

# Travel Patterns, Needs, and Barriers of Adults with Autism Spectrum Disorder

## Report from a Survey

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Although autism spectrum disorder (ASD) has received a substantial amount of attention in other fields, very little appears in the transportation literature about people with ASD. Because the National Household Travel Survey and metropolitan travel surveys do not classify people with ASD as a separate category of persons with disabilities, very little information is available about their travel patterns, needs, or barriers. To bridge the existing information gap, this paper provides results from a recent survey that focused exclusively on adults with ASD in New Jersey to learn about their travel patterns, the importance of the various types of trips they make, and the barriers they encounter regarding the use of different transportation modes. The survey, distributed through various organizations throughout the state, was completed by or for 703 adults. Because the objective of the paper is to provide as much information as possible from the survey, no attempt has been made to compare the travel patterns, needs, and barriers of the survey respondents with those of the general population. However, other researchers can easily compare the survey results provided in this paper with data from other sources. Although the survey generated other valuable information, the most revealing information pertained to barriers to walking, driving, taking public transit, and even taking rides from others. The information collected through this research is being shared through outreach efforts with agencies that provide or fund transportation to persons with disabilities in New Jersey.

Reliable national or statewide data on the number of adults with autism spectrum disorder (ASD) are not readily available. However, data for children provide some insights about the prevalence of ASD for the nation and some of its parts. According to the latest report on the subject by the Centers for Disease Control and Prevention (CDC), the prevalence rate for ASD among 8-year-olds in the United States is 14.7 per 1,000 children (1). Among the CDC's 14 Autism and Developmental Disabilities Monitoring Network sites in the country, the New Jersey region has a prevalence rate of 21.9 per 1,000 children, which is the highest among all sites. Yet very little is known about the travel patterns or mobility barriers of the significantly large and growing population of persons with ASD. This research bridges a gap in the existing knowledge base

by providing insights from a survey of 703 adults with ASD in New Jersey. The objective of the paper is to provide summary information on travel patterns, needs, and barriers for the surveyed adults with ASD so that other researchers can compare the information with data from surveys of the general population and persons with other types of disabilities.

ASD represents a group of developmental disabilities (1). The newest version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), prepared by the American Psychiatric Association (2), describes the characteristics of ASD. Although autism was formerly considered a type of pervasive developmental disorder, DSM-5 created a single diagnosis, autism spectrum disorder, that includes autistic disorder, Asperger disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (3). Tantrums, aggression, self-injury, property destruction, and ritualistic destruction are some of the behavioral difficulties that may be demonstrated by persons with ASD (4). Cognitive issues often make it difficult for persons with ASD to describe their mental states and experiences (5).

Most of the studies on ASD address children instead of adults. However, because of the increasingly large number of children with ASD who are growing to adulthood, some studies also emphasized the importance of focusing on the needs and barriers of adults with ASD (6, 7). Among the studies pertaining to adults with ASD, most have focused on young adults and issues related to their employment (4, 8–13). It is difficult to know exactly what proportion of adults with ASD is gainfully employed; studies have provided estimates ranging from 15% to 50% (4, 10, 12, 14). Through a survey of young adults with ASD who had completed high school, Newman et al. found that the employed persons with ASD worked only 24 hours a week on average and their hourly wage rate was only \$9.20 (14). The study also found that only 17% of the respondents lived independently.

Many studies mentioned transportation for persons with ASD (15–22). However, these studies cannot be termed transportation studies, as most mentioned the importance of transportation only in the context of access to jobs or job training. In contrast to these studies, some studies were specifically focused on transportation, but instead of considering persons with ASD, they considered persons with developmental disabilities, of which ASD is one type. For example, Wasfi and Levinson prepared a comprehensive study on transportation needs for persons with developmental disabilities in Hennepin County, Minnesota, but the number of persons with ASD in the sample was small (23). Other studies, such as those by Carmien et al. (24), Sohlberg et al. (25), and Precin et al. (26), focused on transportation issues for persons with cognitive and intellectual disabilities. Dudley et al. prepared a report for Autism

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Calgary by specifically focusing on the transportation needs of persons with ASD, but the report included only a literature review and some discussions and did not provide any empirical data (27). Feeley conducted a general-purpose survey of adults with ASD in New Jersey, where she included a few questions on travel patterns and barriers (28). That study noted a high dependence of persons with ASD on friends and family for travel purposes. Sheppard et al. (29), Huang et al. (30), and Reimer et al. (31) focused on the driving skills of adults with ASD by taking into account small samples of individuals. One can conclude from these studies that only high-functioning persons with ASD can drive without significant problems. Even those who can drive often show poor visual function, motor function, and cognition.

Overall, the literature review conducted for this research indicated that transportation is only one of many barriers for persons with ASD. For some, physical and psychological characteristics often impose barriers to social interaction, education, and success in the labor market. However, transportation is very important for many adults with ASD because of their need to access important activities. Although a few transportation studies have been conducted regarding persons with developmental and cognitive or intellectual disabilities, studies that have specifically and comprehensively addressed all facets of transportation for persons with ASD have been rare.

## SURVEY AND RESPONDENTS

Because of the extreme difficulty in contacting adults with ASD through random sampling, the authors resorted to a convenience sampling design and used 27 avenues to distribute the survey among potential respondents, including the use of websites and contact lists maintained by various organizations and agencies. In addition, members of the research team attended a number of events involving persons with ASD to publicize the survey.

The online survey was set up using Qualtrics. The survey instrument was approved by the Rutgers University's Institutional Review Board and pretested on approximately 20 adults with ASD or their guardians. The survey effort resulted in the collection of data from a total of 717 respondents, of which 14 were eliminated because they reported belonging to a state other than New Jersey. Thus, the total number of targeted respondents who completed the survey was 703. Most of the respondents completed the full survey, although some did not respond to specific questions. Of the total, only six surveys were received by mail from respondents who requested paper copies and the rest were completed online. Ninety-eight percent of the surveys were completed between June and December 2014; the remaining 2% were completed in the beginning of 2015. Different parts of the state were represented well as the respondents belonged to 240 of the state's 565 municipalities; the highest number of respondents belonging to one municipality was 12.

It is not surprising that only a small proportion of the surveys was completed by the adults with ASD themselves. Although they completed 6.7% of the surveys, parents completed 81.9%, counselors completed 3.6%, legal guardians completed 2.4%, and others, including siblings and schoolteachers, completed the remaining 5.4%. Although such a low self-completion rate would be unacceptable if the survey respondents were drawn from the general population, because of the inability of many persons with ASD to express their feelings and observations, the persons closest to them are often in a better position to express the needs and barriers of persons with ASD than they are themselves.

In addition to disability, a reason for the low self-completion rate for the adults with ASD is that 86.3% of them lived with their parents, 7.8% lived in assisted living centers or group homes, and only 2.5% lived alone (the remaining 3.4% lived with relatives, friends, and so on). Such a large proportion of the persons targeted by the survey lived with their parents partly because of their disability but also partly because of how relatively young they were. Among the persons who completed the survey or had the survey completed by others, 45.9% were between the ages of 18 and 21, 40.2% were between the ages of 22 and 29, and only the remaining 13.9% were 30 or older.

Some characteristics of the survey participants are important to note so that their responses can be fully contextualized. Although the DSM-5 mentions that men are four times more likely to be diagnosed with ASD than are women, the male to female ratio was 3.16 among the survey respondents. Of the respondents, 27.6% had less than a high-school diploma, 41.5% had a high-school diploma, and only 3% had a bachelor's degree or higher level of education. Partly because of their young age, 29.5% of the surveyed persons with ASD were students and another 20.2% were taking vocational training. Only 0.9% were employed full time, 15.9% were employed part time, 8.8% worked as volunteers, and another 6.9% were employed at sheltered workshops.

The travel patterns and barriers for adults with ASD cannot be fully comprehended without understanding the impairments that are related to the disability. Table 1 shows the responses, as well as the proportion of responses and the proportion of respondents, to a multiple-choice question in the survey about impairments. The proportion of responses is shown because the respondents were allowed to select multiple impairments. One can observe from the table that almost two-thirds of the respondents have difficulty with social interaction and almost half have difficulty with executive functioning and organizational skills. Other very common impairments include a focused area of interest and perseveration, sensory issues, cognitive and intellectual impairments, and mental health issues. These and other impairments listed in Table 1 are likely to have a significant effect on the way that these individuals travel. For example, social interaction issues can affect a person's ability to use mass transportation because it requires the person to be in close proximity to others, executive and organizational difficulties can make it strenuous to plan trips, and cognitive and intellectual difficulties can mean that an individual requires assistance from others while making trips.

## TRAVEL PATTERNS

### Travel Modes Used

Because persons with disabilities travel far less than the general population, instead of being asked about the travel modes they used on the day of the survey, they were asked which travel modes they had used during the past three months. The respondents were provided a list of travel modes to select from, with instructions to select all the modes they had used during the stipulated period. The responses to the question are summarized in Table 2, where it is evident that the most common practice for the respondents is to ride as passengers in vehicles driven by others. Most of these rides are given by parents, but rides provided by friends, volunteer drivers, and local government or nonprofit agencies also constitute large shares of the rides the respondents took. Only a very small proportion of persons with

**TABLE 1 Difficulties Related to ASD Experienced by Survey Respondents**

Impairment	Responses	Number of Responses (%)	Number of Respondents (%)
Severe cognitive or intellectual impairment	170	5.8	24.2
Mild cognitive or intellectual impairment	253	8.6	36.0
Some difficulty with speech	198	6.7	28.2
No speech	73	2.5	10.4
Other communication difficulties	208	7.0	29.6
Executive functioning or organizational skills difficulties	348	11.8	49.5
Social interaction and social literacy difficulties	460	15.6	65.4
Focused area of interest, perseverance, or both	301	10.2	42.8
Sensory issues (hyper- or hyposensitivities)	291	9.8	41.4
Self-care difficulties	112	3.8	15.9
Physical coordination issues	112	3.8	15.9
Coexisting mental health issues (depression, anxiety, and so forth)	236	8.0	33.6
Coexisting medical issues	138	4.7	19.6
Other, please specify	56	1.9	8.0
Total	2,956	100.0	na

NOTE: na = not applicable.

ASD drives; a much larger proportion walks outside their homes. The use of fixed-route transit, consisting of commuter train, light rail, and buses, is not very common, but Access Link, the Americans with Disabilities Act (ADA)–complementary paratransit service provided by New Jersey Transit (NJ Transit), seems to be used by many. Among the fixed-route transit modes, buses are used most commonly. This could be because buses typically pick up and drop off riders closer to their homes than do trains.

In addition to the question on travel modes used during the past three months, the respondents were asked about the frequency of using specific modes. The question on walking revealed that 55.2% of the respondents never walked in their neighborhoods, 25.9% sometimes walked, 14.2% often walked, and only 4.7% always walked. Similarly, the question on public transit use revealed that 61.4% of the respondents never used any form of transit, 31.5% sometimes used transit, 5.7% often used transit, and 1.4% always

**TABLE 2 Travel Modes Used by Adults with ASD During Past Three Months**

Travel Mode Used in Past 3 Months	Responses	Number of Responses (%)	Number of Respondents (%)
Drives himself or herself in a private car	22	1.6	3.1
Passenger in a private car with parents or family	480	35.8	68.3
Passenger in a private car with friends	98	7.3	13.9
Bus or van operated by a county, municipality or nonprofit agency (not school bus)	110	8.2	15.6
Taxi or other for-hire vehicle	52	3.9	7.4
Walk	201	15.0	28.6
Bicycle	41	3.1	5.8
Passenger in a private car with volunteer driver	84	6.3	11.9
NJ Transit train	38	2.8	5.4
NJ Transit light rail or subway	12	0.9	1.7
NJ Transit bus	45	3.4	6.4
Access Link from NJ Transit	88	6.6	12.5
SEPTA/PATCO public transportation services	3	0.2	0.4
Day program	6	0.4	0.9
Group home	6	0.4	0.9
School or educational institution	11	0.8	1.6
Other, please specify	44	3.3	6.3
Total	1,341	100.0	na

NOTE: SEPTA = Southeastern Pennsylvania Transportation Authority; PATCO = Port Authority Transit Corporation.

used transit. When those who never used transit were asked if they had considered using transit, 68.4% mentioned never considering it, indicating that approximately 42% of all respondents never considered using any form of public transit.

Because of the low likelihood that respondents drove, instead of directly inquiring about driving frequency, the respondents were first asked whether they had a driver's license; then those who had a license were asked how frequently they drove. As expected, only 9.3% of the respondents mentioned having a driver's license. Of this group, 23.9% drove every day, another 30.4% drove one or more times a week but did not drive every day, 19.4% drove less than once a week, and 26.1% never drove. The respondents were not asked how frequently they took rides from others, but the response to a question revealed that 97.6% of all respondents took rides from others for school, work, recreational, social, or other activities. In sum, the questions on travel mode use revealed that driving and taking fixed-route transit are not very common among the survey respondents. Although walking is more common, more than half the respondents never walked outside their homes. The most common mode of transportation for the persons with ASD is taking rides, and in most cases the rides are provided by someone in the same household.

### Trip Purpose by Travel Mode

The survey respondents who mentioned walking, driving, or taking any form of transit were asked three separate questions about the purposes of their trips by these modes. Because people make trips using the same mode for multiple purposes, the respondents were allowed to select as many trip purposes as were relevant from a given list. The responses to the questions are summarized in Table 3, where the bottom row shows the total number of responses for each mode. The lists of purposes for driving and public transit trips were the same, but additional purposes were listed as potential responses to walking trips.

It is evident from Table 3 that work or employment is not one of the most common trip purposes for any of the travel modes. The reason is that only a few of the respondents are gainfully employed. In contrast, a fairly large proportion of respondents for each of the three modes mentioned making trips for social and recreational purposes and for shopping and daily errands. For driving and public transit, the proportions of trips for education and vocational training and visiting families or friends are also substantial, but not many walking

TABLE 3 Trip Purposes by Travel Mode

Trip Purpose	Walking (%)	Driving (%)	Public Transit (%)
Work or employment	4.5	11.9	12.4
Education, vocational, or job training	6.2	10.1	21.5
Social or recreational activities	14.5	16.5	31.5
Medical and healthcare appointments	1.5	11.9	7.1
Religious activities	3.0	5.5	1.2
Visiting families and friends	8.5	16.5	12.4
Shopping or daily errands	17.7	18.3	9.7
Exercise	33.6	na	na
To get to bus stop or train station	8.1	na	na
Walking dog	1.7	na	na
Other purposes	0.9	9.2	4.4
Total	100.0	100.0	100.0
Total responses ( <i>N</i> )	470	109	340

trips are made for those purposes. The most common purpose for walking trips is exercise, but walking to transit stations is also not too uncommon. However, the responses clearly reveal that walking is not very common when it comes to trips to work, education, and medical or health appointments. Although it appears from Table 2 that more adults with ASD are capable of walking than driving or taking any transit mode, their low propensity to make walking trips for transportation purposes could possibly be the result of their destinations being too far from their homes or of other factors, including lack of adequate pedestrian infrastructure, parental opposition to independent walking, or both.

### TRAVEL NEEDS AND AVAILABILITY OF TRANSPORTATION

All respondents were asked through a series of questions about the purposes for which they needed transportation. They were required to select yes or no to indicate whether they needed or did not need transportation for specific purposes. The questions were not meant to learn about the gap between availability and need for transportation, but instead to learn about the importance of traveling for different purposes. The responses to the questions are summarized in Table 4.

TABLE 4 Transportation Needed for Different Purposes

Trip Purpose	Respondents			Percent			Total Respondents Selecting Yes (%) <sup>a</sup>
	Yes	No	Total	Yes	No	Total	
Work or employment	333	114	447	74.5	25.5	100.0	47.4
Education, vocational, or job training	408	63	471	86.6	13.4	100.0	58.0
Shopping or daily errands	408	70	478	85.4	14.6	100.0	58.0
Social or recreational activities	445	40	485	91.8	8.2	100.0	63.3
Support group	255	111	366	69.7	30.3	100.0	36.3
Religious services	245	126	371	66.0	34.0	100.0	34.9
Medical and healthcare appointments	433	48	481	90.0	10.0	100.0	61.6
Visiting family and friends	405	66	471	86.0	14.0	100.0	57.6

<sup>a</sup>Estimated out of 703 total respondents.

It can be observed from Table 4 that the need for transportation is felt the most for trips to social and recreational activities, followed respectively by trips for medical or healthcare appointments and education or training. Transportation is also very important for visiting family and friends and shopping and errands, but not so important for trips to religious activities, attending support group events, or employment. When the responses summarized in Table 4 are compared with the purposes of actual travel shown in Table 3, it becomes evident that there is a consistency between the trips made and the transportation needed for most purposes. One exception is trips for medical and healthcare purposes, for which the need for transportation is felt very strongly, but such trips are not made very frequently.

Another question in the survey inquired about the availability of transportation, both private and public, for trips with different purposes. The responses revealed that transportation is available to a greater extent for trips that have a higher need. For example, fewer respondents mentioned that transportation was unavailable for trips to education and training activities, medical and healthcare appointments, and shopping and errands than for trips to religious and support group activities. The results indicate that persons with ASD and their families make adjustments of time and resources to ensure that transportation is available for trips that are of high importance, but do not necessarily make such adjustments for trips of lower priority.

**MOBILITY BARRIERS**

The most important objective of the survey was to identify the mobility barriers encountered by adults with ASD. Pertinent to this objective, a number of questions were included in the survey that addressed issues related to the use of a specific mode, including walking, driving, taking rides from others, and taking public transit. The responses from the survey are summarized below for each mode.

**Barriers to Walking**

The survey respondents were given a list of potential barriers that could prevent them from walking in their neighborhoods. The list included the absence or poor quality of sidewalks, the absence of streetlights, poor quality of intersections or street crossings, traffic speed and volume, crime, and the absence of destinations nearby. In addition, the respondents were allowed to select a separate category

called “Other” and specify barriers that were not in the list. The barriers selected by most respondents from the list were absence of destinations (25.0% of respondents), traffic speed and volume (24.9%), and absence or poor quality of sidewalks (17.4%). The barriers selected least commonly were crime (5.3% respondents), absence of streetlights (8.7%), and poor quality of intersections and crossings (11.9%). Perhaps more important, 28.2% of the respondents selected the “Other” category and invariably specified their impairments related to the disability as barriers to walking. Thus, although the responses showed that some of the environmental barriers to walking encountered by the general population are also encountered by persons with ASD, the latter encounter additional barriers because of their impairments.

Although individuals without ASD might not think of walking in their neighborhoods as a difficult task, walking requires certain skills and abilities that many persons with ASD do not have. To examine whether the respondents had the critical skills to walk safely in their neighborhoods, they were asked whether they had any difficulty with various aspects of walking. Once again, they were given a list and instructed to indicate whether they had difficulty with one or more aspects. The responses are summarized in Table 5. It is evident from the responses that such basic skills as crossing roads, judging vehicle distance, and determining direction, which persons in the general population take for granted, are difficult for a large proportion of persons with ASD. In addition, a substantial proportion of persons with ASD also have to deal with distractions while walking because of their disability. Because of these difficulties, 53.5% of the respondents indicated in response to another question that they did not know how to safely cross a road without assistance from others.

**Barriers to Driving**

Unavailability of vehicles in their households is not a barrier to driving for most surveyed adults with ASD. The survey revealed that only 3.6% of the respondents lived in households without any vehicles; 26.4% lived in households with one vehicle, 46.9% lived in households with two vehicles, and 23.1% lived in households with three or more vehicles. However, only 9.3% of the adults with ASD had a driver’s license and many used it only as an identity card instead of as an actual license to drive. Of the 47 individuals who had a driver’s license, 61.4% mentioned that they had some form of difficulty when driving. In response to a question inquiring

**TABLE 5** Difficulty with Different Aspects of Walking

Difficult Aspect of Walking	Responses	Number of Responses (%)	Number of Respondents (%)
Crossing a street	290	16.7	41.3
Judging the distance, or speed of cars, or both	318	18.3	45.2
Walking in areas without sidewalks (on grass or in streets)	193	11.1	27.5
Dealing with distractions while walking	282	16.2	40.1
Too many people on the sidewalk	64	3.7	9.1
Too many cars or too much traffic	257	14.8	36.6
Difficulty determining directions or route	247	14.2	35.1
Other—please specify	86	5.0	12.2
Total	1,737	100.0	na

about specific difficulties, 55.3% of the persons with a driver's license mentioned difficulty dealing with traffic, 34.0% mentioned difficulty caused by distractions near roads, 27.7% mentioned difficulty judging distance, and another 27.7% mentioned difficulty with parking. Because of these difficulties, 26.1% of those with driver's licenses did not drive at all, 19.6% drove less than once a week, 30.4% drove once or more a week, and only 23.9% drove daily.

### Taking Rides from Others

As noted, the most common travel practice among the surveyed adults with ASD is taking rides from household members and others. Yet even taking rides from others involves difficulties for some persons with ASD. Among the survey respondents, 11.7% reported having difficulties when taking rides from others. Among those who experienced difficulties, 16.1% experienced anxiety, 14.3% displayed aggression, 12.5% displayed agitation, and another 12.5% demonstrated compulsive behavior. Fear, attempts to injure oneself, and unsafe behavior, such as trying to open car doors and unbuckle seatbelts, were also mentioned by some.

The unavailability of persons who could give rides is also a serious travel barrier for adults with ASD. Although they most commonly travel by taking rides, 72.8% of the respondents reported missing activities at least sometimes because of the unavailability of persons who could give rides when needed. The persons who provide those rides—mostly parents and other family members—must expend time and resources to provide the rides. When asked about such sacrifices, 73.2% of the respondents reported that the ride gives at least sometimes missed their own activities, including work, to

give the rides. Thus, despite being the most common form of travel for persons with ASD, getting rides from others is not always possible and it can be challenging for their family members to give rides when needed.

### Barriers to Taking Public Transit

As mentioned previously, 61.4% of the respondents never used any form of public transit, and among them, 68.4% never considered using it. To examine how the transit users and nonusers perceived the barriers to using transit, two separate questions were included in the survey, one for the transit users and the other for the nonusers. The same list of potential barriers was provided and the respondents were instructed to select all that they considered to be barriers to using transit. The results are summarized in Table 6, where the three columns on the left show the responses of the transit users and the three columns to the right show the responses of the nonusers.

It is evident from Table 6 that even among those who have used transit in the past, more than half have difficulty planning public transit trips by themselves, more than 40% have difficulty getting to transit stations or stops without help, and similar proportions are concerned about treatment by transit drivers and other passengers. Although perhaps little can be done by transit agencies to address some of these barriers, the survey also revealed that almost 50% feel that public transit is not available to take them where they need to go and 39% feel that they cannot get transit when they need to use it.

Because the proportion of transit nonusers who answered the question on barriers to using public transit was far smaller than the proportion of transit users who answered the question, the figures

TABLE 6 Barriers to Using Public Transit

Barrier	Transit Users (N = 195)			Transit Nonusers (N = 310)		
	Responses	Number of Responses (%)	Number of Respondents (%)	Responses	Number of Responses (%)	Number of Respondents (%)
Difficulty getting to the bus stop or train station without help	79	9.3	40.5	46	10.4	14.8
Difficulty getting on or off trains or buses	32	3.8	16.4	29	6.5	9.4
Public transportation service is not available when needed	76	9.0	39.0	37	8.4	11.9
Public transportation service is not available to destinations	94	11.1	48.2	52	11.7	16.8
Too many trip transfers needed	51	6.0	26.2	23	5.2	7.4
Public transportation fare is too high	26	3.1	13.3	8	1.8	2.6
Parents or guardians do not want the individual to use public transportation	33	3.9	16.9	19	4.3	6.1
Difficulty with planning a public transportation trip	99	11.7	50.8	45	10.2	14.5
Public transportation service is not reliable	53	6.2	27.2	25	5.6	8.1
Worried about crime on public transportation	58	6.8	29.7	31	7.0	10.0
Worried about finding a seat on a bus or train	42	4.9	21.5	19	4.3	6.1
Worried about public transportation driver friendliness or helpfulness	83	9.8	42.6	43	9.7	13.9
Worried about how other public transportation passengers will treat the individual	85	10.0	43.6	42	9.5	13.5
Other barriers	38	4.5	19.5	24	5.4	7.7
Total	849	100.0	na	443	100.0	na

in the sixth column are smaller than the figures in the third column, where the proportions for transit users are shown. Yet the barriers that apply to the two groups are similar in that not knowing how to plan transit trips, having difficulty going to transit stations and stops without help, not having transit service to destinations, and being concerned about treatment by drivers and fellow passengers are also the most common perceived barriers for transit nonusers.

Because individuals' awareness can influence their perception of barriers to using transit, all survey respondents were asked if they were aware of NJ Transit's reduced fare program, of its ADA-complementary Access Link service, and of county paratransit for persons with disabilities. Among the respondents, 53.1% mentioned being aware of the reduced fare program, 66.2% mentioned being aware of the Access Link service, and 39.9% reported being aware of county paratransit services. However, of the respondents who were aware of the reduced fare program, only 43.8% took advantage of it. Similarly, of those who were aware of the Access Link service, 49.2% never applied for eligibility; of those who did apply and were eligible, 78.4% reported using the service. In contrast, only 23.8% of the respondents who were aware of county paratransit services had ever used such services. In sum, despite being aware of transit programs and services to assist persons with disabilities, many adults with ASD cannot or do not take advantage of such programs and services.

The survey respondents were also asked if they had received any form of travel training. Only 31.7% reported having received such training. The most common practice appears to be receiving travel training from school instructors and parents. In response to a multiple-choice question, 77.9% reported receiving travel training from school instructors, 33.1% reported receiving training from parents, 18.8% reported receiving training from professional travel trainers, and 6.5% reported receiving training from therapists.

## CONCLUSIONS AND IMPLICATIONS OF THE SURVEY RESULTS

The primary objective of this paper was to provide information on the travel patterns, needs, and barriers of persons with ASD from a survey of adults in New Jersey. Although the intent of the survey was to collect data from adults of all ages, most survey respondents were below the age of 30 and lived with their parents.

The survey showed that the adults with ASD experience many difficulties that prevent them from participating in activities that others may take for granted, including employment. Although for adults without disabilities it may be common to make work trips several times a week, the proportion of work trips is small among persons with ASD. However, many regularly travel for education and training. The survey showed that education and training, healthcare appointments, shopping and errands, and visiting friends and family members are their predominant trip purposes.

The survey also showed that persons with ASD have many travel-related concerns and barriers that others may not have. Although the primary mode of transportation for the general population in this country is to drive to various destinations, driving is an option for only a very small proportion of adults with ASD. Even among the small proportion of persons with ASD who have a driver's license, very few actually drive on a regular basis because of their impairments. Similarly, taking mass transit is a challenge for many persons with ASD because they often cannot travel to transit stations or stops on their own, cannot prepare travel plans involving transit, and

are apprehensive of the treatment they might receive from transit operators and the other passengers with whom they would have to ride. Although many more adults with ASD can walk than drive or take transit, even walking in their neighborhoods is a challenge for many as they have difficulty crossing roads, judging distance, and comprehending directions. Despite having the ability to walk, the propensity to walk is low among the survey respondents.

Because of their difficulties with driving, taking transit, and walking, the most common practice among adults with ASD is to take rides from others, especially from parents, other family members, and friends. However, the survey revealed that they often have to forgo trips because of the unavailability of persons who can give rides. Parents and family members often forgo other activities, including work, in order to provide rides to persons with ASD.

The survey results raise a number of issues about meeting the travel needs of adults with ASD through planning and policy. The survey showed that traveling for education and training, healthcare appointments, shopping and errands, and social and recreational purposes is more common and also more important for persons with ASD than is traveling for employment. However, when many of the surveyed adults with ASD complete education and training, they will also have to make trips for work. Although students and trainees often travel by school bus or get rides from parents and family members, many may not have those opportunities when they join the work force. In those circumstances, ADA-complementary services such as Access Link or other socially sponsored transportation services may have to step in to meet their travel needs.

To a great extent, the survey respondents have been able to satisfy their travel needs because of parents and other family members, who often provide rides by giving up their own activities. However, when parents will no longer be able to provide the rides that they are providing now because of aging, or when persons with ASD begin to live independently, it will be necessary for society to step in if the travel needs of persons with ASD are to be met. Because of their disability, some adults with ASD will perhaps never be able to use fixed-route transit such as buses and trains, but some may be able to use those modes if they live close to transit stations or stops and they get travel training. For others, traveling may be possible only when they get rides from others, whether it is from Access Link, county paratransit, voluntary drivers, or agencies that cater to the needs of persons with disabilities. On the basis of the survey results, only a very small proportion of the adults with ASD can be expected to drive to their day-to-day travel destinations. Most others will need assistance from socially provided transportation services. Finally, because walking is the second most common practice among persons with ASD (after taking rides from others), if persons with ASD could live in areas where activities are within walking distance, they could satisfy some of their travel needs simply by walking. Improvements to sidewalks and crosswalks, as well as traffic-calming measures, could also encourage persons with ASD to walk more often.

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The authors are responsible for the paper's content and any potential errors and omissions.

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