Developing a research protocol to investigate stress, workload, and driving apprehension during driving lessons in young adults with an autism spectrum disorder: a feasibility study.

Veerle Ross1, Daniel J. Cox2, Matthijs L. Noordzij3, Kimberly Geryl4,5, & Annemie Spooren5,6

1 Hasselt University, School of Transportation Sciences, Transportation Research Institute, Agoralaan, 3590 Diepenbeek, Belgium
2 University of Virginia Health Sciences Center, Virginia Driving Safety Laboratory, Box 800-223, Charlottesville, VA 22901, USA
3 University of Twente, Faculty BMS, Psychology, Health and Technology, Drienerloaan 5, 7522 NB Enschede, the Netherlands
4 University of Ghent, Faculty of Medicine and Health Sciences, St. Pietersnieuwstraat 33, B-9000 Gent, Belgium
5 Hasselt University, Faculty of Medicine, and Life Sciences, Rehabilitation Research Center (REVAL), Agoralaan, 3590 Diepenbeek, Belgium
6 Pxl university of applied Science, Centre of expertise innovation in care, Elfde-Liniestraat 24, B-3500 Hasselt, Belgium

Introduction

Driver’s license → independence and autonomy
Controlling a vehicle → multi-task
Autism spectrum disorder (ASD) characteristics may interfere with (safe) driving

Potential problems when learning to drive (e.g., multitasking, need for repetition, increased workload and stress, Ross et al. - 2015)

Elevated risk for anxiety
Driving apprehension (Ross et al., 2018)
Anxious arousal (e.g., Reimer et al. 2013)

Driver instructors → key players in development of (safe) driving skills
Development of educational modules for instructors
Lack of effect evaluations
Research protocols often too demanding

GOAL: Feasibility study with wearable technology & questionnaires to determine levels of stress, workload, & driving apprehension during driving lessons

Developed a research protocol & asked a pilot sample to evaluate the procedure

Methods

Q-sensor wristbands → levels of stress & workload via measurement of electrodermal activity
Rating Scale of Mental Effort (RSME)
Driving Attitude Scale Parent-Report (DAS-PR) & Self-Report (DAS-SR) → signs of apprehensive driving

Participants: 4 ASD diagnosed (1 male) & 2 control (1 male) learner drivers, age 18-25

Results

Procedures and measures were evaluated positively.
To avoid incomplete or unusable data, attention should go to clear enough instruction of the correct procedure

E.g., two wore sensors on the upper instead of the lower wrist, leading to unusable data.

Questionnaires not always consistently completed

Non-parametric group comparison tests were not significant, probably due to the limited sample size

Only one ASD learner driver completed the driving exam during the study (i.e., one academic year)

Conclusions

1. The developed protocol was evaluated positively
Can be used to investigate levels of stress, workload, & apprehension during driving lessons
2. Sufficient attention to the instructions is warranted (e.g., inclusion of practice sessions and reminders)
3. Sufficient time allocation to the study is required to include the driving exam

References


Ross, Veerle; Cox, Daniel; Reeve, Ron; Brown, Timothy; Moncrief, Matthew; Schmitt, Rose & Gaffrey, Gary. Measuring the attitudes of novice drivers with ASD as an indication of apprehensive driving: Going beyond basic abilities. Autism, special issue: Adolescents and young adults, Volume: 22 issue: 1, page(s): 62-69.