

# **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.**

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## **Background**

Autism Spectrum Disorders (ASD) are known to impact quality-of-life (QoL). Driving can increase autonomy and QoL by enabling maintenance of work and social contacts. Research suggests people with ASD experience difficulties in complex driving situations. These difficulties may induce increased stress, workload, and driving apprehension (i.e., fear or worry), discouraging the pursuit of licensure and potentially interfering with safely learning to drive.

Driver instructors can be seen as key players in the development of safe driving skills, already during the learning phase. Internationally, attention went to the development of educational modules for driver instructors to learn how to deal with ASD learner drivers. Especially in the Netherlands, and recently in Belgium, several driving schools adopt a distinct approach for ASD learner drivers. However, effect evaluations often lack, neither has it been investigated whether these approaches lead to less stress, workload, and driving apprehension. Moreover, to avoid extra stress, too demanding research protocols are best avoided.

## **Objectives**

We conducted a feasibility study with wearable technology and questionnaires to determine levels of stress, workload, and driving apprehension during driving lessons. To this end, we developed a research protocol and asked a pilot sample to evaluate the procedure.

## **Methods**

The protocol included Q-sensor wristbands to indicate levels of stress and workload during driving lessons via measurement of electrodermal activity. We also included the Rating Scale of Mental Effort (RSME), together with the Driving Attitude Scale Parent-Report (DAS-PR) & Self-Report (DAS-SR) from Cox and colleagues as indicators for signs of apprehensive driving. Participants wore Q-sensors during each lesson and completed the RSME after each lesson, as their instructors also did. After the first, middle, and final driving lesson, participants and their parents completed the DAS questionnaires. Besides that, we included questionnaires to

determine baseline levels of anxiety and ASD characteristics. We followed a similar procedure for participants that took a driving test. The pilot sample included 4 ASD diagnosed (1 male) and 2 control (1 male) learner drivers, age 18-25. Participants received the instructions once, at reception of the materials.

## Results

Procedures and measures were evaluated positively. However, to avoid incomplete or unusable data, special attention should go to clear enough instruction of the correct procedure. For instance, two participants wore sensors on the upper instead of the lower wrist, leading to unusable data. Furthermore, questionnaires were not always completed consistently. The 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

The developed protocol was evaluated positively and therefore can be used to investigate levels of stress, workload, and driving apprehension during driving lessons. However, sufficient attention to the instructions is warranted (e.g., inclusion of practice sessions and reminders). Finally, to include the driving exam, sufficient time allocation to the study is required.