair Activities on Paratransit](#), viewed video recordings from two paratransit vehicles, recorded over the course of 12 months. These recordings occurred while passengers using wheelchairs or scooters were riding in the vehicles, for a total of 475 passenger trips. Cameras in the front and rear of the vehicles provided views of the rear, side and front of the wheelchair, including the lap of the passenger. A third camera, installed in one of the vehicles, recorded a floor-level view of the passenger's wheelchair and the areas of the floor where straps were attached. For each video recording, the researchers noted whether the passenger used a manual wheelchair, power wheelchair, or scooter. They then noted whether the driver properly used the WTORS to secure the wheelchair or scooter and any specific errors made during this process. Proper technique was defined as applying all four tie-downs to an appropriate location on the frame of the wheelchair or scooter, using a strap angle of 30-45 degrees, and ensuring that the straps were properly tightened so that the wheelchair/scooter did not move more than a couple inches in any direction. Finally, the

researchers also looked at whether the drivers used the lap and shoulder belts correctly to secure each passenger and any specific errors in how these were applied.

The researchers found that the drivers made errors in securing wheelchairs or scooters to the floor in about 20% of the trips. The most common errors included not applying all four of the tie-downs, placing at least one of the tie-downs in the wrong spot on the wheelchair or scooter (such as on top of the armrest instead of on the frame of the wheelchair), or tightening the straps at the wrong angle. Although only 19 of the 475 trips involved scooters, there was a higher percentage of errors for the trips involving scooter users (56%) than for manual wheelchair users (20%) or power wheelchair users (17%).

The researchers also found that the lap and shoulder belts were used correctly in only 12% of the trips. In almost all of these cases, the driver neglected to use the shoulder belt altogether, instead letting it hang behind the passenger. Some drivers also placed the lap belt across the top of the wheelchair armrests instead of passing it under the armrests and across the passenger's lap.

The authors noted that errors such as not using all four tie-downs, and not using the shoulder belt, can increase a passenger's risk for injury. Paratransit drivers and supervisors may benefit from training and hands-on practice with securing passengers seated in wheelchairs or scooters. Educating passengers about paratransit safety procedures may also enable them to self-advocate and educate drivers who are assisting them in boarding the paratransit vehicle. Finally, vehicle and WTORS manufacturers may wish to explore alternatives to WTORS that are partially or fully automated, or that can be operated more independently by passengers.

[To Learn More](#)

Research in this and other areas of wheelchair transportation safety and accessibility continues at the Injury Risk Assessment and Prevention Laboratory at the University of Louisville <http://louisville.edu/research/injury-risk-assessment/research/wcsafety>

The University of Michigan Transportation Research Institute offers a toolbox of information products to teach wheelchair and scooter users, caregivers, and transportation professionals about wheelchair transportation safety, including videos, slide decks, and brochures <http://wc-transportation-safety.umtri.umich.edu/knowledge-translation/education/tool-box>

The US Department of Transportation offers guidance for bus and rail operators on the law and safe practices regarding wheelchairs <https://www.transit.dot.gov/regulations-and-guidance/civil-rights-ada/questions-and-answers-concerning-wheelchairs-and-bus-and>

To Learn More About this Study

Frost K, Bertocci G, Smalley C (2018) [Wheelchair tiedown and occupant restraint practices in paratransit vehicles](#). PLoS ONE 13(1): e0186829. This article is available from PLoS One under Open Access and from the NARIC Collection.

Figure 1 Reprinted from Ride Safe (<http://wc-transportation-safety.umtri.umich.edu/ridesafe-brochure>) under a CC-BY license, with permission from the Regents of the University of Michigan, original copyright 2015.

Research In Focus is a publication of the National Rehabilitation Information Center (NARIC), a library and information center focusing on disability and rehabilitation research, with a special focus on the research funded by NIDILRR. NARIC provides information, referral, and document delivery on a wide range of disability and rehabilitation topics. To learn more about this study and the work of the greater NIDILRR grantee community, visit NARIC at www.naric.com or call 800/346-2742 to speak to an information specialist.

NARIC operates under a contract from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), Administration for Community Living, Department of Health and Human Services, contract #GS-06F-0726Z.