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A Retrospective Study of Factors Associated with the Successful Completion of a New Driver

Training Program

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Lori Breeden, EdD, OTR

A Research Project Entitled

A Retrospective Study of Factors Associated with the Successful Completion of a New Driver
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Submitted to the School of Occupational Therapy at University of Indianapolis in partial
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By

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A Retrospective Study of Factors Associated with the Successful Completion of a New Driver
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University of Indianapolis

Abstract

Background: Researchers examined existing new driver training records to determine factors associated with successful completion of a driver training program.

Method: Forty-one de-identified driving evaluation and discharge records were examined retrospectively. Data included demographic information, in-clinic assessments (Trails Making Test (TMT) Parts A and B, Useful Field of View(UFOV), life-skills questionnaire) on-road skills, and intervention units. Mixed method analysis included Mann-Whitney U to compare successful and unsuccessful groups and a qualitative examination of therapists and parents narrative.

Results: Individuals in the successful group were more likely to have adequate on-road driving skills of braking/acceleration, four way stop, lining the vehicle, following distance, and traffic gaps than the unsuccessful group ($p < .05$). Statistical significance was not detected for TMT Part A ($p=.551$) and B ($p=.996$) between groups. Qualitative results indicated that successful drivers demonstrated independence in activities of daily living (ADL), instrumental activities of daily living (IADL), and communication skills prior to participating in the new driver program. Also, adequate on-road skills, emotional maturity, and practical levels of anxiety seem to support success for new drivers.

Conclusion: Important considerations when evaluating new drivers success are on-road skills, independence in IADL and ADL, communication skills, emotional maturity, and practical levels of anxiety. However, OT/Certified Driving Rehabilitation Specialist (CDRS) should further investigate the use of other executive function assessments for new drivers rather than TMT Part A and B.

A Retrospective Study of Factors Associated with the Successful Completion of a New Driver Training Program

In 2016, the Federal Highway Administration reported that there were over 218 million drivers on the road; 8,590,649 were new drivers nineteen years or younger (Distribution of licensed drivers, 2016). Driving is pivotal to one's independence because it allows for social participation and a sense of life satisfaction (McNamara, George, Ratcliffe, & Walker, 2015). However, motor vehicle crashes are the leading cause of death for teens (age 16-19 years) in the United States (CDC, 2019). With 5.4 million children diagnosed with Attention-Deficit/Hyperactive Disorder (ADHD) and 1 in 88 diagnosed with Autism Spectrum Disorder (ASD), there is an increased number of new drivers with these conditions operating a vehicle (Classen, Monahan, & Wang, 2013). Those with ADHD and ASD often have characteristics which compromise driving such as dysfunctions in planning, organizing, attention to detail, executive skills, and motor skills, and those with Generalized Anxiety Disorder have excessive anxiety about ordinary, day-today situations that can be intrusive and cause distress or functional impairment (Classen & Monahan, 2012; Er 2015). The purpose of this study is to determine the factors associated with a new driver's successful completion of a driver training program facilitated by occupational therapists who are CDRS.

Literature Review

Occupations are “various kinds of life activities in which individuals, groups, or populations engage, including activities of daily living (ADL), instrumental activities of daily living (IADL), rest and sleep, education, work, play, leisure, and social participation” (AOTA, 2014, p. S19). ADLs are “activities oriented toward taking care of one’s own body” such as dressing, bathing, toileting, personal hygiene, and feeding (AOTA, 2014, p. S19). IADLs are

“activities to support daily life within the home and community that often require more complex interactions than those used in ADLs” such as driving and community mobility, child rearing, and financial management (AOTA, 2014, p. S19). The IADL of driving is a symbol of entrance into independence and a valued occupation for many individuals (AOTA, 2014).

Individual IADLs and ADLs have been shown to relate to the overall functional performance of a person in their everyday lives (Weaver, 2015). Occupational therapists are skilled in the assessment of functional performance in individuals (Dickerson, Reistetter, Davis, & Monahan, 2011). When a client demonstrates fundamental abilities in ADL and IADL, the client is then able to engage in more activities that further enhance overall functioning (Weaver, 2015).

Young Adults with ASD, ADHD, and GAD

Young adults with ADHD or ASD exhibit behaviors that compromise safe driving performance (Classen & Monahan, 2012). Young adults with ADHD tend to be easily distracted, forgetful, impulsive, and require additional time to process information than peers without ADHD (ADHD: The Basics, 2016). These characteristics found in young adults with ADHD can negatively impact their driving performance. ASD is also a common disorder seen in young adults characterized with repetitive behaviors, fixated interests, and motor coordination deficits (National Institute of Mental Health, 2011). New drivers with ASD tend to have a higher heart rate, gaze pattern to low stimulus areas rather than high stimulus areas, and slower response speed (Cox et al., 2015; Reimer et al., 2013). Cox et al. found that when adding working memory demands to an already difficult driving task, young adults with ASD are hindered by an increase in steering and braking errors indicating an overall lower working memory performance (2015). Brooks et al. (2016) concluded that young adults with ASD had more difficulty with

psychomotor speed (movement in conscious mental activity), reaction time, cognitive flexibility, and executive function than the control group when using a driving simulator.

Studies indicate that drivers with ADHD and ASD, are more likely to get into car accidents when compared to their typically developing peers (Cox et al., 2015). Classen, Mohanon, and Wang (2013) discovered young adults with ADHD and ASD compared to typically developing peers, displayed decreased ability with planning, attention, set shifting, motor performance, and sequencing. Additionally, these young adults had poorer right-eye visual acuity, selective attention, visual-motor integration, cognitive abilities, processing language symbols, integration of verbal and nonverbal mental processes, and motor performance compared to healthy controls (Classen, Monahan, & Wang, 2013). When further evaluated by a CDRS, the individuals made more driving errors related to visual scanning, speed regulation, lane maintenance, and adjustment-to-stimuli compared to healthy controls (Classen, Monahan, & Wang, 2013). While young adults with ASD and ADHD have an increase in hazardous driving skills and safety, many are able to obtain and maintain their license after going through a driver training program.

Generalized anxiety disorder (GAD) is one of the common mental disorders in the United States that can negatively impact an individual's quality of life and ADL (Er, 2015). The excessive anxiety about ordinary, day-today situations that is often intrusive and functional impairment impacts those with GAD (Er, 2015). Higher levels of anxiety while driving lead to a variety of dangerous driving behaviors such as increased amount of crashes (Dula, Adams, Miesner, & Leonard, 2010).

Certified Driving Rehabilitation Specialist and Driver Training Programs

To optimize community mobility, individuals at risk for impaired driving due to developmental challenges or medical diagnoses are referred to a CDRS before they are able to take the standardized driver assessment for their respective state (DMV.org, 2017). A comprehensive driving evaluation is administered from an occupational therapist who is a CDRS (AOTA, 2016). To comprehensively evaluate drivers, a CDRS plans, develops, coordinates and implements driver training programs for clients of varying ages and needs (AOTA, 2016; Association for Driver Rehabilitation Specialists, 2016). Driver training programs may include strategies, car modifications, adaptive equipment, or interventions (Dickerson, Reistetter, Schold Davis, & Monahan, 2011). The CDRS title, established in 1995, is achieved after extensive experience and a passing score on the exam given by the Association for Driver Rehabilitation Specialists (ADRS) (ADRS, 2016; Dickerson et al., 2011; Yuen, Brooks, Azuero, & Burik, 2012). The credentials indicate experience educating and training drivers, adapting vehicles, and building a network with the ADRS (Dickerson et al., 2011).

Educational pre-driving interventions may be helpful to those who have not experienced on-road driving such as young adults with ADHD or ASD. Poulter and Mckenna (2010) used an educational pre-driving assessment to examine if educational tools were beneficial in changing the attitudes of teenagers who scored high on a risk-taking questionnaire (2010). They found that educational interventions made a statistically significant impact on young adult drivers change in attitudes.

Frequency and Duration of Driver Training Programs

Driver training programs are imperative for young drivers with varying diagnoses such as ASD and ADHD because driving includes many complex skills that impact overall independence

(AOTA, 2014). The duration of a training program needed to successfully complete a program is unknown, but it can be understood that the focus of these programs is to prepare and equip an individual for the complex nature of driving (Mazer, Gelinas, & Benoit, 2004). In addition to determining which client factors were influential in determining a client's readiness to drive this study will include information on the frequency and duration of driver training.

Trail Making Tests

Many assessments for individuals who have disabilities are not supported by research in predicting ability to safely drive (Adler, Rottunda, Christensen, Kuskowski, & Thuras, 2006; Classen, Wang, Crizzle, Winter, & Lanford, 2013). However, the Trail Making Test (TMT) Part A and B are promising. The TMT are standardized neuropsychological tests administered to individuals ages 11-74 to assess scanning capabilities, visual searching, speed of processing, mental flexibility, divided attention, and executive function (Classen, Wang et al., 2013; Tombaugh, 2004; Reynolds, 2002). TMT Part A and B are administered to individuals who have been referred to a CDRS (Classen, Wang et al., 2013). The goal of the assessment is to connect a series of letters and/or numbers in an ascending order making a trail as quickly as possible (Reynolds, 2002).

Low scores on the TMT Part B have been a valid predictor of failing a behind the wheel on-road assessment in many driving studies for populations other than young adults with ADHD and ASD (Classen, Wang et al., 2013; Classen et al., 2011; Uc et al., 2006; Mullen, Weaver, Riendeau, Morrison, & Be'dard, 2010). In a study of older drivers who completed TMT Part B and an assessment called Useful Field of View (UFOV), researchers found both tests to be comparable and accurate in predicting behind the wheel on-road performance having a comparison p-value of .02 indicating a correlation between the two assessment (Classen, Wang

et al., 2013). Researchers have found Trails B to be a valid predictor of on-road performance amongst community-dwelling older licensed drivers, people with Parkinson's disease, and patients with brain injury (Classen, Wang, et al., 2013; Classen et al., 2011; Uc et al., 2006; Mullen, Weaver, Riendeau, Morrison, & Be'dard, 2010). Gibbons et al. (2017) determined TMT Part B to have the best sensitivity and specificity compared to four other cognitive tests including Trails A to screen for fitness to drive. Marshall et al. found TMT Part A and B to be one of three assessments to be the most useful screening tests to assess cognitive abilities relevant to predicting fitness to drive in patients with strokes (2007). Dawson, Anderson, Datrup, Uc, and Rizzo (2009) examined participants with Alzheimer's Disease and found poorer scores on TMT Part A related to significant increases in driving safety errors.

With the same purpose and set up as TMT Part A and B, the Comprehensive Trail-Making Test (CTMT) includes five subtests and was made to overcome the limitation of Part A and B being too brief and general (Reynolds, 2002). Reynolds (2002) reports that individuals with a learning disability or cerebrovascular accident (CVA) perform below the standardization sample. When compared to their normal peers, adolescents with a Traumatic Brain Injury (TBI) performed significantly worse on the CTMT, nearly 2 standard deviations below the control group mean (Armstrong, Allen, Donohue, & Mayfield, 2008). Armstrong et al. (2008) found that the CTMT was sensitive in detecting cognitive impairments in individuals with TBI. Overall, research referenced above displays CTMT's sensitivity to the presence of learning disabilities and cognitive impairments that affect skilled driving ability. However, research based specifically on driving performance and the CTMT is limited. For individuals with ADHD and ASD, those that performed poorer in cognition (assessed with the CTMT), visual function,

visual-motor integration, and motor performance made more driving errors than their peers when using driving simulator (Classen, Monahan, Brown, & Hernandez, 2013).

There is limited research on the TMT Part A and B and CTMT associated with young adults' driving performance. However, researchers of one study found no relationship between the performance-based executive function measures (TMT Part A and B) and driving performance of young adults (Pope, Ross, & Stavrinos, 2016). This current researchers hope to add to research in this area to determine if the TMT Part A and B scores are associated for new drivers with various diagnoses successful completion of a driver training program.

Dickerson, Meuel, Ridenour, & Cooper found that older adults' driving performance can be predicted by the interaction of physical, visual, and cognitive factors rather than one isolated factor supporting the idea that many factors need to be evaluated by an occupational therapist to determine driving performance (2014). Older drivers' performance can be predicted by the interaction of physical, visual, and cognitive factors rather than one isolated factor (Dickerson et al., 2014; Tarawneh, McCoy, Bishu, & Ballard, 1993). Similar to the Dickerson et al. (2014) study, this study will examine the following question: what are the factors associated with a new driver's successful completion of a driver training program? Researchers will be analyzing factors such as an individual's performance in occupations, assessment scores of TMT Parts A and B, and frequency and duration of a new driver training program. Researchers of the study hypothesize that factors associated with successful completion would include higher scores on TMT Parts A and B, independence with ADL and IADL, and increase duration of the driver training program.

Methods

Research Design

Researchers conducted a retrospective review of de-identified new driver client records from a Midwestern driving rehabilitation center. No identifiable information was collected, thus the study was determined to be exempt by the institutional review board at University of Indianapolis.

Participants

No human subjects participated in this study; all data were collected from 41 de-identified client records of young adults who participated in a Midwestern new driver training program. Inclusion criteria for client records were as follows: did not possess a state driver's license, evaluated by one of two occupational therapists with the CDRS certifications, participated in the Midwestern new driver training program, and had a referral signed by a physician. This study did not include information from client records who did not participate in the driver training program due to choice or severity of impairments identified during evaluation.

Data Collection

Prior to data collection, the client records were reviewed by two OT/CDRS to de-identify occupational therapy driving evaluation and discharge summaries as well as give each record an ID number. Data collection took place onsite of the Midwestern driving rehabilitation center for 5 weeks. The evaluation and discharge summaries were transcribed into a Microsoft Excel® spreadsheet that was stored on a password protected computer in a locked office at the University of Indianapolis. The evaluation and discharge summaries included in clinic evaluation, on the road evaluation information, and the total number of intervention billing units.

No identifiable health information was collected as a part of this study. All electronic data will be destroyed three years after the completion of the research project.

In clinic evaluation. Abundant data were collected from the OT/CDRS in clinic evaluations. Factors included levels of independence in occupational tasks from a Life Skills Checklist, identification of road signs, and lower and upper extremity strength, range of motion, and coordination. Narratives from children's parents were collected regarding their child's level of independence in life skills. Information was also collected regarding the therapist and parents' perception of clients' driving potential during the in clinic evaluation. Additional information collected during the in clinic evaluation included age, diagnoses, living situation, employment, school involvement, participation in leisure activities, and driving history. Cognition and executive function were measured using the TMT Part A and B. Vision was assessed with visual acuity, peripheral vision, and the Useful Field of View (UFOV) assessment.

Assessment tool reliability and validity. TMT Part A and B were found to be valid tests to measure executive function in adolescents with traumatic brain injuries (Allen, Thaler, Ringdahl, Barney, & Mayfield, 2012) and adolescents with brain dysfunction (Allen, Thaler, Barchard, Vertinski, & Mayfield, 2012). The UFOV is a cognitive assessment used to measure an individual's processing speed that has been reported to predict driving performance. The computer version of the UFOV was reliable and valid with 66 older adults (Edwards et al., 2005). With young adults, McManus et al. (2015) found the UFOV subtest 3 to significantly predict simulated driving collisions. Other researchers found both the TMT Part A and B and UFOV to be comparable and accurate in predicting older drivers on-road performance having a comparison p-value of .02 (Classen, Wang et al., 2013).

On the road evaluation and discharge summary. The on-road evaluation consisted of completing common car functions (apply seat belt, adjust mirror), driving performance with speed modulation, braking and acceleration, and lining a vehicle, decision making skills based on driving scenarios (following distance, 4 way stops), and behavioral observations while driving. The discharge summaries completed by the OT/CDRS included their recommendation for discharge, total number of intervention billing units (1 unit = 8 to 22 minutes) during the new driver training program, and if the client was successful or unsuccessful in completing the new driver training program. When a client was successful in the new driver training program, the OT/CRDS determined the client to be fit to drive and appropriate to take the state drivers test. When a client was unsuccessful in the new driver training program, the OT/CDRS determined the client to be not fit to drive and advised not to take the state drivers test.

Data analysis

Quantitative. Quantitative data analysis was carried out with Statistical Package for the Social Sciences (SPSS) version 25 using Spearman Rho and Mann-Whitney U. Spearman Rho was used to determine relationships of variables for clients who were successful or unsuccessful in the completion of the driver training program. After statistically significant relationships were identified, and continuous data failed to be normally distributed, variables across groups were compared using Mann-Whitney U-test.

Qualitative. Qualitative data were analyzed using a thematic approach to organize, identify, and record patterns in the data (Braun & Clarke, 2006). First, researchers became familiar with the data. Data was organized by successful and unsuccessful drivers and analyzed within like categories. These included: behavioral observations, parents' perception and therapist's summary of clients driving potential. Next, researcher divided into 2 teams to begin

initial coding data. After key words were identified of 10 client records within each category, researchers came together to insure consistency. Third, themes were identified with corresponding quotes among successful and unsuccessful groups. A table was developed to organize quotes into their thematic category. Themes were then reviewed to insure trustworthiness; member checking was used to validate themes with one of the evaluating CDRS. Lastly, themes and quotes were refined and analyzed in each category between successful and unsuccessful groups to determine conclusions.

Results

The client records reviewed were between the ages of 17 and 29 with diagnoses of ASD, ADHD, Generalized Anxiety Disorder (GAD), and other specified pervasive developmental disorders. The average age of the drivers was 20.1. These clients lived with various other individuals including but not limited to parent(s), step-parent(s), sibling(s), and grandparent(s), within their home in the Midwest.

Quantitative

Of the 41 individuals, 24 were successful in completing the new drivers training program, and 17 were unsuccessful. Successful individuals completed new drivers training program for a mean of 64.08 intervention units while unsuccessful new drivers completed the program for a mean of 42.25 intervention units (1 unit= 8-22 minutes). Individuals who successfully completed the driver training program were more likely to have adequate decision making skills for 4 way stops and recognizing an appropriate following distance as a passenger with statistical significance ($p < .04$) (see Table 1). While behind the wheel, successful individuals in the program were more likely to have adequate skills in maintaining appropriate traffic gaps, braking and accelerating, and lining the vehicle than unsuccessful drivers with statistical significance ($p <$

.05) (see Table 1). Lining the vehicle is the proper positioning of the vehicle in a lined parking spot. As seen in Table 2, statistical significance was not detected for the scores on TMT Part A ($p=.551$) and B ($p=.996$) between the success and unsuccessful group in the new drivers training program. No other between group data for successful completion of the driver training program were found.

Table 1

On-Road Assessment Results Between Groups

Category	Mann-Whitney U	Z	p<.05	N	r
Passenger Ride					
4 way stops	57.5	-2.83	.004	34	-.485
Following Distance	6	-2.073	.038	12	-.598
Behind the wheel					
Traffic Gaps	78	-1.973	.049	33	-.343
Braking and Acceleration	97.5	-2.499	.012	39	-.400
Lining Vehicle	96	-2.075	.038	36	-.346

Note. Significant at the p<0.05 level.

Table 2

Clinical Assessment Results Between Groups

Category	Mann-Whitney U	Z	p>.05	N	r
TMT Part A	161	-.596	.551	40	-.094
TMT Part B	180.5	-.043	.996	40	-.007

Note. Significant at the p<0.05 level.

Qualitative

A qualitative analysis of the life skills, behavioral observations, and therapists perception narratives indicated common characteristics of successful new drivers. The common characteristics were analyzed into six themes: independence in ADL, independence in IADL, emotional maturity, practical levels of anxiety, communication skills, and adequate on-road driving skills.

Themes common of life skills. Two themes were common in the successful group: (1) independence in ADL and (2) independence in IADL. Researchers found through parent report and therapists summaries, success in new driver training program was consistently paired with reported independence, “with basic self-care tasks”. Additional narratives included, “client is independent with self-care with minimal reminding” and “gets himself ready each day”. Continued independence and increased responsibility in basic self-care tasks allowed a therapist to report that a client can, “complete many higher level ADLs independently”. Compared to the parents of the successful clients, the parents of the unsuccessful drivers reported, “client requires assistance with high level ADLs” and that client has, “anxiety completing all self-management”.

The second theme is independence in IADL tasks. Parents of the clients who were successful reported clients to have independence with meal preparation, clients were “able to cook for himself”, “complete light meal prep independently for quite some time”, and “regular responsibilities [of].. doing the dishes”. Clients were also responsible for their medication management, “he takes his medications regularly” and “he manages his own medication”. Taking care of pets was a third IADL clients were responsible for such as “taking care of the dog”, “taking care of the family pets” and “taking care of the cat”. Clients had independence with other IADL such as, “manages his own bank account” and “mowing the lawn”. Clients who

were unsuccessful in the training program required assistance with medication management as reported, “his parents do a fair amount in terms of managing client’s medication routine” and, “he needs reminding to take his medication”.

Themes common of behavioral observations. Three themes were common to the successful group: (1) emotional maturity, (2) practical levels of anxiety, and (3) communication skills. Emotional maturity can be depicted through the following therapist narratives. One therapist described a client to have “significant emotional maturity, and... [it] impacts his ability to take on the task of becoming an independent driver”. Another client “demonstrated some insight as he is aware of his overly cautious nature and his fear of driving that may interfere with his goal”. These represent the emotional maturity displayed in successful drivers. Of the unsuccessful group the theme of emotional immaturity was revealed when a client “raised his t shirt at one point to scratch an itch or access something on his stomach and his mother had to cue him that it was not appropriate.” Another client “appears to have issues with emotional maturity, this may be a barrier to a successful outcome”.

The second theme is related to anxiety. Therapists noted the successful clients showed practical levels of anxiety compared to overwhelming, debilitating levels associated with unsuccessful drivers. The therapist recognized that a practical level of anxiety was a positive trait as it indicates the client has a heightened state of alertness and attention to address the diverse driving environments. The therapist reported that one individual in the successful group, “stated she was very nervous, however; she offered insight into her anxiety and smiled appropriately throughout”. Another successful client had, “worked hard to learn to express herself verbally and manage her anxiety”. Comparatively, the therapist noted, “client’s inability to manage his stress

and anxiety behind the wheel of a car could lead to serious, life/death consequences” which led to unsuccessful completion of new driver program.

The last behavioral observation theme is communication skills. The following quotes describe how the evaluating therapist recognized communication skills that stood out to her. A therapist reported an individual who was successful to have, “answered questions thoughtfully in the clinic. He demonstrated some insight into his challenges”. Another successful client showed communication skills as, “he would thoughtfully ask for a greater explanation if he did not understand a concept or word”. In contrast, one therapist documented an unsuccessful client, “demonstrated a tendency to be concrete in thinking and when giving answers... [he] was not able to abstract further... his answers were at times tangential from original line of question”. Lastly, another unsuccessful client had, “difficulty articulating his thoughts in a clear and coherent managing care of the family pets.”

Theme common of therapists’ perception. A theme common to the successful group was adequate on-road skills which are the basic skills required to drive a car through a low complex level environment. For example, a driver’s skills were described as “He physically handled the car well. His turns were smooth and accurate. His lane position was good in the neighborhood. He demonstrated smooth and adequate braking and acceleration.” Additionally, descriptions of “performance in the vehicle was above average overall with good understanding of road rules and applies them correctly while maintaining adequate physical handling of the vehicle” were reported. Unsuccessful clients showed less than adequate skills as described by, “he needed cueing on many occasions when approaching intersections, when other vehicles were present, and in “putting it all together”... he had a few critical errors (hitting a curb, missing a stop sign, and attempting to pull in front of a moving vehicle that he should yield to)”. An

unsuccessful client described as not having adequate on-road skills “made errors at several traffic lights and was not able to consistently navigate two and four way stops. This is indicative of a combination of a lack of consistency and poor understanding of the road rules”.

Discussion

Quantitative

On-road driving skills such as braking/accelerating, lining up the vehicle and judging traffic gaps were associated with successful completion of a new driver training program.

Walshe, McIntosh, Romer, & Winston (2017) found poor lane positioning and poor braking performance to be more common for young adult drivers with ASD as compared to typically developing young adult drivers. The results from this study suggest the importance of on-road evaluations when considering young adults’ driving potential. Researchers also indicated the need for young adult drivers with ASD to be able to practice these skills (Walshe et al., 2017).

While they suggested practicing skills using a simulator to ensure a safe environment, our experience with a CDRS suggests their clinical judgment is sufficient to decide the resources used to practice on-road skills. Additional skills associated with successful completion include adequate decision making for 4 way stops and recognizing an appropriate following distance within the car as a passenger.

For this population of new drivers, the TMT Part A and B were not found to be connected to successful completion of a new driver training program. Similarly, Pope et al. (2016) found executive function measure TMT Part A and B did not show association with young adults’ driving performance. Although our results suggest TMT Part A and B are not representative of new drivers with ASD, ADHD and GAD, driving programs should further investigate the use of TMT with this population. While TMT Part A and B assesses executive function as a whole,

previous research by Walshe et al., (2017) identifies the need to assess one executive function skill at a time. However, with other populations researchers found TMT Part B to be a valid predictor of on-road performance amongst community-dwelling older drivers, patients with Parkinson's disease, and patients with brain injury (Classen, Wang, et al., 2013; Classen et al., 2011; Uc et al., 2006; Mullen et al., 2010). Additionally, Marshall et al. (2007) found TMT Part A and B to be one of three assessments to be the most useful screening tests to assess cognitive abilities relevant to predicting fitness to drive in stroke patients. Therefore, future research is necessary to determine if TMT Part A and B are valid predictors of on-road performance of new drivers.

Unsuccessful drivers received less intervention units in the new driver training program than successful drivers. The OT/CDRS reported that within the first 10 hours of training it often becomes clear if individuals will be successful in the program based on client's improvements in driving skills. OT/CDRS whose clients are showing little improvement in driving skills in the first 10 hours of training should consider discharging patients to eliminate unnecessary use of intervention units and resources.

Qualitative

Life skill. In the current study, parents of clients who were successful in the new driver training program frequently reported the client's independence to complete ADL and IADL tasks. Previous studies in this area have similar findings. In order to properly perform self-care activities, an individual needs to be able to maintain attention, have an understanding of the ADL, motivation to perform the ADL, and proper motor functioning (Guidetti & Tham, 2002). Self-care ADL and IADL such as: home establishment and management, meal preparation and cleanup, safety and emergency, shopping and self-care have been shown to relate to overall

functional performance in individuals (Mann et al., 2005; Arbesman & Logsdon, 2011; Goverover, Chiaravalloti, & DeLuca, 2008; McNulty & Fisher et al., 2001; Brown, Rempfer, & Hamera, 2002). Researchers found a relationship between IADL performance and performance on a behind-the-wheel driving assessment in older adults, suggesting that observation of IADL performance can predict driving ability (Dickerson et al. 2011). The research above supports this study's findings in the importance of assessing independence with ADL and IADL during a driving evaluation.

Behaviors. Researchers found that therapists frequently reported emotional maturity, communication skills, and practical levels of anxiety of successful clients in the new driver training program. Based on qualitative themes, researchers concluded that new drivers who demonstrated emphasized behaviors listed above were more likely to succeed in a new driver training program. Similar studies identified that high levels of anxiety correlated with dangerous driving, and that individuals who demonstrated impulsive-sensation seeking or emotional immaturity, and anxiety demonstrated poor driving performance (Poó & Ledesma, 2013; Wang , Qu, Ge, Sun, and Zhang, 2018). Observing the behaviors of new drivers can help CDRS occupational therapists determine pre-driving skills and the likelihood of these individuals on their success rate of a driving program.

Perception. As discussed by Classen, Mohoanon, and Wang (2013), individuals with ADHD and ASD have decreased performance in planning, attention, motor performance, and sequencing which affects driving performance. In the current study, adequate skills in basic driving were highlighted by therapists for those who were successful. The mentioned characteristics by Classen, Mohoanon, and Wang (2013) are basic skills needed for driving. Therapists' perception of clients having adequate skills for basic driving tasks is supported by the

quantitative results that the performance with on-road skills was statistically significant in the groups who were successful.

Limitations

The limitations of this study include sample size, decreased generalizability, and lack of objective life-skill measures. There was a small sample size with 41 charts reviewed. Additionally, the sample was a small group of individuals who were all located in the Midwest. These individuals had access to this particular clinic, which is not representative of the general population of new drivers with ASD, ADHD, GAD, and other specified pervasive developmental disorders.

Implication for practice and recommendations for future research

The findings of this study have the following implications for occupational therapy practice. Important considerations when evaluating young drivers success are on-road skills, independence in IADL and ADL, communication skills, emotional maturity, and practical levels of anxiety. OT/CDRS should investigate the use of other executive function assessments for new drivers rather than TMT Part A and B. Future research should be completed to determine on-road skills that predict success in a new driver training program. Additionally, further research needs to be conducted to determine if TMT Parts A and B are predictors of driving performance in young adults.

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