Understanding Transportation Challenges for People with Disabilities Returning to Work

Jessica Murray

The Graduate Center, City University of New York

The research reported herein was performed pursuant to a grant from Policy Research, Inc. as part of the U.S. Social Security Administration's (SSA's) Analyzing Relationships Between Disability, Rehabilitation and Work. The opinions and conclusions expressed are solely those of the author(s) and do not represent the opinions or policy of Policy Research, Inc., SSA or any other agency of the Federal Government.

Abstract

Transportation is a persistent barrier to employment for people with disabilities. Transportation options are limited by geographic location and available public transit modes, and individuals differ in their ability to navigate transportation challenges and find employment. This study uses self-determination theory as a guiding framework to develop a transportation barriers survey instrument to examine challenges that impact feelings of *autonomy, relatedness,* and *competence* while using transportation. The survey was distributed in New York State to people with and without disabilities, and included questions about well-being, employment and motivation to work, travel behaviors, knowledge of financial and social supports, and use of technology. There were significant differences in between-group measures of well-being, travel behaviors, multiple issues impacting motivation to work, and use of smartphones for people with disabilities and people without disabilities. There were also significant differences in transportation challenges, lack of accommodations impacting motivation to work, and use of technology, including smartphones, computers, and navigation applications between Social Security disability benefits recipients and disabled non-recipients. A higher percentage of disability benefits recipients were aware of transportation discounts and services than non-recipients, but low percentages of disability benefits recipients were aware of deductions for qualified transportation expenses available through Social Security Administration (SSA) programs, and low percentages of disability benefits recipients took advantage of the deductions. There was high internal consistency for the transportation barriers survey instrument, and for the autonomy and competence subscales, but lower internal consistency for the relatedness subscale. There were significant differences in overall scores for transportation barriers between people with disabilities and without disabilities, as well as between disability benefits recipients and non-recipients. Training, financial, and social supports can be effective in changing travel behaviors of people with disabilities, and this report includes policy recommendations for local policymakers, SSA and transportation agencies.

Background and Literature Review

Access to transportation is one of the top three barriers faced by people with disabilities in the search for work (Kessler Foundation, 2015). Of the 68 percent of people with disabilities who were striving to work, a quarter (25.6%) reported a lack of transportation, but the report did not expand on reasons why they lacked transportation. Fewer than half of this group (41.9%) were able to overcome the barrier, and less than a quarter (22.5%) sought help with transportation as part of job preparation. The report doesn't specify what resources people accessed to find help with transportation issues. However, there is also evidence that financial support for transportation and travel training programs are not well-known to people with disabilities (Lubin & Deka, 2012).

Surveys of obstacles to participation among people with disabilities also show that transportation is a major problem, but often fail to examine which aspects of transportation present the most challenges (Hammel et al., 2015; Whiteneck et al., 2004). Some studies analyze obstacles in the built environment like lack of curb cuts, or other access barriers (Harris, Yang, & Sanford, 2015), as well as lack of transit options, mechanical issues, personnel problems, and transit agency policies that prevent public transit use (Bezyak, Sabella, & Gattis, 2017). People with disabilities tend to drive less and ride with others or use public transportation more often (Bezyak et al., 2019). Affording transportation is also an issue, especially when considering that more than half of people who rely on Social Security benefits live below twice the federal poverty line (Stegman Bailey & Hemmeter, 2015).

Our understanding of the transportation behaviors of people with disabilities is limited by measurement issues that oversimplify diverse experiences of disability in both national and regional transportation studies. Surveys like the National Household Travel Survey (NHTS) or the American Time Use Survey (ATUS) under-represent people with disabilities, and may overgeneralize behaviors due to differences in local geography and available transportation options. These surveys often exclude disability as a demographic characteristic, leading some researchers to draw conclusions by using medical conditions as a proxy for disability (Myers & Ravesloot, 2016). Analysis of behaviors of people reporting a medical condition (8.5%) in the NHTS showed that people with disabilities traveled less than people without disabilities and over a third (34.1%) didn't travel at all on the day of the survey (Brumbaugh, 2018). Recent figures from the CDC show disability prevalence in the U.S. at 25% (Okoro, 2018), meaning that the NHTS fails to capture the true breadth of mobility behaviors among people with different disabilities.

The limited research on this topic perpetuates assumption that disability or environmental barriers are the primary causes of limited mobility, but there are few studies that examine social, structural, or psychological barriers to transportation. The causes of immobility are likely to be a complex combination of physical challenges, information deficits, environmental obstacles, geographically-based lack of access, resource deficits, and psychological barriers, including demotivation when faced with an over-challenging environment. Supports for overcoming these challenges are necessary to encourage independent mobility as a means to labor force participation.

Self-Determination Theory and Transportation

According to self-determination theory, motivational processes occur on a continuum from extrinsic motivation controlled by others to intrinsic and fully autonomous motivation determined by the individual (Ryan & Deci, 2017). Basic Psychological Needs Theory (BPNT) is a mini-theory within self-determination theory which posits that the fulfillment or support for three basic psychological needs will enhance intrinsic motivation and well-being. The three basic psychological needs are *autonomy*, or self-directed action; *relatedness*, or belongingness and connectedness with others; and *competence*, or self-efficacy.

When applied to transportation systems, these basic needs include one's ability to choose a destination and a way to get there (autonomy), feelings of belonging and connection to others along the way (relatedness), and the skills necessary to transport oneself (competence). Lack of support for the three basic psychological needs hypothetically discourages intrinsically-motivated daily travel. In other words, while transportation is necessary for participation in most activities outside the home, deficits in the environment can be over-challenging for people with disabilities, making daily travel an undesirable activity, further alienating them from others, and limiting their human potential.

There are many qualitative studies that examine problems in transportation for people with various disabilities. They typically rely on interviews, observation, and focus groups to identify environmental and architectural barriers (Hammel et al., 2015), social barriers (Bissell, 2009), and embodied experiences of daily travel (Butler & Bowlby, 1997). Based on these and other studies, factors in transportation found to thwart basic psychological needs were identified:

- autonomy - access barriers, lack of mode choice, and financial barriers;
- relatedness - difficulty or reluctance to seek help, separate transportation modes or spaces for people with disabilities that magnify physical differences, and lack of awareness or support by transit employees; and
- competence - lack of transportation and/or navigation skills, lack of information about accessibility, and barriers to accessing information.

Supports for autonomy, relatedness, and competence in transportation make independent travel possible and may empower people to strive for other goals related to work and education. There have been few intervention studies for people with disabilities using transportation, but those that have been conducted were concerned with supporting similar psychological constructs, like *independence*, and *participation* (Bascom & Christensen, 2017), *empowerment* (Deka, 2014), *belonging* (De Vos, Schwanen, Van Acker, & Witlox, 2013), *inclusion* (Haveman, Tillmann, Stöppler, Kvas, & Monninger, 2013), *skills* (Zalewska, Migliore, & Butterworth, 2016), *confidence*, and *self-efficacy* (Crudden, Antonelli, & O'Mally, 2017).

The most effective interventions paid attention to social and ecological factors and were tied to external goals like work or education. For example, Crudden, Antonelli, and O'Mally (2017) developed an intervention for people with blindness and low-vision who were seeking help with transportation through vocational rehabilitation. Participants lacked basic knowledge about finding and using different modes of transportation, but the intervention group showed improvements in social problem-solving skills and greater confidence using transportation after a

personalized training. In another successful intervention, Haveman, Tillmann, Stöppler, Kvas, and Monninger (2013) conducted a 3-year ecological study in Germany that included a strong social support component, including training for parents, teachers, and bus drivers. At the end of the program, there was a 65.3% increase of young people with intellectual disabilities (age 7-18) (n = 124) who could travel independently on public transportation. Lubin, Alexander, & Harvey (2017) conducted an in-person training and field trip with older people (age 55-85+) (n = 343) and saw a 73-80% increase in participants' willingness to try using public transportation after the training. In an intervention to provide financial support through travel vouchers in an area with limited public transportation, 50% of adults with varying disabilities (age 18-56) (n = 73) showed improvements in attaining higher education or learning skills after participating in the program (Samuel, Lacey, Giertz, Hobden, & LeRoy, 2013).

Participants in these studies had diverse disabilities (developmental, cognitive, communication, visual, physical, and multiple disabilities), lived in rural, suburban, and urban locations, and ranged in age. This shows that there is potential for creative policy solutions that could benefit the independence of people with disabilities and encourage work-related goal attainment at the same time. Financial supports, transportation training, and support for accessible transportation information appear to be the most effective interventions outside of removing architectural access barriers.

Financial supports.

Financial supports can improve autonomy over decision-making and be an effective tool in changing travel behaviors of people with disabilities (Samuel et al., 2013). However, there are limited financial supports for transportation for people with disabilities who receive Social Security Disability Income (SSDI), Supplemental Security Income (SSI), or income from both programs (referred to collectively as disability benefits recipients hereafter). These are primarily qualified Impairment-Related Work Expenses (IRWE) or Blind Work Expenses (BWE), which can be deducted from Substantial Gainful Activity (SGA). There are SGA earning thresholds that affect SSDI or SSI eligibility. In 2018, the thresholds of allowable SGA were $1,180 per month for people with disabilities other than blindness, and $1,970 per month for people who are blind. The Achieving a Better Life Experience (ABLE) Act also provides financial supports for transportation for people who became disabled before the age of 26 in the form of nontaxable savings accounts for qualified expenses. Transportation expenses that qualify as IRWE deductibles include the cost of modifying a vehicle in order to travel to work, mileage expenses, taxis, paratransit, or other kinds of transportation needed because of a disability rather than due to a lack of public transportation (Social Security Administration, 2018). The cost of a vehicle or other expenses not related directly to a person's disability and not incurred for work do not qualify. For people who are blind, BWE deductions includes the cost of for-hire transportation to and from work.

Public transit agencies also provide financial resources for people with disabilities in the way of discounts for mass transit. For people with disabilities who are unable to use fixed route transit because of inaccessibility, transit agencies are required to provide paratransit service, which is intended to be comparable to fixed route transit. While progress has been made in making buses

wheelchair accessible, fixed-route transit, which includes inner-city and commuter rail service is not entirely wheelchair accessible. In New York City, only 20 percent of subway stations are accessible to people who use wheelchairs, and accessibility features like Braille signage are only guaranteed to be implemented in key stations that are ADA compliant. Transit agencies are allowed to charge a fare of up to twice that of the standard fare for paratransit (Part 37 - Transportation Services for Individuals with Disabilities, FTA, 1991), and no discounts are available for frequent travelers. As an incentive to encourage the use of mass transit modes instead of paratransit service, which costs the transit agency more than $70 per trip (Citizen's Budget Commission (CBC), 2016), New York City Transit offers paratransit-eligible individuals a free MetroCard for up to 4 one-way trips per day. Despite the availability of reduced fares for transportation, there is evidence that there is limited knowledge and use of these types of discounts among those who are qualified (Deka, 2012).

Transportation training. There are different types of training available to individuals that depend on type of disability and age. Orientation and mobility (O&M) training is a specialized and intensive training for people who are blind and have low vision. Any individual who is legally blind is eligible for free O&M training through organizations that are part of the New York Vision Rehabilitation Association for the Blind and through the New York State Commission for the Blind. Travel training typically refers to comprehensive safety and navigation training to use public transportation for adolescents or young adults with intellectual or developmental disabilities (I/DD) and may be provided as part of a high school program, or through day programs administered through various support organizations like YAI (Young Adult Institute) or AHRC (formerly the Association for the Help of Retarded Children). In New York City, District 75, the public school district for students with developmental, sensory, and multiple disabilities (other than blindness), provides travel training to students between the ages of 14-21. Training typically involves curriculum that includes step-by-step trip-planning, social-behavioral training, and safety training. In-person travel training guides students through the travel process according to their skills, then trainers shadow students as they travel alone to make sure that they are able to navigate independently without incidents.

New York City Transit provides transportation training to adults who are eligible for paratransit, which can apply to any type of disability. The training has historically been contracted through another disability service organizations and in addition to the topics listed above, provides training for correctly using mobility aids like crutches, walkers, wheelchairs, and scooters to board transit vehicles. Trainees are typically guided through a trip to a destination they frequent often, like school, work, a day program, or other location, but may not gain the skills to navigate to other destinations. For adults with disabilities other than blindness who associate travel training only with I/DD or don't want to go through the paratransit qualification process, there are few in-person training supports or resources.

Accessible transportation information. Transportation systems can help to support competence as long as informational supports are effective. The failure to deliver important route information both audibly and visibly within transit stations and on vehicles is a consistent problem

for people with cognitive and sensory disabilities (Bigby et al., 2017; Haveman et al., 2013; Worth, 2013). Advances in technology and the proliferation of online travel information create opportunities for technologies to support people with disabilities through using principles of distributed cognition—the development of mobile tools for guided mobility and navigation, customization of information, and monitoring by caretakers (Carmien et al., 2005). Similar tools help people without disabilities save time, as well as cognitive and affective effort in planning and executing non-routine travel (Grotenhuis, Wiegmans, & Rietveld, 2007), but many of these tools are not designed with the needs of people with disabilities in mind.

Because travel can take up so much mental effort, people with disabilities may try to save cognitive resources by researching and planning trips in advance. Waara et al. (2013) used an ecological model of aging to develop a survey of internet use for travel planning by older people and people with functional limitations living in Sweden. Their aim was to better understand how the individual competence of members of vulnerable populations was related to environmental resources and information. Participants who reported use of the internet for travel information described the high level of detail about trips that was available online, including rail car and station accessibility information, the availability of restrooms, and photographs of unfamiliar places, giving them a higher level of confidence. Some participants described a verification process of researching information online first, then speaking directly to a station or travel agent. The process of triangulating information instilled more confidence for passengers with disabilities travelling independently. Comprehensive online travel information was a support to passengers, helping them feel safer, more confident, and willing to travel to new destinations.

It's clear that there are social and environmental factors in transportation aligned with one or more of the basic psychological needs of autonomy, relatedness, and competence. Resource disparities may further exacerbate the impact of these barriers for people with disabilities, especially those who are disability benefits recipients. A social-ecological research design that considers these variables is necessary for a better understanding of self-reported transportation difficulties in the context of employment.

Research Questions

Given the numerous challenges with transportation for people with disabilities, there is likely to be an association between motivation and transportation for this group when compared to people without disabilities. This relationship may carry over into motivation to work. There are other issues that also impact motivation to work, so these are examined as well. Financial supports, information access, and technology can support independent mobility for people with disabilities, but there is evidence that there is sometimes a lack of awareness about these supports or access to technology within the disabled population. While we have a good sense of the problems in transportation based on the literature, it is less clear how these issues impact motivation for daily travel. There are a number of factors in transportation that may theoretically thwart fulfillment of autonomy, relatedness, and competence, and here they are analyzed together to see if these constructs represent unique factors. There are no existing measures for factors that thwart

autonomy, relatedness, or competence in transportation, nor are there studies that examine the relationship between transportation mobility and well-being for people with disabilities.

RQ1: Are there differences between the three comparison groups on key outcome measures like well-being or travel behaviors, including trip frequency, trip speed, and transportation modes? *H1:* People with disabilities will have lower well-being, a lower number of weekly trips, travel more slowly, and be more auto-dependent than people without disabilities. These differences will be greater for disability benefits recipients.

RQ2: To what extent does transportation access impact motivation to work for the two comparison groups (disabled vs. nondisabled and Social Security disability benefits recipients vs. disabled non-recipients)? How do other common obstacles to work vary for these groups? *H2a:* People with disabilities will be more likely to report that access to transportation impacts their motivation to work to a greater extent than people without disabilities, and *H2b:*disability benefits recipients will report that transportation impacts their motivation to work more than people with disabilities who do not receive disability benefits.

RQ3: Do disability benefits recipients have less awareness of transportation supports than people with disabilities who do not receive disability benefits? Are disability benefits recipients less likely to have access to technology that could provide access to information than non-recipients? *H3a:* People with disabilities who do not receive disability benefits will be more aware of transportation supports than people with disabilities who receive disability benefits. *H3b:* People with disabilities who do not receive disability benefits will have greater access to technology than people with disabilities who receive disability benefits.

RQ4: Is it possible to reliably measure basic psychological needs in transportation? Do factors in transportation that have been shown to thwart basic psychological needs have a greater impact on people with disabilities than people without disabilities? Do disability benefits recipients face more issues that thwart their travel-related psychological needs than people with disabilities who do not receive disability benefits? *H4:* Factors in transportation shown to thwart autonomy, relatedness, and competence will cohere into an internally consistent scale. Endorsement of factors that thwart autonomy, relatedness, and competence will be higher (indicating more transportation-related challenges) for people with disabilities than people without disabilities, and higher for disability benefits recipients than non-recipients.

Methods

The goal of the survey was to better understand transportation issues people with disabilities face, while determining if these challenges are amplified for disability benefits recipients living in New York State. I used a social-ecological design that considered exogenous variables that may impact self-reported mobility behaviors and challenges.

Participants

Adults over the age of 18 who live in New York State were recruited using snowball sampling with a goal of having similar-sized groups of people with disabilities and people without disabilities. Recruitment took place through disability service organizations who are part of the network of New York State Independent Living Council (NYSILC), through social media affinity

groups, listservs, and other channels. There was additional in-person recruiting at disability organization meetings. A raffle prize of twenty $50 prizes was used as an incentive for participation. There were a total of 977 visitors to the survey webpage during the study window, meaning that the overall response rate for people who clicked through on the survey link or visited the website was 30%, not including participants who abandoned the survey midway (*n* = 170). Partial responses were not analyzed.

A total of 297 people completed the survey, 179 reported at least one disability and 118 reported no disability. Broad disability types were: physical (*n* = 92), sensory (*n* = 39), including Deafness or hearing loss (*n* = 14), blindness or low vision (*n* = 21), or sensitivity to noise or light (*n* = 27), developmental disability (*n* = 30), mental health (*n* = 84), and chronic condition (*n* = 54). Disability types were non-exclusive and many people reported multiple disabilities. A separate question asked about functional limitations that may affect people with multiple types of disabilities. These included being able to move around physically (*n* = 96), understand information (*n* = 30), see or hear information (*n* = 43), be around people (*n* = 77), deal with frustration (*n* = 73), or communicate (*n* = 48). Of people with disabilities, 60 were disability benefits recipients, meaning they received SSDI (*n* = 44), SSI (*n* = 25), or both (*n* = 4). Participants ranged in age from 19 - 85, with an average age of 42.9 years, (SD = 16.3). The sample had an overrepresentation of female participants (*n* = 199) compared to male participants (*n* = 88) and unspecified or non-binary participants (*n* = 10; see Table 1 for full demographic details and Table 2 for disability profiles).

Measures

The survey included demographic questions, detailed disability questions, and Social Security questions, including the level of awareness of financial supports available through Social Security work incentive programs. There were also questions about travel behaviors, including frequency of transportation modes used, types of trips made, and distance and time spent traveling to a person's most frequent destination. There were additional questions to assess transportation problems along with other common barriers to work. Cronbach's alpha was calculated for all scales to measure internal consistency and are included with each scale's initial alpha score. Scales with alpha values ≥ 0.9 are considered to have excellent internal consistency, while scales with alpha values ≥ 0.8 are considered good, those with alpha values ≥ 0.7 are acceptable, and values ≥ 0.6 considered questionable or poor.

Well-Being. Based on the self-determination framework, the brief 8-item Flourishing Scale (Diener et al., 2010) was included as an overall outcome measure of well-being. The scale items cover several areas of emotional functioning with items like, "My social relationships are supportive and rewarding," and "I am engaged and interested in my daily activities." All items are

worded positively, with a scale ranging from strongly disagree to strongly agree. The scale was validated among 689 participants and factor analysis showed a single factor that was stable over time (a = .87). Internal consistency was very good for the current sample (a = .89).

Transportation Thwarting Basic Psychological Needs (TTBPN) scale. In order to better understand transportation challenges and which transportation supports might benefit people with disabilities to travel more independently, I developed a novel measure of factors in Transportation Thwarting Basic Psychological Needs (TTBPN) based on factors identified in the literature. This measure included Likert-scale items for 18 transportation factors found to impact feelings of autonomy, relatedness, and competence (see Table 3). Participants were asked to rate the ease of using transportation for items on a 4-point scale with one being "very easy" and four being "very difficult." The scale had excellent overall internal consistency (a = .92), with items for the three subscales loading onto the three factors. The autonomy subscale (a = .88) and competence subscale (a = .89) both had very good internal consistency, and the relatedness subscale (a = .79) had acceptable internal consistency (see Table 3).

Balanced Measure of Psychological Needs fulfillment. An abbreviated and adapted measure of the Balanced Measure of Psychological Needs fulfillment (BMPN) (Sheldon & Hilpert, 2012) was included as a validity check for the novel TTBPN measure. The 12-item scale was developed to be adapted to assess fulfillment of basic psychological needs across domains, and includes 2 positively- and 2 negatively-worded items for autonomy, relatedness, and competence. Because the scale is intended to be modified for different contexts, the prompt was for participants to "Think about your daily trips during the last month rate your agreement" with a series of statements like, "I was able to go somewhere that interests me," "I felt disrespected by one or more people," and "I was able to handle a challenging situation." The overall scale showed acceptable internal consistency (a = .76), but factor loadings did not align with the hypothesized subscales.

Perceived Accessibility. The Perceived Accessibility (PAC) scale (Lättman, Olsson, & Friman, 2016) measures the extent to which people feel that they can rely on public transportation, and was expected to relate to the autonomy subscale in the TTBPN measure. Items were slightly reworded to include private transportation modes, so "public transportation" was replaced with "the transportation options I have." The modified scale has four positively-worded items like, "It is easy to do daily activities with the transportation options I have," and is measured on a 5-point Likert scale with one being "strongly disagree" and five being "strongly agree." The original scale was validated with 246 participants and had good reliability (a = .86). The modified scale had excellent internal reliability for the survey sample (n = 291; a = .92).

Disability Identity. Four items about disability identity and the social model of disability from the Questionnaire on Disability Identity and Opportunity (QDIO) (Darling & Heckert, 2010) were included and were expected to correlate with measures of relatedness. The 4-item scale had two positively- and two negatively-worded items like, "It isn't easy for people with disabilities to be treated as 'normal,'" and "My disability is an important part of who I am." Items were taken from two subscales, which had acceptable internal reliability (disability pride, a = .78; social model, a = .72), but the modified scale had poor internal consistency (a = .58).

Self-Efficacy. Four items from the Generalized Self-Efficacy scale were included (GSE) (Schwarzer & Fuchs, 1996). The GSE is a 10-item measure of perceived self-efficacy that can be adapted for different domains, and was expected to relate to competence factors. The adapted scale asked about daily transportation experiences and participants were asked to rate statements like, "I am confident that I can deal efficiently with unexpected events" on a five point Likert scale with one being "strongly disagree" and five being "strongly agree." The scale has been validated in various contexts, with Chronbach's alpha ranging from .76 to .90, with the majority in the high .80's. Internal consistency was very good for the survey sample (a = .89).

Issues impacting motivation to work. Questions about issues impacting motivation to work included seven Likert-type items of commonly reported obstacles to work. Each item used a four-point scale with one being "not at all" and four being "to a great extent." The issues were: (a) possibility of losing healthcare or other benefits (b) balancing my disability or medical needs and work (c) difficulty getting the accommodations I need to do the job (d) not having reliable transportation options (e) discrimination by potential employers (f) not having the right skills or education for the jobs I want, and (g) balancing family or caretaking needs and work. The scale had acceptable internal reliability for the survey sample (a = .79).

Procedure

The online survey was conducted using Qualtrics software and was open to participants over the course of three months in the beginning of 2019. In order to accommodate people with disabilities who had difficulty completing an online survey, large-print paper copies were provided or conducted by phone upon request. Of 10 paper surveys distributed, two were returned and the survey was conducted by phone for five participants.

Design

While the selection criteria was broad, it was hypothesized that few factors would result in significantly different transportation behaviors or experiences, with disability being one such factor. The goal was to recruit people with and without disabilities as the main comparison group, and to potentially have more comparison groups within the disabled participant pool, such as disability benefits recipients and non-recipients, as well as different disability types. Some questions were not applicable to people without disabilities or to people with different disabilities, so branching logic was used to exclude non-relevant questions and improve participant retention during the survey. Similarly, questions like household income which people sometimes don't want to answer, or have difficulty answering, as well as cognitively challenging questions were not required in order to improve higher completion rates for the overall survey. Some of these difficult measures included trip distances, travel expenses, and other open-entry continuous variables.

Analysis. In order to understand obstacles people with disabilities face when seeking or maintaining work, and how transportation challenges compare to other obstacles, parametric and nonparametric analyses were conducted with several dependent variables, including (a) well-being, (b) transportation and mobility behaviors, (c) issues impacting motivation to work, (d) awareness of supports, and (e) use of technology. Cronbach's alpha were calculated for items in the Transportation Thwarting Basic Psychological Needs (TTBPN) and the Balanced Measure of

Psychological Needs scale adapted for transportation (BMPN-T) as a test of internal consistency. Spearman's correlations were run for the subscale means for autonomy, relatedness, and competence factors with other existing scales to see if there was a relationship between the constructs and as a validity check for the constructs of the TTBPN scale. These were the Perceived Accessibility (PAC) (expected to correlate with autonomy), the Disability Identity Scale (DIS) for disabled participants (relatedness), and Generalized Self-Efficacy Scale (GSE) (competence).

The main independent variables used for analysis were disability status and Social Security disability benefits recipient status (disabled participants who receive SSI, SSDI, or a combination of benefits, and disabled participants who did not receive any disability benefits). Parametric and nonparametric analyses were conducted for three comparison groups consisting of nondisabled participants (n = 118), disability benefits recipients (n = 60), and disabled non-recipients (n = 119).

Results

There were significant differences in between-group measures of well-being, travel behaviors, multiple issues impacting motivation to work, and use of smartphones between people with disabilities and people without disabilities. There were also significant differences between transportation challenges and lack of accommodations impacting motivation to work, and evidence of less use of technology, including smartphones, computers, and navigation applications for disability benefits recipients than disabled non-recipients. A higher percentage of disability benefits recipients were aware of transportation discounts and services than disabled non-recipients, but low percentages of participants were aware of deductions for qualified transportation expenses available through SSA, and low percentages of people with disabilities took advantage of benefits even when aware of them. There was high internal consistency for the overall survey instrument and autonomy and competence subscales, but lower internal consistency for the relatedness subscale, and significant differences between people with disabilities and without disabilities, as well as for disability benefits recipients and disabled non-recipients.

Wellbeing

Hypothesis 1 stated that people with disabilities will have lower well-being, a lower number of trips, travel more slowly, and be more auto-dependent than people without disabilities and was partially confirmed. People without disabilities reported higher well-being (flourishing; M = 4.24, SD = .57) than people without disabilities (M = 4.01, SD = .72), $t(295) = 4.2$, $p < .001$, but there was not a significant difference in well-being between disability benefits recipients and disabled non-recipients. A simplified indicator of participation, the number of days "getting out of the house and going somewhere" each week showed differences across comparison groups. People with disabilities traveled an average of 1.4 fewer days (M = 4.99, SD = 1.9) than people without disabilities (M = 6.38, SD = 1.1), $t(293) = 7.09$, $p < .001$. Disability benefits recipients traveled on fewer days on average (M = 2.16, SD = 1.01) than non-recipients with disabilities (M = 3.13, SD = .93), $t(176) = 6.23$, $p < .001$. Only five people who all had disabilities reported not leaving their home each week, four of whom were receiving SSI or SSDI.

Transportation Behaviors

Because the number of respondents in non-urban areas (n = 53), including suburban (n = 40), small town (n = 10), and rural (n = 6) was relatively small, analysis of transportation behaviors was conducted for urban respondents (n = 240). It took people with disabilities an average of 9.3 minutes longer to get to their most frequent destination (M = 38.12, SD = 29.27) than people without disabilities (M = 28.74, SD = 18.71), $t(225) = -2.7$, $p < .01$. People with disabilities also reported waiting 4.1 hours more per week than people without disabilities for transportation or being stuck in traffic, and traveled slightly more miles on average, but neither of these results were significant at the 95% alpha level. However, the pattern was reversed for disability benefits recipients, who spent an average of 11.9 fewer minutes (M = 29.5, SD = 24.61) to get to their most frequent destination than disabled non-recipients (M = 41.44, SD = 30.34), $t(131) = 2.48$, $p < .05$. Disability benefits recipients also traveled fewer miles on average and reported spending less time waiting for transportation than disabled non-recipients, but these differences were not significant and likely related to employment status.

Transportation modes and affordability. Binary variables for nine modes of transportation were compared using chi-square test of association for disability status and disability benefits recipient status. The modes compared were; walk or use a wheelchair, bicycle, bus, subway, train, paratransit, car (as a driver), car (as a passenger), and taxi. Disability benefits recipients were less likely to use the subway than disabled non-recipients X^2 (1, N = 179) = 11.69, $p < .01$. There were no other significant differences in mode usage based on disability status or disability benefits recipient status.

A single item from the TTBPN scale, which asked about being able to afford transportation, was compared between groups based on disability status and disability benefits recipient status. A logistic regression showed that people with disabilities were 2.5 times more likely to report that affording transportation was very difficult (95% CI, 1.59 to 3.92) Wald $X^2(1) = 3.99$, $p < .01$ than people without disabilities. The same was true for disability benefits recipients, who were 2.6 times more likely to report that affording transportation was very difficult (95% CI, 1.42 to 4.88) Wald $X^2(1) = 3.99$, $p < .01$ compared to disabled non-recipients.

Issues Impacting Motivation to Work

Hypothesis 2a stated that people with disabilities will be more likely to report that access to transportation impacts their motivation to work to a greater extent than people without disabilities, and hypothesis 2b stated that disability benefits recipients would report an even greater impact than disabled non-recipients. As predicted, transportation was a significant issue impacting motivation to work. Data for the seven issues impacting motivation to work were not normally distributed and were analyzed using logistic regression with the independent variables of disability status and disability benefits recipient status. Difficulty getting accommodations, transportation, discrimination, and lacking skills or education impacted people with disabilities more than people without disabilities and these results were significant. Participants with disabilities were 4.1 times more likely to give the highest rating for lack of accommodations impacting their motivation to work than people without disabilities (95% CI, 2.57 to 6.59) Wald $\chi^2(1) = 37.54$, $p < .001$. They

were also 2.9 times more likely to highly rate lack of reliable transportation (95% CI, 1.90 to 4.53) Wald $\chi^2(1) = 37.54$, $p < .001$, 3.6 times more likely to highly rate discrimination by employers (95% CI, 2.30 to 5.63) Wald $\chi^2(1) = 33.45$, $p < .001$, and 1.6 times more likely to highly rate lack of skills and education (95% CI, 1.02 to 2.41) Wald $\chi^2(1) = 37.54$, $p < .05$ than people without disabilities.

However, difficulty getting accommodations and transportation were the only statistically significant issues impacting motivation for disability benefits recipients when compared to disabled non-recipients. Disability benefits recipients were two times more likely to rate lack of accommodations as impacting their motivation to work to a great extent (95% CI, 1.15 to 3.60) than disabled non-recipients Wald $\chi^2(1) = 6.0$, $p < .05$, and 3.1 times more likely to rate transportation issues as impacting their motivation to work to a great extent (95% CI, 1.72 to 5.65) than disabled non-recipients Wald $\chi^2(1) = 14.67$, $p < 001$.

Accommodations requested. An open-text question asked about the type of accommodations needed for people who reported difficulty getting accommodations. Results were coded and summed. There was a need for greater mobility, including "micro-mobility" within workplaces, as well as transportation close to workplaces. The accommodations needed included; an accessible workplace, including bathrooms ($n = 22$), flexible workplace and/or schedule ($n = 21$), software, equipment or furniture ($n = 18$), transportation access, including affordability ($n = 12$), personal care considerations including extra time for breaks, using the bathroom, and having a personal care attendant ($n = 11$), accessible documents or help with forms ($n = 6$), healthcare ($n = 4$), appropriate tasks or assistance with physical tasks ($n = 5$), and a quiet workplace ($n = 3$).

Awareness of Financial Supports

Hypothesis 3a stated that people with disabilities who do not receive disability benefits will be more aware of transportation supports than people with disabilities who receive disability benefits. This hypothesis was not supported by the data, in fact the opposite was true. People with disabilities were asked about their awareness of transportation supports available through transit agencies, including paratransit service, reduced fare MetroCards, reduced fares on off-peak trains, and free MetroCards for paratransit passengers.

Among people with disabilities, 57.1% were aware of paratransit service ($n = 60$), 61.9% were aware of reduced fare MetroCards ($n = 65$), 46.7% were aware of reduced fares on off-peak trains ($n = 49$), and 41.9% were aware of free MetroCards for paratransit passengers. The number of people with disabilities receiving these benefits were also low; 29.5% were using paratransit ($n = 31$), 28.6% were receiving reduced fare Metrocards ($n = 30$), 23.8% were receiving reduced fares on off-peak trains ($n = 25$), and 13.3% were receiving a free MetroCard for paratransit passengers. Of the 32 paratransit users, only 31.3% were receiving the free MetroCards ($n = 10$). Chi-square tests of association showed that a higher percent of disability benefits recipients were aware of paratransit than disabled non-recipients X^2 (1, $N = 92$) = 11.0, $p < .01$, reduced fare MetroCards X^2 (1, $N = 105$) = 16.5, p < .01, and free MetroCards for paratransit passengers X^2 (1, $N = 105$) = 15.3, $p < .01$. There were no proportional difference in awareness for reduced fares on off-peak trains between the groups. Overall, awareness was higher for these supports than benefits available

through the Social Security Administration, but many were still unaware, somewhat aware, or uncertain of details.

Social Security disability benefits recipients were asked about their awareness of financial supports available through SSA, including qualified transportation deductions for Achieving a Better Life Experience (ABLE), Impairment-Related Work Expenses (IRWE), and Plan to Achieve Self Support (PASS). An additional non-transportation financial support, the Medicaid Buy-In program was also included. The program, which is available in New York State, allows people with certain disabilities to maintain their Medicaid coverage while working. Overall awareness of all of these supports was low; 20% were aware of qualified transportation deductions for ABLE (n = 12), 25% for IRWE (n = 15), 23.3% for PASS (n = 14), and 33.3% for Medicaid Buy-In (n = 20). The rest were somewhat aware, unsure of the details, or not aware at all. The number of people taking advantage of these supports was even lower; only 5% were taking qualified transportation deductions for ABLE (n = 3), 3.3% for IRWE (n = 2), 3.3% for PASS (n = 2), and 6.7% for Medicaid Buy-In (n = 4).

Access to Technology and Information

Hypothesis 3b stated that disabled participants who do not receive disability benefits will have greater access to technology than people with disabilities who receive disability benefits, which was supported by the data. A smaller percentage of people with disabilities reported not having a smartphone compared to people without disabilities X^2 (1, N = 297) = 8.1, $p < .05$, but for those who had a smartphone, there was no difference in proportions of having a data plan. There were no group differences in having access to a computer at home or internet based on disability status. Disability benefits recipients reported lower percentages of having a smartphone than disabled non-recipients X^2 (1, N = 179) = 8.07, $p < .01$, and lower percentages of having a data plan for their phone X^2 (1, N = 179) = 15.81, $p < .01$. There was also a lower proportion of disability benefits recipients who had a computer at home than disabled non-recipients X^2 (1, N = 179) = 6.5, $p < .05$, but no difference in having internet among those who had computers.

Transportation information sources. Participants were asked how they found information about transportation service and changes and were given a number of different options including transit agency websites and applications, a navigation app like Google Maps, text or email notifications, paper maps and schedules, calling for information, or asking family or friends. Two binary variables were calculated for analog and digital information sources, with paper maps, calling for information, and asking family and friends being coded as analog, and other online and app-based sources coded as digital. The individual information sources and analog and digital modalities were compared between groups based on disability status and disability benefits recipient status. Overall, disability benefits recipients reported a lower proportion of using one of the digital modes for finding transportation information compared to disabled non-recipients X^2 (1, N = 179) = 7.28, $p < .01$. They also reported using navigation applications less frequently than disabled non-recipients X^2 (1, N = 179) = 12.07, $p < .01$. A greater percentage of people with disabilities called for information compared to people without disabilities X^2 (1, N = 297) = 7.92, $p < .01$, but otherwise there were no significant differences in sources of information.

Factors in Transportation Thwarting Basic Psychological Needs (TTBPN)

Hypothesis 4a stated that factors in transportation shown to thwart autonomy, relatedness, and competence would cohere into an internally consistent scale. The overall scale had excellent reliability ($\alpha \geq 0.9$), but this value can be skewed by the large number of items in the scale. Alphas for individual subscales were lower, with autonomy and competence scales having alpha levels that are considered a good fit ($0.9 > \alpha \geq 0.8$), and the relatedness scale having an alpha level considered acceptable ($0.8 > \alpha \geq 0.7$) (see Table 3 for items and alpha levels). When testing factor loadings, the items hypothesized to be conceptually related to autonomy, relatedness, and competence cohered into subscales, supporting this hypothesis.

Correlations with other scales. For a further validity check of the autonomy, relatedness, and competence scales, Spearman's correlations were run for the means of autonomy, relatedness, and competence factors with other existing scales; Perceived Accessibility (PAC) (autonomy), Disability Identity Scale (DIS) (relatedness) (for disabled participants), and Generalized Self-Efficacy Scale (GSE) (competence). There was a moderate negative correlation between PAC, which had higher scores for greater perceived accessibility, and autonomy items, which had higher scores for greater difficulty. This relationship was statistically significant $r_s = -0.62$, $p < .001$. There was also a moderate negative correlation between GSE scores and competence items, $r_s = -0.45$, $p < .001$. Disability identity and relatedness items were not significantly correlated.

Group differences. Hypothesis 4b stated that endorsement of factors that thwart autonomy, relatedness, and competence will be higher (indicating more transportation-related challenges) for people with disabilities than people without disabilities, and higher for disability benefits recipients than non-recipients. As predicted, there were group differences in the overall TTBPN scale means based on both disability status and disability benefits recipient status. People with disabilities rated factors in transportation as more difficult overall ($M = 2.29$, $SD = 0.69$) than people without disabilities ($M = 1.75$, $SD = 0.61$), $t(297) = -6.72$, $p < .001$. Disability benefits recipients also rated transportation as more difficult ($M = 2.47$ $SD = 0.65$) than disabled non-recipients. ($M = 2.20$, $SD = 0.70$), $t(164) = -2.34$, $p < .05$.

Discussion and Implications

Most of the hypotheses were confirmed, with several exceptions. Hypothesis 1 stated that people with people with disabilities will have lower well-being, take a lower number of trips, travel more slowly, and be more auto-dependent than people without disabilities, with greater differences for disability benefits recipients. This hypothesis was confirmed for number of trips and travel speed for both comparison groups. Despite differences in mean scores of wellbeing for people with disabilities and people without disabilities, this outcome was not further influenced by receiving disability benefits. There was no evidence among the survey population that people with disabilities are more auto dependent than people without disabilities, but they were less likely to use the subway than people without disabilities.

There were group differences in how often people travel during a typical week, but this finding also shows that transportation behaviors may be more nuanced than what national surveys report. While some researchers have concluded that 34% of people with disabilities are homebound based on their response to travel behaviors for one day, an additional measure to get a sense of travel behavior during one week would provide a better estimate of real transportation habits and allow planners to identify unmet needs.

In support of hypothesis 2, people with disabilities reported a number of issues that impacted their motivation to work to a greater extent than people without disabilities, including lack of accommodations, lack of reliable transportation options, discrimination, and lack of skills and education. Disability benefits recipients rated the lack of accommodations and lack of reliable transportation options as more impactful to motivation to work than disabled non-recipients. Accessible workspaces and transportation were in the top five most frequently reported necessary accommodations, reinforcing the finding transportation is an important support for employment, and suggesting that physical transportation barriers are analogous with inaccessible workplaces for some people with physical disabilities. Flexibility of work schedules and locations were also common challenges.

Social Security disability benefits recipients had limited awareness of financial supports available through SSA and Medicaid, and very few of the participants in the study took advantage of those supports. However, as opposed to hypothesis 3a, they were more aware of discounts available through transit agencies, though many still did not take full advantage of the benefits. Hypothesis 3b was supported by evidence of a gap in access to technology, especially among disability benefits recipients, who reported a lower percentage of having smartphones, data plans, and computers at home. Additionally, disability benefits recipients were more likely to access information about transportation service and service changes using analog modes than disabled non-recipients. This suggests that there may be transportation information barriers for disability benefits recipients due to a lack of technology and/or training.

Finally, hypothesis 4 was supported by the survey data. The novel scale of factors in Transportation Thwarting Basic Psychological Needs scale (TTBPN) had good internal consistency, meaning that people who had difficulty with some aspects of transportation reported having difficulty with other factors as well. The relatedness subscale had the lowest alpha levels, and the scale did not correlate with the positive disability identity scale, meaning that greater refinements to the relatedness subscale and a different relevant measure of relatedness are needed for future studies. The balanced measure of psychological needs adapted for transportation (BMPN-T), meant to measure fulfillment of psychological needs in transportation, did not have good internal consistency and was not a good measure of the fulfillment of autonomy, relatedness, and competence in transportation. The autonomy and relatedness subscales had moderate correlations with the Perceived Accessibility to Transportation scale (PAC) and Generalized Self-Efficacy scale (GSE), suggesting that the constructs are conceptually related. Future analysis will include confirmatory factor analysis of the TTBPN scale to identify items that should be removed or further refined. These early results suggest that it is possible to measure factors that thwart basic

psychological needs, but fulfillment of basic psychological needs may be more difficult to measure, or fulfillment may be better captured by low scores (showing little difficulty) on the TTBPN scale.

Policy Implications

Findings were consistent with national studies of barriers to work for people with disabilities which show that transportation and getting accommodations for work are among the most challenging problems (Kessler Foundation, 2015). Transportation was the most frequently reported accommodation needed, followed by physically accessible workplaces—a form of micro-mobility that is analogous with transportation. In New York City, many buildings that pre-date the ADA lack accessible entrances and restrooms and there are few incentives for property owners to make improvements. These are structural issues that can be challenging to overcome, but employers can provide flexible workplaces as an accommodation to people who have accessibility needs. This would also require that businesses change interview locations for people who need such accommodations along with a commitment to recruiting and hiring people with disabilities. Tax incentives for building modifications or hiring people with disabilities could incentivize businesses to implement such changes. There are similar challenges with the New York City subway being old and largely inaccessible, but alternative modes can be difficult to afford and public options like paratransit are frequently unreliable (Barron, 2019).

IRWE and BWE transportation deductions. There are few financial supports for transportation from SSA, and these come in the form of deductions for modified vehicles that qualify as Impairment Related Work Expenses (IRWE), or deductions for all travel expenses that qualify as Blind Work Expenses (BWE), which are available exclusively to blind individuals. Deductions don't apply to people with other disabilities who live in suburban or rural areas and can't drive or don't already own a vehicle that can be modified. There are no supports for people living in urban areas where owning a car is expensive or in transit deserts where accessible public transportation is difficult to attain. Of the survey sample, only four participants with physical disabilities reported owning a vehicle that had been modified for a wheelchair. This may explain why many participants who took the survey were unfamiliar with the benefits and even fewer took advantage of them. Broadening the definition of who is eligible for transportation deductions under IRWE and allowing for other types of transportation deductions may incentivize work for people who are discouraged from working because of transportation challenges.

IRWE and BWE technology deductions. There is evidence that disability benefits recipients have less access to technology, including computers, smartphones, and data plans, which may negatively impact their ability to navigate independently. There are no supports for technology through SSA that are not tied specifically to work expenses. SSA rules state that computer equipment and software expenses can be deducted from substantial gainful activity earnings unless they are not related to a person’s disability and employment. Given that personal computers and smartphones are often used for work and personal purposes, the strict limits on technology only being used for work may be limiting. Having access to technology should be seen as a bridge to employment, and people with disabilities who have access to a computer and internet

at home are more likely to be attractive candidates for jobs that allow remote work. Access to personal computers also makes self-employment possible. Given the reported need for flexible schedules and workplaces, removing restrictions for deductions for technology from earnings may encourage people to try initiatives like the Plan to Achieve Self Support (PASS) and re-enter the workforce.

There is financial support for mobile technology, but restrictions may be a barrier to accessing smart phones. The Federal Lifeline phone program offers smartphones for new customers with limited data plans and call minutes, with reduced cost plans for additional data and minutes. The program also allows the option of an internet connection at home, but participants must choose between mobile service or internet service, and only one account is allowed per household. This survey did not ask about awareness of this program, but future research and participant screening for other studies will assess knowledge and use of the program. Additional research is needed to understand why a lower proportion of disability benefits recipients are adopting mobile technology. For people with blindness and low vision, or limited manual dexterity, training for using accessibility features may be necessary.

Transit agency policies. While disability benefits recipients had greater overall awareness of discounts for transportation and paratransit than non-recipients, there were still large gaps in awareness about some benefits. A higher percentage of disability benefits recipients knew about these supports than non-recipients, but there was low usage by people with disabilities, even among Social Security recipients. More research is needed to understand why people who are aware of transportation discounts and services are not using them. It could be related to transit agency policies for eligibility, the process of acquiring discounts or services, or how the transit agencies communicate these benefits. On a state-budgetary level, the cost-saving benefits of improving access to transportation for people with disabilities are two-fold. There is a trade-off between providing costly paratransit service and improving access to mass-transit. The benefits of reducing barriers to transportation will also encourage more people to work, which can increase tax revenues and reduce state contributions to SSI and Medicaid.

Transit agencies can make use of the findings about factors in transportation that thwart autonomy, relatedness, and competence. The relatedness items showed the lowest internal consistency, but interpersonal interactions may occur less frequently in transportation environments. Passenger-to-transit agency employment interactions may be a more frequent type of interaction and more relevant to transit agencies, and transit agency policies and practices may also affect feelings of relatedness. Issues that impact people with disabilities and people without disabilities similarly may highlight areas that need immediate attention in order to improve transportation experiences for all passengers.

Limitations

The study population came from snowball sampling in New York State, but the majority of recipients were based in New York City. Future studies will focus more on recruiting in other parts of the state in order to analyze transportation challenges for people in areas where public transportation is limited or unavailable. Some disability types were underrepresented, including

blindness, low vision, deafness, and hearing impairment, which makes between-group comparisons difficult. More outreach is needed to distribute the survey through organizations that focus on specific disabilities, with emphasis on alternative formats for people who need assistance with completing the survey. Some variables like travel time and distance or waiting in traffic were open-ended and difficult for some participants to answer. Many answered in ranges, there were several extreme outliers, and some participants didn't answer at all. These types of questions may either be difficult to answer or can be exaggerated. Future studies will offer ranges that can more precisely measure these variables, even if continuous variables are preferable for the research questions. GPS and travel diary methods will be used to measure actual vs. perceived mobility behaviors. Finally, the survey is cross-sectional, so it is not possible to determine causality of relationships. Future longitudinal research is needed, along with an informational intervention to show the impact of outreach and training on awareness of financial and other supports to encourage employment among disability benefits recipients.

Conclusion

The results of the survey show some of the specific challenges associated with transportation, a known barrier to returning to work for people with disabilities. Comparing these challenges between people with disabilities and people without disabilities, and between Social Security disability benefits recipients and disabled non-recipients highlights the areas where more research and support is needed. Policies that focus on improving transportation and technology access, including financial supports, are necessary to improve employment outcomes. More immediate and low-cost training support for people with disabilities who do not use smartphones or navigation applications could improve outcomes in the short term.

References

Barron, J. (2019, May 16). Just Like the Subway, Public Transit for New York's Disabled Riders Is Maddening. *The New York Times*. Retrieved from https://www.nytimes.com/2019/05/15/nyregion/mta-access-a-ride-nyc.html

Bigby, C., Johnson, H., O'Halloran, R., Douglas, J., West, D., & Bould, E. (2017). Communication access on trains: a qualitative exploration of the perspectives of passengers with communication disabilities. *Disability and Rehabilitation*, 1–8.

Bissell, D. (2009). Conceptualising differently-mobile passengers: geographies of everyday encumbrance in the railway station. *Social & Cultural Geography*, *10*(2), 173–195. Retrieved from http://www.tandfonline.com/doi/abs/10.1080/14649360802652137

Brumbaugh, S. (2018). *Travel Patterns of American Adults with Disabilities*.

Butler, R., & Bowlby, S. (1997). Bodies and spaces: an exploration of disabled people's experiences of public space. *Environment and Planning D: Society and Space*, *15*(4), 411–433.

Carmien, S., Dawe, M., Fischer, G., Gorman, A., Kintsch, A., & Sullivan Jr, J. F. (2005). Socio-technical environments supporting people with cognitive disabilities using public transportation. *ACM Transactions on Computer-Human Interaction (TOCHI)*, *12*(2), 233–262.

Citizen's Budget Commission (CBC). (2016). *Access-A-Ride, Ways to Do the Right Thing More Efficiently*. Retrieved from https://cbcny.org/sites/default/files/REPORT_ACCESS-A-RIDE_09202016.pdf

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. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=124402380&site=ehost-live

Darling, R. B., & Heckert, D. A. (2010). Orientations toward disability: Differences over the lifecourse. *International Journal of Disability, Development and Education*, *57*(2), 131–143.

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative

feelings. *Social Indicators Research*, *97*(2), 143–156.

Grotenhuis, J.-W., Wiegmans, B. W., & Rietveld, P. (2007). The desired quality of integrated multimodal travel information in public transport: Customer needs for time and effort savings. *Transport Policy*, *14*(1), 27–38. https://doi.org/10.1016/j.tranpol.2006.07.001

Hammel, J., Magasi, S., Heinemann, A., Gray, D. B., Stark, S., Kisala, P., … Hahn, E. A. (2015). Environmental barriers and supports to everyday participation: a qualitative insider perspective from people with disabilities. *Archives of Physical Medicine and Rehabilitation*, *96*(4), 578–588.

Haveman, M., Tillmann, V., Stöppler, R., Kvas, Š., & Monninger, D. (2013). Mobility and Public Transport Use Abilities of Children and Young Adults With Intellectual Disabilities: Results From the 3-Year Nordhorn Public Transportation Intervention Study. *Journal of Policy and Practice in Intellectual Disabilities*, *10*(4), 289–299.

Kessler Foundation. (2015). *2015 National Employment and Disability Survey*. Retrieved from http://kesslerfoundation.org/sites/default/files/filepicker/5/KFSurvey15_Results-secured.pdf

Lättman, K., Olsson, L. E., & Friman, M. (2016). Development and test of the Perceived Accessibility Scale (PAC) in public transport. *Journal of Transport Geography*, *54*, 257–263. https://doi.org/10.1016/j.jtrangeo.2016.06.015

Lubin, A., Alexander, K., & Harvey, E. (2017). Achieving mobility access for older adults through group travel instruction. *Transportation Research Record: Journal of the Transportation Research Board*, (2650), 18–24.

Lubin, A., & Deka, D. (2012). The role of public transportation as job access mode: lessons from survey of people with disabilities in New Jersey. *Transportation Research Record: Journal of the Transportation Research Board*, (2277), 90–97.

Myers, A., & Ravesloot, C. (2016). Navigating time and space: how Americans with disabilities use time and transportation. *Community Development*, *47*(1), 75–90.

Part 37 - Transportation Services for Individuals with Disabilities, FTA. , § Section 37.53 Exception for New York and Philadelphia (1991).

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.

Samuel, P. S., Lacey, K. K., Giertz, C., Hobden, K. L., & LeRoy, B. W. (2013). Benefits and

quality of life outcomes from transportation voucher use by adults with disabilities. *Journal of Policy and Practice in Intellectual Disabilities*, *10*(4), 277–288.

Schwarzer, R., & Fuchs, R. (1996). Self-efficacy and health behaviours. *Predicting Health Behavior: Research and Practice with Social Cognition Models*, *163*, 196.

Sheldon, K. M., & Hilpert, J. C. (2012). The balanced measure of psychological needs (BMPN) scale: An alternative domain general measure of need satisfaction. *Motivation and Emotion*, *36*(4), 439–451.

Social Security Administration. (2018). *2018 Red Book: A summary guide to employment supports for persons with disabilities under the Social Securtiy Disability Insurance (SSDI) and Supplemental Security Income (SSI) Programs.* Retrieved from https://www.ssa.gov/redbook/index.html

Waara, N., Risser, R., & Agneta, S. (2013). Exploring the influence of online traveller information services on the use of public transport by older people and people with functional limitations: A mixed methods approach. *Technology and Disability*, *25*(1), 15–25.

Worth, N. (2013). Visual impairment in the city: Young people's social strategies for independent mobility. *Urban Studies*, *50*(3), 574–586. Retrieved from http://journals.sagepub.com/doi/abs/10.1177/0042098012468898

Appendices

Table 1

*Participant Profiles (*category not mutually exclusive)*

	Nondisabled	Non-SS Recipient	SS Recipient	Total
Gender				
Female	76	87	36	199
Male	41	25	22	88
Other or not specified	1	7	2	10
Age				
19-28	30	30	6	66
29-35	19	32	7	58
36-44	23	20	13	56
45-60	28	12	20	60
61-85	18	25	14	57
Race and Ethnicity*				
White	78	90	32	200
Black	9	12	9	30
Hispanic	18	10	12	40
Native American	0	1	0	1
Asian	14	10	2	26
Indian	1	3	3	7
Middle Eastern	3	3	2	8
Education Level				
Less than HS	0	0	3	3
High school	2	5	6	13
Some college	8	12	13	33
Associate degree	2	0	4	6
Bachelor's degree	37	30	15	82
Master's degree	42	35	12	89
Professional degree	6	9	1	16
Doctorate	16	13	2	31
Household Income				
0-$25,000	9	13	34	56
$26,000-$50,000	22	23	10	55
$51,000-$90,000	23	28	5	56
$92,000-$150,000	26	30	3	59
$151,000-$350,000+	34	15	2	51
Geographic Location				
Rural	1	2	3	6
Small Town	5	1	4	10
Suburban	13	16	11	40
Urban	98	100	42	240
Total	118	119	60	297

Table 2

*Employment Status by Disability Type, Number of Disabilities, and Acquired or Congenital (*categories and subcategories are not mutually exclusive)*

	Unemployed SS Recipient	PT Employed SS Recipient	Part-Time Employed	Full-Time Employed	Total
Disability Type					
Physical*	31	17	18	27	93
Sensory*	9	9	13	8	39
Blindness	5	2	6	1	14
Low Vision	4	1	0	2	7
Deafness	1	1	0	2	4
Hearing Loss	2	2	4	2	10
Mental Health*	13	15	23	33	84
Depression	10	13	17	23	63
Anxiety	12	12	18	26	68
Bipolar Disorder	2	0	3	2	7
Schizophrenia	1	0	0	0	1
Developmental*	5	7	7	11	30
ADD/ADHD	0	3	2	5	10
Autism	2	2	3	3	10
Learning (LD)	2	1	1	3	7
Chronic Condition*	15	11	10	18	54
Number of disabilities					
1	15	15	29	37	96
2	11	8	11	16	46
3	7	5	4	5	21
4	3	2	2	3	10
5	2	2	1	1	6
Acquired	22	23	33	45	123
From Birth	16	9	14	17	56
Total	38	32	47	62	179

Table 3

Cronbach's alpha for TTBPN Scale Items

How would you rate the ease of using transportation for the following?

Autonomy Items	α (subscale)	α (full scale)
Getting into vehicles without assistance.	0.8874	0.9273
Having transportation options	0.8613	0.9237
Getting reliable public transit service	0.8639	0.9234
Being able to afford transportation	0.8732	0.9255
The terrain or distance between home and bus stop or subway station	0.8663	0.9241
Getting frequent and reliable public transit in my neighborhood	0.8689	0.9242
Overall	**0.8844**	
Relatedness items		
Asking for help if I'm lost	0.7562	0.9276
Communicating with transit staff	0.7471	0.9267
Feeling like I'm too slow or in the way	0.7724	0.928
Feeling respected by transit staff	0.7377	0.9251
Asking friends or family for rides or to travel with me	0.773	0.9285
Asking for access to designated facilities like seating, elevators, or restrooms	0.7417	0.9265
Overall	**0.7870**	
Competence items		
Planning routes or scheduling rides	0.8948	0.9235
Navigating inside train or subway stations	0.8827	0.9222
Finding information about service delays or changes	0.8756	0.9232
Understanding information about service delays or changes	0.8853	0.9255
Navigating to and from bus stops or subway stations	0.8884	0.9229
Understanding signage, schedules, or maps	0.887	0.9252
Overall	**0.8941**	
Overall		**0.9298**