

Title: Usability Evaluation of the Safer Seat

Study Protocol

NCT Number: NCT07011446

Document Date: 11/26/2024

Version: 0.03

A low-burden vehicle transfer aid that facilitates safe and efficient transfers into and out of vehicles is needed to support equitable community mobility and reduce the prevalence of the more than 200,000 vehicle transfer injuries annually.¹ Although both high- and low-tech transfer aids are currently available in the market, they fail to address key aspects of safe vehicle transfer or are inaccessible to the majority who need them. High-tech solutions are prohibitively expensive and require vehicle modifications restricting the user's access to all but one vehicle; low-tech solutions are not aligned with clinical recommendations because of design flaws that limit the functional support they provide. Furthermore, the safety of these systems as a seat in a moving vehicle is unconfirmed. Additionally, challenges related to vehicle transfers results in decreased use of vehicle transportation in the community setting, which may be contributing to the low employment rate (22.5%) among individuals with disabilities, 43.3% below the general.²

To address the design shortcomings of existing transfer aids, the Safer Seat, a vehicle seat overlay designed to promote safe transfers into and out of vehicles, has been developed. The Safer Seat uses a dynamic seat interface to aid in two critical aspects of vehicle transfers: 1) transitioning from sit-to-stand and 2) turning to face the front of the vehicle. The novel, patent-pending tilt-lift function supports the sit-to-stand motion, and a rotation function helps a user turn during the transfer. The objective of the present study is to Evaluate Safer Seat usefulness and usability among a small cohort of target end users.

Participants: A target N=20 individuals living with impaired mobility who use a cane, walker, or manual wheelchair to support their mobility, will be recruited to complete routine use safety testing. Inclusion criteria will include self-reported ability to complete sit-to-stand transfers at modified independent (independent with the use of an assistive device) or minimal assist (a small amount of assistance from another person) level. Participants will be recruited through Pitt+Me and other University of Pittsburgh registries. In addition, direct email outreach recruitment will be used within natural circles know to research personnel.

Methods: Participants will be asked to transfer onto/off of the vehicle seat using their normal method of transfer and then to trial transferring onto/off of a vehicle seat with the Safer Seat 1 one or more times with study personnel (each participant will be asked to complete at least one transfer and will be invited to complete additional as needed for each participant to feel that they have a good sense of the Safer Seat's level of usability and usefulness in their case. The number of transfers above the initial transfer will be participant driven).

Participants will engage at a single time point (approximately 45-60 minutes) at the Department of Rehab Science & Technology, University of Pittsburgh building (6425 Penn Ave, Suite 401, Pittsburgh, PA 15206) in a clinical space that includes a vehicle seat. The PI, Dr. Julie Faieta, an occupational therapist, will attend every data collection session during the transfer portion to ensure safety during transfers. Dr. Faieta is trained in safe vehicle transfers and has worked in clinical settings where she has facilitated and aided in numerous transfers at minimal, moderate, and maximal assistance levels.

Outcome Measures. Demographic data will be recorded for all participants to include age, sex, diagnosis, and time since injury if appropriate.

Transfers will be observed by the research personnel and success in transfers will be recorded according to the Physical Mobility Scale (See at bottom of document).

Usefulness and usability of the Safer Seat transfer experience will be reported by participants via the Technology Acceptance Model Perceived Ease of Use, Usefulness, and Attitudes Toward Use questionnaires modified from those reported in Davis (1985).³ In addition, participants will

engage in a brief semi structured interview that will be audio recorded and transcribed via Microsoft Teams. Interview questions will include the following:

1. Does the Safer Seat address a real problem that you are experiencing?
2. Did you find the Safer Seat difficult or simple to use? Why?
3. Would you use the Safer Seat in routine day-to-day vehicle transfers? Why?
4. What is the most cumbersome aspect of the Safer Seat?
5. If you could change anything about the Safer Seat what would you change?
6. Would you recommend the Safer Seat to others? Why?

PHYSICAL MOBILITY SCALE

Sitting to Standing

(0) Unable to weight bear

(1) Gets to standing with full assistance from therapist. Describe:

.....

(2) Requires equipment (e.g. handrails) to pull to standing.

Specify equipment used:

.....

(3) Pushes to stand, weight unevenly distributed, standby assistance required

(4) Pushes to stand, weight evenly distributed, may require frame or bar to hold onto once standing

(5) Independent, even weight bearing, hips and knees extended, does not use upper limbs

Standing to Sitting

(0) Unable to weight bear

(1) Gets to sitting with full assistance from therapist

Describe:

.....

(2) Can initiate flexion, requires help to complete descent, holds assistive device, weight unevenly/evenly distributed

(3) Poorly controlled descent, stand-by assistance required, holds assistive device, weight evenly/unevenly distributed

(4) Controls descent, hold assistive device, weight evenly distributed

(5) Independent and does not use upper limbs, weight evenly distributed

References Cited.

1. Zhang X, Wang Y, Faieta J. Entering and Exiting the Vehicle: Day-to-Day Activity, or High-Risk Endeavor Among Older Adults. *Submitted, Under Reivew*.
2. Persons with a Disability: Labor Force Characteristics - 2023. *New Release Bureau of Labor Statistics*. <https://www.bls.gov/news.release/pdf/disabl.pdf>
3. Davis FD. *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results*. Massachusetts Institute of Technology; 1985.