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Transportation and Vision Loss: Where are we Now?

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Abstract

Transportation barriers prevent many persons with disabilities, particularly persons with visual disabilities, from engaging in many typical and desired life activities. A focus group of orientation and mobility providers, a survey of persons with blindness or low vision, and an intervention study assisting persons with vision loss with their employment-related transportation were conducted to learn more about transportation issues faced by persons with visual disabilities. Results indicate that persons with visual impairments who are unable to drive need support finding and accessing transportation options. Some persons with low vision may be able to drive using bioptic devices but those persons must receive appropriate evaluations and training in the use of those devices. Persons with visual disabilities reported limiting their participation in social and leisure activities and visiting family and friends, potentially resulting in social isolation. Service providers are advised to engage persons with vision loss in discussions about available transportation resources.

Transportation remains complicated or impossible for a significant portion of the U.S. population known as the “transportation-disadvantaged” (Government Accountability Office, 2013).

Approximately 80 federally funded programs in eight different agencies serve the transportation-disadvantaged, a group that includes people who are elderly, have disabilities or low incomes, or those unable to access public or private transportation systems (GAO, 2013). People with

disabilities who live in rural areas face additional challenges obtaining and accessing transportation (Gonzales, Stombaugh, Seekins, & Kasnitz, 2006).

Transportation and Vision Impairment

Both driving and use of public transportation pose unique problems for persons who are blind or have low vision. Currently 42 states allow eligible persons with visual impairments to drive with the use of a bioptic telescope (International Academy of Low Vision Specialists, 2015).

However, this option is available to only a small percentage of persons with vision loss and is not feasible to those with more severe visual impairments or blindness. Persons with vision loss do not usually benefit from the vehicular modifications that may be helpful to persons with other physical disabilities. Consequently, independent access to private transportation has traditionally been impossible for persons with blindness or severe low vision. Assistance from family and friends is a typical alternative for persons with vision loss.

Using public transportation is also difficult for persons with blindness or low vision as the environmental cues associated with accessing it are designed for persons with vision and are frequently inaccessible (Marston & Golledge, 2003). Despite the Americans with Disabilities Act, sometimes transit stops are not marked, drivers may not call out stops, or riders may find the route to reach public transportation is unsafe or inaccessible. These factors reduce public transportation options for persons with vision loss.

Lack of access to transportation has been identified as a major employment barrier for persons with vision loss (Crudden, Sansing, & Butler, 2005; Crudden & McBroom, 1999), causing some to decide not to apply for jobs or to decline employment (Bjerkan, Nordtømme, & Kummeneje, 2013). Some people with vision loss choose where to live based on availability of

transportation (American Foundation for the Blind, 2003) or the ability to navigate the neighborhood (Golledge & Marston, 1997).

Transportation Access and Mental Health

Independent travel allows participation in not just employment, but community and recreation activities. The inability to travel independently can result in discouragement and a perceived loss of freedom (Montarzino, Ambrecht, Findlay, Hine, & Dhillon, 2007). Persons who lose the ability to drive due to vision loss may experience isolation or depression (DeCarlo, Scilley, Wells, & Owsley, 2003) and frustration associated with their dependence on others (Golledge & Marston, 1997; Salomone & Paige, 1984). Lack of transportation may then result in reduced socialization and participation in leisure activities, thereby exacerbating feelings of isolation.

When traveling, persons with blindness or low vision must concentrate and exercise increased effort and attention. When going to a new place or using a new route, a person with low vision may experience “tension, anxiety and feelings of insecurity” (Passini, Dupre, & Langlois, 1986, p. 906). Although open areas, such as lobbies and parking lots, are more difficult for persons with vision loss to navigate (Passini et al., 1986), urban areas are more stress inducing for older people, potentially due to the excessive stimuli and dynamic environment (Rutberg, 1976).

People who are blind or have low vision face numerous obstacles to accessing and using transportation. To identify and attempt to address some of these obstacles, particularly as they apply to employment, The National Research and Training Center (NRTC) on Blindness and Low Vision conducted three research activities investigating transportation issues faced by

persons with vision loss. Summaries of the results and implications for future research and practice are presented.

To explore issues associated with transportation and blindness and low vision, and particularly how transportation impacts employment, the NRTC conducted a focus group with O&M providers and an electronic survey of persons who are blind or have low vision. We also designed, implemented, and evaluated an intervention to assist persons who are blind or have low vision in locating and securing transportation to work. Research questions included: How often is public transportation used and what are barriers to its use? What activities are limited by lack of transportation? How does access to transportation affect participation in employment? What issues influence low vision drivers using bioptic devices? What transportation tasks are most stressful and how does transportation stress limit activities? How confident are people with visual impairments in planning and using transportation? How does a transportation intervention impact social problem-solving, transportation knowledge, transportation self-efficacy, and access to employment?

Orientation and Mobility Provider Focus Group

Orientation and mobility specialists provide individualized instruction to persons with vision loss about the ability to travel safely and efficiently between and within different environments. Because these providers address strategies associated with overcoming transportation barriers, their perspectives were sought concerning the major transportation challenges experienced by persons with vision loss and innovative strategies in overcoming those barriers. The focus group was conducted at a national professional conference and included six O&M instructors working with adolescents or adults with vision loss.

Participants reported that persons in rural areas usually lack public transportation and rely on family and friends for transportation and those using service animals sometimes experienced further limitations due to drivers being unwilling to have the animals in their vehicles. Persons in urban areas had travel problems associated with use of public transportation, such as limited service, long wait times, and unreliability of service. Persons with vision loss living further from metro areas tended to have problems with transportation being unreliable, causing them to be late for appointments or work. Public transportation was also a problem for persons who needed it for weekend or evening use when services were more limited. Participants reported that because of the expense associated with it, few people with vision loss can rely on cab services for ongoing transportation needs.

Participants agreed that transportation barriers limit employment opportunities for persons with vision loss. Some with access to public transportation were reluctant to use it due to safety concerns. O&M providers reported observing some innovative transportation strategies that included use of bioptic devices, negotiating individual transportation plans with private providers or public systems, hiring a driver, and relocating closer to the job site. Additional information about O&M provider perspectives can be obtained from the article by Crudden (2015) on the reference list.

Transportation Survey

A draft survey about transportation issues was developed with participation from persons who are blind or have low vision. The survey included items about transportation and travel skills, as well as demographic items. The survey was pilot tested and implemented using an electronic platform and logic was imbedded in the survey so that each participant only received applicable items. The first administration was to persons 18 to 65 years of age in the NRTC's participant

registry of volunteers with visual impairments. The link was sent to approximately 255 persons between September and November 2013, yielding 140 useable surveys. A \$25 gift card was sent to 126 persons who provided their contact information and completed the entire survey. After slight modifications to formatting and adding a few items, the survey was opened in January and February 2014 to all persons with visual impairments between 18 and 65 years of age. The link was disseminated on the NRTC's webpage, through major consumer groups, the NRTC's national advisory board, and through personal contacts. Participants could forward the link to others. Participants who completed the survey and provided contact information were entered into a drawing for a \$100 gift card. Six gift cards were awarded from the pool of 353 respondents. The combined total of useable surveys was 492 as one person completed both versions of the survey.

Survey participants were predominantly White (77.4%). Over half were legally blind (53.9%), 38.2% were totally blind, and 7.9% had less severe visual impairments. Participants tended to be well educated with 31.7% having graduate or professional degrees, 28.4% bachelor's degrees, 28.8% associate's degrees or some college, 8.7% a high school diploma, and only 2.5% with no high school diploma. Participants were employed (48.6%), self-employed (7.6%), retired (10.7%), volunteers (9.4%), or unemployed (23.7%). Annual income ranges included 28.9% earning less than \$25,000, 22% earning \$25,000 to \$49,999, 13.4% earning \$50,000 to \$74,999, 15.8% earning over \$75,000, and 19.9% choosing not to answer. In regard to census region, 42.3% resided in the South U.S., 24.3% in the Northeast, 18.8% in the Midwest, and 14.5% in the West, and 92% lived in metropolitan areas. Participants could use more than one mobility device and most tended to use a white cane for travel (64.6%); 26.4% used a dog guide and 13.4% a wayfinding device, though 23.6% did not use a mobility device.

Results from the transportation survey and the resulting studies should be evaluated with caution given that the responses were from volunteers with vision loss who learned about the survey and completed it through electronic communication. Consequently, this sample was not representative of the population of persons with vision loss. Additionally, the sample included a larger percentage of people who are employed, White, with higher education, and with access to public transportation than would be expected in the population of working age persons with vision loss.

Transportation Use and Activities

Most participants (81.3%) had access to fixed-route transportation, though 11.5% did not use it and 16.5% used it less than once per month. Those who used public transportation infrequently were asked why and the most common reasons were difficulty getting to a destination (56.6%), inconvenience (53.8%), fears about safety (35.9%), unreliability (30.2%), and insufficient shelter from weather while waiting (28.3%). Another 21.2% of the participants used transportation six or more times per week, 14.4% used it four to five times per week, 16% used it two to three times per week, and 5.5% used it at least once per week. Of the 106 participants without access to public transportation, 93.1% said they would use it if it were available.

Over one-third (38.1%) of participants reported declining employment due to transportation concerns. Among unemployed participants, 51% reported that their employment was limited by lack of transportation but only 29.1% said lack of transportation was the reason they were not working. Employed participants relied on combinations of public transportation (41.9%); paratransit (30.2%); walking (25%); riding with a spouse or family member (18.2%);

using a taxi (11.4%); or riding with volunteers, carpools, or hired drivers (17.6%) to get to and from work, with 2.6% driving themselves.

Lack of transportation causes participants to limit their participation in entertainment or leisure activities (72.4%), visiting their friends or family (66.2%), shopping for groceries (41.5%), other shopping (56%), and participating in volunteer work (46%). Fewer participants reported limiting their employment (37.1%), going to medical appointments (35.7%), or going to worship services (34.9%) due to lack of transportation. Additional information about the survey and participant responses can be found in the article by Crudden, McDonnall, and Hierholzer (2015) in the reference list.

Transportation and Stress

Even when transportation was available, stress associated with transportation sometimes limited survey respondents' participation in typical daily activities. Over half of the survey respondents with transportation limited their participation in entertainment or leisure activities (59.7%) or visiting family and friends (50.1%). Other activities limited by transportation stress were other shopping (45.7%), grocery shopping (35.9%), volunteer activities (35%), medical appointments (32.8%), worship services (29.1%) and employment (23.5%). The most stressful transportation activities were walking in unfamiliar environments and in urban areas where sidewalks were unavailable, accessing unfamiliar bus routes, and crossing intersections without a signal, but the length of time since vision loss was associated with lower stress in walking activities. Older persons and those with additional physical disabilities reported more stress using public transportation. Persons who received O&M training and those who used public transportation more often had less stress associated with its use. For more information about how stress

impacts both walking and use of public transportation among person with vision loss, see the article by Crudden, Cmar, and McDonnall (2017) in the reference list.

Transportation and Self-Efficacy

Survey respondents employed full-time had higher transportation self-efficacy and higher confidence in their ability to perform transportation tasks, such as giving directions to a driver, asking someone for transportation assistance, or riding a bus or shuttle. Tasks where respondents had lower confidence were arranging transportation with a co-worker or someone at a nearby business, finding and hiring a driver, or negotiating with a driver for a fair price. Persons with high self-efficacy were more likely to be employed, particularly if they were younger.

Drivers with Low Vision

A small number of survey respondents (17), had a valid driving license. Low vision drivers had a mean age of 55.45 years, 58.8% owned a car, and six reported using bioptic devices to drive. Respondents limited their driving at night (82.4%), reduced their speed (64.7%), limited driving duration (64.7%), and/or restricted their routes (58.8%) due to their vision impairment. Vision loss also caused drivers to limit some of their activities, such as participating in leisure or entertainment (70.6%), visiting family or friends (47.1%), and shopping other than grocery shopping (29.4%). Although 14 of the 17 low vision drivers had access to public transportation, only six reported frequent use. For more information about driving with low vision, see the article in the reference list by Crudden, Steverson, and Cmar (in press).

Transportation Intervention

A transportation coordinator provided individualized assistance to persons who are blind or visually impaired to assist them in securing transportation to and from work. State vocational rehabilitation counselors referred persons with vision loss who needed transportation assistance.

Participants were placed into an intervention or a comparison group based on geographic location. The coordinators worked individually with persons in the intervention group to identify transportation goals, options, and resources, and to develop an individualized transportation plan. The coordinator attempted to assist the participants in generating solutions, addressing challenges, breaking tasks into manageable steps, and planning for the future.

Participants in both groups completed pre and posttest measures by telephone that included the *Social Problem-Solving Inventory, Revised (SPSI_R)*, short form (D'Zurilla, Nezu, & May-deau-Olivares, 2002) and two instruments constructed by the research team, one measuring transportation self-efficacy and another measuring transportation knowledge. Comparison group members received a gift card after completing pre and posttest measures as well as a document describing transportation options (Crudden, 2014) while intervention group participants received gift cards at posttest. Intervention group participants also received an O&M screening prior to implementation of the intervention.

The intervention group had significantly higher scores for social problem-solving skills at posttest than the comparison group and both groups had improvement in their transportation self-efficacy and transportation knowledge, with intervention participants having higher scores, though differences between the groups were not significant. The majority of the intervention participants were satisfied with the intervention and recommended it for others with vision loss. Results of the transportation self-efficacy scale indicate that participants in both groups tended to have confidence in their abilities to find and access transportation. However, arranging a ride with someone working nearby, finding and hiring a driver, and finding transportation options on the internet were tasks with lower confidence levels. The lack of a random sample and the number of persons who dropped out of the intervention group mean the results must be

interpreted with caution. For further information concerning the intervention and its outcomes, see the article in the reference list by Crudden, Antonelli, and O'Mally (2017).

Discussion

Most people recognize that giving up or being unable to attain a driver's license is a hardship in our society, yet this is a common experience for persons with visual disabilities. Some persons with vision loss could retain the ability to drive if they were referred for and received the necessary assessments and training in the use of bioptic devices. However, most bioptic drivers restrict their driving in some ways and those restrictions can limit their participation in some activities, particularly those that occur at night.

Previous research has documented that transportation is a barrier to employment for persons with visual disabilities (Bjerkan et al., 2013; Crudden & McBroom, 1999; Montrazino et al., 2007) but there is scant research about how transportation barriers might influence participation in other life activities. Service providers should be aware that while there are numerous government programs that attempt to facilitate transportation, persons with vision loss face unique challenges and no one service delivery system is designated to address those challenges.

Our research found that transportation issues continue to be an employment barrier for persons with vision loss. However, lack of adequate transportation is also limiting participation in other life activities, such as entertainment and leisure pursuits, visiting family and friends, shopping, and volunteer activities. Transportation to medical appointments and to worship services were also limited, but less so than other areas, including employment. When participation in these life activities is limited, particularly those activities that involve socialization with others, persons with low vision may be at risk for isolation and ultimately,

depression. Efforts should be made to identify and address transportation barriers so that persons with vision loss can maintain their desired participation in social and community activities.

Navigating transportation options and making transportation arrangements appear to be complicated tasks that can be difficult for persons with vision loss even when they have at least average social problem-solving skills and confidence in their transportation abilities. When traveling, persons with vision loss, particularly those who are older or with additional disabilities, may experience high levels of stress. Traveling is even more stressful when the environment is unfamiliar. Stress associated with travel apparently causes some people with vision loss to avoid it, and consequently, the opportunity to participate in activities. It is important for service providers to remember that difficulty with travel for persons with vision loss goes beyond availability as even when transportation is available, individuals may determine they are unwilling or unable to tolerate the stress associated with it.

Our intervention project found that participants benefitted from having a transportation coordinator meet with them to discuss their transportation needs and options. Persons with vision loss typically will not have a service provider designated with engaging them in these types of discussions. The emergence of self-driving vehicles is eagerly anticipated by persons with vision loss but until independent travel becomes more accessible to persons with vision loss, it may be helpful if all social and medical service providers discuss transportation resources and options. The transportation guide developed by the NRTC can be accessed at:

<http://www.blind.msstate.edu/our-products/transportation-guide/> and is available for

dissemination to persons with vision loss. Interested service providers can find additional transportation information to support consumers with blindness and low vision at:

<http://www.blind.msstate.edu/search/search.php?q=transportation&x=0&y=0>.

References

- American Foundation for the Blind. (2003). *Livable communities project 2003*. Retrieved from: <http://www.afb.org/info/afb-research-projects-archive/livable-communities-2003/23>
- Bjerkan, K. Y., Nordtømme, M. E., & Kummeneje, A. M. (2013). Transportation to employment. *Scandinavian Journal of Disability Research*, 15, 342-360.
- Cmar, J. L., McDonnall, M. C., & Crudden, A. (in press). Transportation self-efficacy and employment among individuals with visual impairments. *Journal of Vocational Rehabilitation*.
- Crudden, A. (2014). *A transportation guide for persons who are blind or have low vision*. National Research and Training Center on Blindness & Low Vision at Mississippi State University. Retrieved from: <http://www.blind.msstate.edu/our-products/transportation-guide/>
- Crudden, A. (2015). Transportation issues: Perspective of orientation and mobility providers. *Journal of Visual Impairment & Blindness*, 109(6), 457-468.
- Crudden, A., Antonelli, K. & O'Mally, J. (2017). A customized transportation intervention for persons with visual impairments. *Journal of Visual Impairment & Blindness*, 111(4), 341-353.
- Crudden, A., Cmar, J. & McDonnall, M. C. (2017). Stress associated with transportation: A survey of persons with visual impairments. *Journal of Visual Impairment & Blindness*, 111(3), 219-230.
- Crudden, A. & McBroom, L. W. (1999). Barriers to employment: A survey of employed persons who are visually impaired. *Journal of Visual Impairment & Blindness*, 93(6), 341-350.

- Crudden, A., McDonnall, M. C., & Hierholzer, A. (2015). Transportation: An electronic survey of persons who are blind or have low vision. *Journal of Visual Impairment & Blindness*, 109(6), 445-456.
- Crudden, A., & Sansing, W. (2011). Unmet needs: Service issues for persons who are blind or have low vision. *Journal of Visual Impairment & Blindness*, 105, 170-180.
- Crudden, A., Sansing, W., & Butler, S. (2005). Overcoming barriers to employment: Strategies of rehabilitation providers. *Journal of Visual Impairment & Blindness*, 99(6), 325-335.
- Crudden, A., Steverson, A., & Cmar, J. L. (in press). Drivers with low vision: Characteristics and transportation issues.
- D’Zurilla, T. J., Nezu, A. M., & May-deu-Olivares, A. (2002). *Social Problem-Solving Inventory-Revised (SPSI-R)*. North Tonawanda, NY: Multi-Health Systems.
- DeCarlo, D. K., Scilley, K., Wells, J., & Owsley, C. (2003). Driving habits and health-related quality of life in patients with age-related maculopathy. *Optometry and Vision*, 80(3), 207-213.
- Golledge, R. G. & Marston, J. R. (1997). Attitudes of visually impaired persons toward the use of public transportation. *Journal of Visual Impairment & Blindness*, 91, 446-459.
- Gonzales, L., Stombaugh, D., Seekins, T., & Kasnitz, D. (2006). Accessible rural transportation: An evaluation of the Traveler’s Cheque Voucher program. *The Community Development Society*, 37(3), 106-115. Retrieved from:
<http://www.tandfonline.com/doi/pdf/10.1080/15575330.2006.10383112>
- Government Accountability Office. (2013). *Transportations-disadvantaged populations: Coordination efforts are underway but challenges continue*. GAO-14-154T. Washington, DC. Retrieved from: <https://www.gao.gov/assets/660/658766.pdf>

- International Academy of Low Vision Specialists (2015). DMV state driving laws. Retrieved from: <http://ialvs.com/dmv-driving-laws/>
- Marston, J. R., & Golledge, R. G. (2003). The hidden demand for participation in activities and travel by persons who are visually impaired. *Journal of Visual Impairment & Blindness*, 97, 475-488.
- Montarzino, A., Ambrecht, A., Findlay, C., Hine, J., & Dhillon, B. (2007). The impact of mobility and public transport on the independence of visually impaired people. *Visual Impairment Research*, 9, 67-82.
- Passini, R., Dupre, A., & Langlois, C. (1986). Spatial mobility of the visually handicapped active person: A descriptive study. *Journal of Visual Impairment & Blindness*, 80(8), 904-907.
- Rutberg, J. E. (1976). Orientation and mobility in the urban environment: A form of "Future Shock." *New Outlook for the Blind*, 70(3), 89-93.
- Salomone, P. R., & Paige, R. E. (1984). Employment problems and solutions: Perceptions of blind and visually impaired adults. *Vocational Guidance Quarterly*, 33, 147-156.

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