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Professor Carolyn Unsworth
CQUniversity Australia
School of Medical, Health and Applied Science,
Melbourne Campus
120 Spencer Street,
Melbourne, VIC, 3000
AUSTRALIA
Email: c.unsworth@cqu.edu.au

Anthony Pepi
Productivity and Safety Team
National Transport Commission
Level 3/600 Bourke Street
Melbourne Vic 3000

Dear Mr. Pepi,

Feedback in relation to Issues Paper: Barriers to the safe use of innovative vehicles and motorised mobility devices.

Introduction

Thank-you for the opportunity to provide feedback on this issue. The feedback provided below relates specifically to:

Qu.9 Is there a need for construction and performance requirements for motorised mobility devices to ensure safe use on public transport infrastructure?

However, other general comments in relation to the other questions raised are provided.

As a researcher and occupational therapist, I investigate transport mobility for people with disabilities and age-related health problems, including assessment of fitness-to-drive for car drivers (Unsworth, Pallant, Russell, et al., 2011; Harries, Unsworth, Gokalp, et al., 2018; Unsworth & Baker, 2015), and motorised mobility device (motorised wheelchairs and motorised mobility scooters) use. The information provided in this feedback document pertains directly to the use of "Motorised Mobility Devices (MMDs)" and I do not have expertise in the relation to the use nor problems associated with "Innovative Vehicles". In particular, I have conducted research that supports the independent and safe use of motorised mobility devices as follows:

i) how motorised mobility devices are used by people with mobility limitations to enable independence and promote quality of life (eg. Vaucher et al., 2017; Krishnasamy, Unsworth, et al, 2013)
ii) assessment, education and training to promote skilled driving of motorised mobility devices (Townsend & Unsworth, 2018), and
iii) the use of motorised mobility devices on public transport and roads and the impact of The Disability Standards for Accessible Transport (DSAPT) (Department of Infrastructure and Regional Development, 2013) and Standards Australia – Technical Specification 3695.3:2018 (White and Blue Label scheme) (Unsworth, Rawat, Sullivan et al., 2017; Unsworth, Chua, Naweed, et al., 2018).

Joining me in this submission are colleagues Associate Professor Anjum Naweed (cognitive psychologist) and Dr. Prasad Gudimetla (biomechanical engineer) from CQUniversity, and Dr. Julian Chua (biomechanical engineer).

We are able to provide further documentation to support our submission as required, and welcome collaborative research with other agencies and universities to solve the questions raised in the Issues Paper.

Rights and responsibilities of drivers of all motorised mobility devices, and speed limits

This feedback provides information from our research which aims to increase independence and accessibility, and reduce tips and collisions and resulting injuries among motorised mobility device users. Our research acknowledges that driving any wheeled device from bicycles, through motorised mobility device to a car carries inherent risks. All drivers carry the responsibility of ensuring their vehicle is in good working order and that they have undertaken the necessary training to ensure fitness-to-drive, to promote safety for themselves and all other pedestrian and road users. All drivers are aware that driving carries risk of collision resulting in injury or possibly death. Road safety legislation exists and should continue to be developed to promote road safely for all vehicle users. However, legislation should not be imposed that restricts the freedoms enjoyed by people using motorised mobility devices to remove collision risk, as all drivers understand this risk is present. Dignity of risk must remain.

Speed is an ever present factor in relation to injury risk with MMD use. The intent of speed restrictions is to mimimising tip and collision risk while still enabling people to have enough speed to reach their destination in a timely manner. We call for further research to validate suitable speed limits that take into account timely access, and risk of collision and tipping. Although the 10km/hr limit is a suitable pace for most outdoor use, a more accurate walking pace of 6km/hr is better suited for indoor use and outdoor areas with heavy pedestrian use such as shopping areas and at recreational facilities. One of the problems, however, is that many MMDs are capable of travelling much faster than 10km/hr and drivers are often unaware of the speeds reached as not all devices have speed displays. As noted in the Issues paper, Australian consumers already have limited access to MMDs and therefore speed issues cannot be a factor in the importation of devices. An after-market system to limit speeds on MMDs to should be investigated, together with investigations on what the speed limit should be.

Research evidence to support assessment, education and training for people in skilled use of motorised mobility devices

Assessment, education and training of mobility device users is paramount in reducing collisions, falls, and tip incidents. Assessment identifies a user's knowledge, skills and behaviour, and then education and practical training in the real-world environment can be used to overcome any limitations. Very few standardized assessment and training tools exist for health professionals to use for this purpose (Townsend & Watson, 2013).

In response to this need, Kathryn Townsend (an occupational therapist working in community health facility) and I developed a standardized motorised mobility device assessment and training tool, and occupational therapists are using this nationally. The tool is called the "*Powered Mobility Device Assessment and Training Tool (PoMoDATT)*" which can be downloaded for free from the website www.pomodatt.com. The PoMoDATT offers a proactive approach to facilitating competent and safe motorised mobility device use in the community. We have researched this tool over several years and have recently completed validation and an inter-rater reliability study (Townsend & Unsworth, 2019). On-going research is required to determine if training users with the PoMoDATT reduces the incidence of tips, falls and collisions when people use their MMDs after training.

Research evidence to investigate the use of motorised mobility devices on public transport and roads - Technical Specification SA TS 3695.3:2018 (White and Blue Label Scheme)

Our research team have been working for over 3 years on access for people using motorized mobility aids on public transport. In 2016 our research team surveyed 67 mobility device users from Victoria and Queensland to describe how people used public transport and determine the role of public transport in influencing mobility device choice (Unsworth, Rawat, Sullivan et al., 2017). One of the unexpected findings was that 42% of respondents used two or more seated mobility devices. Notwithstanding the high purchase price of many devices, this finding suggested that motorised mobility aid users may have some flexibility in choosing different devices for different purposes. The most important features when choosing a mobility aid were reliability (dependable motor), turning ability and size. Fifty-two percent of participants strongly agreed that public transport is generally accessible. We concluded that mobility device users, vendors and health professionals need to work together to identify the best mobility devices that fulfil needs, and are reliable and safe when users access the public transport network. Speed of devices did not come up as an issue of note, and users seemed satisfied with the 10km/hr speed limit.

In 2018, the DR SA TS 3695.3:2018 (White and Blue Label Scheme) for MMDs came into effect: "*The objective of this Technical Specification is to specify current requirements for the designation of electrically powered wheelchairs and mobility scooters for access to public transport consistent with the provisions of the Disability Standards for Accessible Public Transport 2002 (DSAPT), and/or footpaths and other road-related areas under Australian Road Rules (ARRs).*" (SA TS 3695.3.2018). The scheme is designed to be self-regulated, with the onus on manufacturers to measure and affix labels as appropriate.

We investigated the accuracy of this Technical Specification in relation to the access of people using motorized mobility aids on public transport, which is the Blue Label component of the scheme. This research was funded by our industry partner, Public Transport Victoria (PTV). A particular concern for PTV was access for people using MMDs on buses and so our research focused on bus access. The White Label component of the scheme specifies motorised mobility devices that are suitable for use on road-related areas, but not on public transport, and we did not investigate this component of the TS. A summary of our research is provided here:

Objective

The Disability Standards for Accessible Transport (DSAPT) and Standards Australia – Technical Specification 3695.3:2018 (Blue Label scheme) require buses and motorised mobility devices to comply to ensure that mobility aid users can access public buses. However, there was no data available to support the compatibility of the standards. That is, if a MMD that meets the Blue Label standard will fit a bus that meets DSAPT standards. The objective of this study was to investigate bus accessibility for MMDs with considerations to DSAPT and the Blue Label scheme using 3D measures and computer simulations.

We prepared 3 reports detailing the full information from our research and these can be made available to the NTC.

Methods

The methods adopted in this study were novel and ‘world first’. We have now published the 3D scanning approach used to accurately measure and understand bus and MMD accessibility and compatibility (Unsworth, Chua, Naweed, et al., 2018).

Three main tasks were undertaken in this study.

1. Initially we sampled 35 commonly used and sold MMDs from large Melbourne retailers. We aimed to determine how many of these 35 different MMD (20 powered scooters and 15 powered wheelchairs) would be awarded a Blue Label according to SA TS 3695.3:2018. This required building four Test Rigs according to the Blue Label scheme specifications and driving the MMDs through them. We believe this is the first time that these test rigs have been built and therefore the MMDs tested in a real environment. Three Test Rigs (Swept Path, Narrow Access and Allocated Space) represent a typical low-floor bus from the entrance to the allocated space for travel, as shown in Figure 1. The fourth simulates a pavement gap as found at railway crossings. MMDs were also measured in 3D and their maximum turning circles were recorded. We did not weigh the devices nor measure their capacity to ascend the 1:8 incline specified.

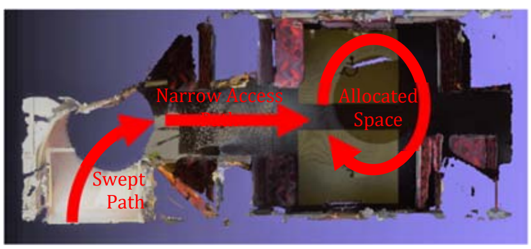


Figure 1: Plan view of a typical bus layout from entrance to allocated space

The MMDs were tested by experienced users as well as a research team member (as shown in Figure 2).

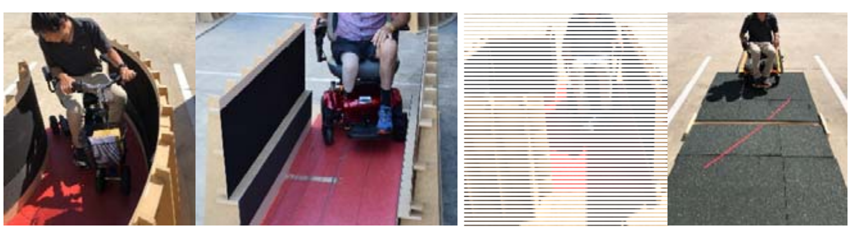


Figure 2: Left to right – Swept Path Test, Narrow Access Path Test, Allocated Space Test, Pavement Gap

2. The second phase of the research aimed to determine how many of a sample of 21 different low-floor route buses from two large operators in Victoria are DSAPT compliant. This was achieved by taking 3D measures of the 21 different low-floor route buses using 3D scanning. The 35 motorised mobility devices we tested and the Test Rigs were also scanned (as shown in Figure 3).

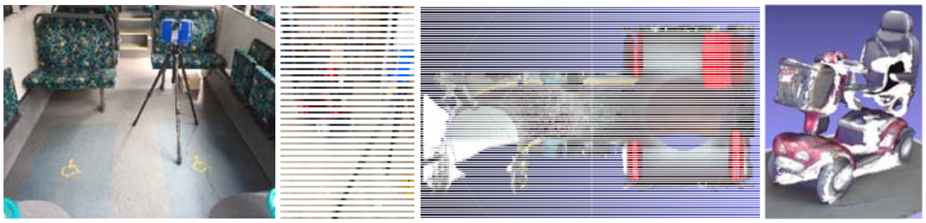
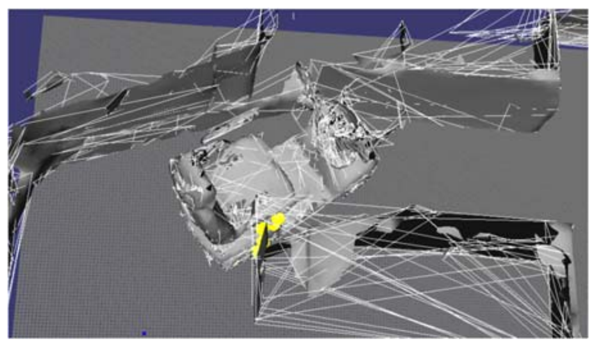


Figure 3: Left to right – 3D scanning a bus, 3D scanning a powered mobility aid, Plan view of a scanned bus 3D model, Scanned scooter 3D model

3. The methodology used for the third component of the research involved computerised meshing the 3D scans of the MMDs with the 3D scans of the buses to determine their fit. The aim was to determine how many of the 35 motorised mobility devices are compatible (fit) the 21 buses and if they are not compatible, in which sections of the bus did they get stuck (called the stuck point). Figure 4 shows the translation from real world testing to 3D computer images:

Figure 4a. Real-world testing of the *'Swept path test'* from *SA TS 3695.3:2018*

Figure 4b. Simulated testing showing aerial view of the *'Swept path test'* in a real bus scan



Examples of the 3D simulations we ran are shown in Figure 5. This involved 35 (MMDs) x 21 (buses) x 2 (Collision Detection and Find Path simulations) = 1470 simulations.

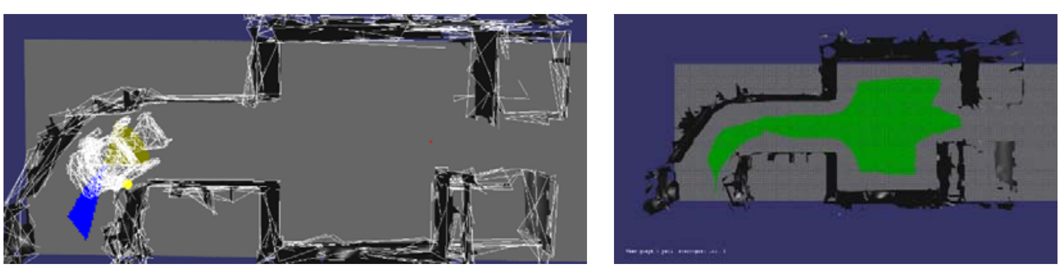


Figure 5: Left – Example of a 3D simulation with stuck point indicated by yellow dot, Right – Example of a successful Find Path simulation where a mobility aid could navigate through a bus.

Findings

1. When navigating the Test Rigs, it was found that 10 out of the 35 motorised mobility devices we sampled would not achieve Blue Label standards. All 10 failed the Allocated Space Test and 2 of them also failed the Swept Path Test.

2. When reviewing the 3D measures of the buses, we found that while some aspects of the buses were compliant with the DSAPT, none were fully compliant. Eleven buses did not achieve the minimum width requirement of 800mm, none of the 21 buses met the Allocated Space requirement of 1300x800mm and 19 of the buses did not have a manoeuvring area of 2070x1540mm.

3. The 3D computerised simulations undertaken demonstrated that motorised mobility devices (both with and without achieving Blue Labels) could successfully access most of the buses. Full details of all measures and calculations are available. In summary:

   - 13 of the 21 buses (despite not being DSAPT compliant) could board and enable allocated space access for at least 22 of the 35 motorised mobility devices.
   - 2 of the motorised mobility devices that did not achieve a Blue Label could successfully access at least 12 of the buses.
   - 4 of the 25 motorised mobility devices that did gain a Blue Label could not access 11 or more buses, and 67% of the stuck points were in the Swept Path area of the buses.

Conclusions

1. Our research team fully supports the idea that consumers should have access to information (such as a label on the MMD) at the point of purchase to guide them in making the best choice for their needs. This information should contain details of compatibility of the MMD with public transport as well as accessing and using the MMD in public and private buildings.

2. If a motorized Mobility Device is awarded a Blue Label under the current Standards Australia – Technical Specification 3695.3:2018, this is NOT sufficient to determine if the device will be able to access a bus. The SA TS 3695.3:2018 (White and Blue Label scheme) should be immediately recalled and further testing undertaken to increase accuracy. We anticipate huge frustration and anger when consumers purchase an expensive Blue Label MMD with an intention to take it on public transport, and then find the device they bought CANNOT access a bus.

3. While none of the 21 buses in our study were fully compliant with all elements of the DSAPT using 3D measures, many MMDs were able to successfully access these buses. This data should also be considered in the modernization of the DSAPT (currently underway), and potential for revision of measures included in DSAPT.

4. The Standards Australia – Technical Specification 3695.3:2018 (White and Blue Label scheme) is a self-regulated scheme, with manufacturers required to measure and affix labels as appropriate. Given manufacturer conflict of interest, self-regulation is not in a consumer's best interests. A better approach may be to have an independent agency with a repository of public transport device measures in 3D, and then manufacturers submit their 3D scans of devices so the agency may quickly and easily run the simulations to determine accessibility for the device on bus, train, light rail and taxi.

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Please don't hesitate to ask for any further information.

Professor Carolyn Unsworth,
PhD, BAppSci(Occ.Ther.), OTR, GradCertTertEd.,
Occupational Therapy Driver Assessor
Fellow of the Occupational Therapy Australia Research Academy