

The Potential for Autonomous Vehicle Technologies to Address Barriers to Driving for Individuals with Autism

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Many of us have family, friends, or acquaintances with a developmental disability known as autism. In fact, according to the latest estimates from the U.S. Center for Disease Control, one in 59 (or 1.7%) of children have autism, and almost half of those with autism have average to high levels of intelligence. Over the next ten years, almost three-quarters of a million young people with autism will become adults. The ability to drive is critical to successfully transitioning to adulthood for most individuals. Research shows that, currently, adults with autism have a much harder time becoming employed and living independently compared to both typically developing adults and adults with disabilities. This study reviews the available literature on the magnitude of challenges to driving and accessing essential opportunities for adults with autism, and the potential of automated vehicles to address those challenges.

Study Methods

The study methods include a synthesis of the literature on the significance of the driving challenges

for those with autism, how diagnostic factors associated with autism may contribute to difficulties driving, and the quality of the evidence supporting linkages between those challenges and driving performance. The study then identifies specific features of automated vehicle technology that may address key challenges. These features are classified by the Society of Automotive Engineers' (SAE) levels of automation 0 to 5 (no vehicle automation to fully automated vehicles). Finally, the study makes recommendations for research, policies, interventions, and services for individuals with autism.

Findings

The synthesis of the literature in this study reveals that many of the diagnostic factors associated with autism may contribute to driving difficulties. Broadly, these factors include challenges in executive function, social-cognitive and motor skills, sensory perception, and integration of sensory-motor skills. Drivers must possess adequate executive functioning abilities to monitor and focus on the road ahead and adapt

to changes in roadway conditions in order to arrive safely at their destination. Social-cognitive skills include the ability to identify driving hazards that are, by nature, social: for example, predicting the actions of other drivers, pedestrians, and bicyclists, and using non-verbal gestures and signals to communicate. The ability to adequately perceive visual and auditory information is necessary for effective executive functioning and must be integrated with motor skills (both fine and gross) to execute decisions that safely address changing roadway conditions. The limited number of exploratory research studies that examine the relationship between impairments in these factors and driving performance provide evidence to support linkages between these challenges and driving performance.

Policy Recommendations

Currently, available legislation and programs provide funding for adolescents and adults with autism to take individualized transit training courses, use subsidized or free transit passes, and access to paratransit if safety is a concern. However, most people in the U.S.—not just people with autism—do not have access to transit that is of high enough quality to enable them to meet their basic travel needs (i.e., work, education, health, shopping, personal, business, and social). SAE level 4 automation is a promising option to expand transit access in lower-density environments affordably; this level of automation allows vehicles to travel at low speeds, on roads that are in excellent condition (i.e., few potholes), and under certain weather conditions (i.e., no snow or rain). In the interim, public funding should be made available to subsidize ride-hailing services when transit is not a feasible travel option. We need funding to implement and evaluate the effectiveness of experimental pilots of these programs.

The review of the literature reveals that occupational therapists certified for driving rehabilitation (OT-DRS) can evaluate adolescents and adults with autism for driving competency and specific impairments that might impede driving competency. Children with autism frequently receive occupational therapy to support educational achievement. Schools are

required to develop plans to help adolescents with disabilities transition into adulthood. Schools, regional centers, and rehabilitative services should be required to inform adolescents and adults with autism about driving evaluations and special training programs. This therapy should also include experimentation with SAE levels 0 to 2 autonomous vehicle technologies (i.e., warning systems, steering, acceleration/deceleration, and braking systems) that are currently publicly available. If therapists determine a significant benefit, then public funding should be made available to allow people with autism to purchase vehicles with recommended technologies. Currently, public funding is available for those with physical disabilities from a variety of public sources to purchase or finance adaptive equipment, such as hand controls, and modify a vehicle to use the equipment and transport wheelchairs. When determined to be effective, public funding should be available to help those with autism purchase of autonomous vehicle technology, just as funding is available for those with physical disabilities to modify vehicles with adaptive equipment. A coordinated research evaluation program should be developed and adopted to improve and measure driving outcomes from driver training programs and the use of autonomous vehicle technology.

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To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/project/1706.



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