Revisiting Clear Floor Area Requirements for Wheeled Mobility Device Users in Public Transportation

Avirind Bharathy and Clive D’Souza
Inclusive Mobility Research Laboratory, Center for Ergonomics, University of Michigan - Ann Arbor

Importance
Current accessibility standards in the U.S. prescribe a minimum dimensions for ‘clear floor area’ to accommodate wheeled mobility device (WMD) users on transportation vehicles. The Americans with Disabilities Act Accessibility Guidelines (ADAAG) for Transportation Vehicles[3] specifies a ‘clear floor area’ for wheelchairs, a space 760 mm (30 in) wide by 1220 mm (48 in) in length.

Prior research on the anthropometry of wheeled mobility device users (n = 500) indicates that these dimensions are too small to accommodate the size of many occupied wheeled mobility devices, especially power chairs and scooters. This paper describes an interactive web-based design tool for determining the dimensions of clear floor area to achieve a user-specified level of physical accommodation based on occupied device width and length measurements taken on 500 WMD users.

Purpose of the Paper
Although being a relatively small minority estimated at about 3.4 million adults in the U.S. population[1], users of wheeled mobility devices constitute a fast growing segment of the population[2]. At the time the research that served as the basis for the ADAAG was completed in the late 1970’s, most wheelchairs were predominantly manual, and quite similar in size and style[4]. Today, the range of wheeled mobility devices available is much more diverse. Power chairs and scooters are much more prevalent than before. Manual wheelchairs are more diverse due to the availability of features that accommodate users with different needs, e.g. different seat widths. A range of accessories and customizable features are also available.

Wheeled mobility users are more diverse as well. Power chairs have allowed more severely disabled people to become mobile in the community. Scooters are being adopted by people who can walk and stand but not for long distances. People are larger due to the obesity epidemic resulting in a growing number of bariatric wheelchairs.

Primary Objectives
Evaluate the level of accommodation achieved for the IDeA Center study sample of mobility device users (n = 500) based on the current requirements for minimum ‘clear floor area’ specified in the ADAAG standards.

What did we measure?
We measured occupied length and width for 500 wheelchair users. The wheelchair types included manual wheelchair, power wheelchair and scooters.

Evaluation of Accommodation
We did a scatter-plot of occupied length vs. occupied width, overlaid with the Standards (ADAAG) Box and determined the level of accommodation achieved for the sample whose dimensions accommodate the largest proportion of participants.

Study Sample Demographics
Occupied Length: computed as the horizontal distance from the extreme near-most and forward-most point of the combined occupant or mobility device.
Occupied Width: computed as the horizontal distance between the extreme lateral right-most and left-most points on the body or mobility device.

Proposed Accommodation Model for Clear Floor Area

The web based design tool provides an interactive approach to:
1. Perform cost-benefit analysis by calculating accommodation levels for various dimensions of occupied length and width.
2. Determine a suitable occupied length and occupied width based on the proposed accommodation model for a required accommodation percentage.

Implications
Power chair users were intentionally oversampled to obtain a better understanding of the functional abilities of this user group, which typically has more severe physical limitations and is more sensitive to design restrictions.

Limitations
More wheelchair users can be accommodated by increasing occupied length compared to a similar increase in occupied width. Weak correlation between occupied length and occupied width revealed by the data set suggests that neither occupied width nor occupied length can necessarily be used to reliably predict the other.

References