

Self-Determination in Transportation for People with Disabilities

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Abstract

Purpose: This study continues a prior ARDRAW project to study transportation-related issues for people with disabilities using the framework self-determination theory (Ryan & Deci, 2017). The study's goals were to a) further develop a set of measures that examine factors that impact feelings of *autonomy*, *relatedness*, and *competence* while using transportation, b) identify informational barriers, and c) develop an informational intervention for Social Security benefits recipients in New York City.

Methods: Iterative surveys were conducted to establish basic psychological needs in transportation measures. A training intervention focused on the basic psychological needs was developed in conjunction with disability community members. Respondents to a second survey ($N = 269$) included participants without disabilities ($n = 126$), disabled Social Security benefits recipients ($n = 66$), and disabled non-recipients ($n = 77$). Details of the development of the training and preliminary results from a small group of training participants ($n = 14$) are presented here as recruiting was delayed by COVID-19.

Results: Revised measures of frustration and satisfaction of basic psychological needs in transportation showed improvements in internal consistency, and there were group differences in scores between disabled and participants without disabilities. The first survey showed very low awareness and usage of transportation deductions among Social Security disability benefits recipients. Follow-up questions about why people do not take advantage of specific programs or deductions were added to the second survey, and open-ended responses included reasons like ineligibility, fears about losing benefits, and confusion over program details. Several intervention participants reported learning about the Social Security Administration's (SSA) programs for the first time. More than half of the training participants showed active engagement with the content by repeating at least one quiz to improve their scores.

Conclusion: Measures of factors that thwart basic psychological needs in transportation showed significant group differences in scores for participants with disabilities compared to participants without disabilities. Preliminary results of an intervention study showed potential for educating people with disabilities on these topics. Still, eligible deductions for transportation earnings may not be aligned with Social Security benefits recipients' needs.

Background and Literature Review

Transportation is just one of the many challenges that people with disabilities and Social Security benefits recipients encounter in their search for work. The bulk of research about transportation and disability focuses on the built environment (Bezyak et al., 2017), typically analyzing barriers that impact people with one kind of disability, like mobility or vision disabilities. Transportation issues for older adults are well-examined in the gerontology and rehabilitation literature as mobility becomes more restricted with age due to functional limitations. Age-related disabilities can impact the ability to engage in active transport, affect stamina, or limit the ability to drive (Musselwhite et al., 2015; van den Berg et al., 2016). There is still a gap in the literature for understanding how transportation environments impact adults with disabilities who are in an age range considered typical of professional, personal, and interpersonal growth (18-65 years).

The Americans with Disabilities Act (ADA, 1990) aimed to improve the integration of people with disabilities into society through employment. Clauses about surface and rail transportation constitute more than 40% of the legislation. Thirty years later, access to transportation remains one of the top three barriers faced by people with disabilities searching for work. Data from a national survey shows that a quarter (25.6%) of those who were seeking employment reported a lack of transportation (Kessler Foundation, 2015). The top issue impacting job searches in the same survey was "not enough education or training," which is also influenced by a lack of transportation (Moriña & Morgado, 2018). Labor force participation among working-age people with disabilities declined by 56% between 1988-2014 while wages stagnated (Maroto & Pettinicchio, 2015). This trend has reversed recently (pre-pandemic), with a low overall unemployment rate leading to people with disabilities finding employment in higher numbers (*Employment Situation Summary*, 2020).

While the outcome of limited access is often the same, transportation barriers differ for people with various disabilities. People who are blind or have low vision cannot drive but may face sparse accommodations where public transit is available (Gallagher et al., 2011). Those with cognitive impairments often have difficulty driving compared to their nondisabled peers (Passler et al., 2020), and may require travel training to learn how to navigate public transportation independently (Moore Sohlberg et al., 2009). People who use wheelchairs can be restricted from driving, but vehicles modified for hand controls and a ramp to enter and exit the car make driving possible for those with financial resources. Costs associated with vehicle modification are one of the approved income-related work expenses (IRWE) for transportation. Still, the upfront expense for a wheelchair user can exceed personal resource limits for Supplemental Security Income (SSI). Geography also plays a role, as people with disabilities who live in rural and suburban areas are more likely to face social isolation because they have fewer options for independent travel (Gonzales et al., 2006). Being transported by a friend or family member, paying for taxis or other private transportation, or using public transportation are often the only options available to people with disabilities who want to work, but those options are not always accessible to everyone. These social, structural, and environmental impediments become barriers

to engagement with transportation systems. These barriers may impact motivation to travel, and by extension, to engage in work or other activities outside the home.

Self-Determination Theory

Self-determination theory is an applied meta-theory of motivation and well-being intended to guide social practices and point to possible interventions (Ryan & Deci, 2017, p. 6). Basic Psychological Needs Theory (BPNT) is a mini theory that posits that the fulfillment or support for autonomy (self-directed action), relatedness (belongingness and connectedness with others), and competence (self-efficacy) will enhance intrinsic motivation and well-being. Studies about transportation experiences for people who have different types of disabilities reveal environmental and structural obstacles that impact feelings of autonomy (Bascom & Christensen, 2017; Lubin et al., 2017), relatedness (De Vos & Witlox, 2016; Haveman et al., 2013), and competence (Samuel et al., 2013). Barriers and supports to transportation for people with different disabilities were identified in the literature and used to inform the development of a measure of transportation barriers refined over iterative surveys. Problems in transportation that thwarted feelings of autonomy, relatedness, and competence included:

- autonomy - access barriers, lack of mode choice, and financial barriers;
- relatedness - difficulty or reluctance to seek assistance, separate transportation spaces, and lack of understanding and support by transit employees; and
- competence - lack of transportation and/or navigation skills, lack of information, and barriers to accessing information.

Within studies that apply the self-determination framework to transportation, competence was recognized as a need that can be supported without the need for expensive infrastructure investment. Several articles identify a lack of transportation and navigation skills which often determine whether people with disabilities can travel independently or not. These shortcomings include difficulty completing the steps of the travel process (Moore Sohlberg et al., 2009), lack of knowledge of travel basics, such as how to interact with drivers and other passengers, how to request stops on a bus, and how to ask for help (Haveman et al., 2013), or lack of knowledge about finding and using different modes of transportation (Crudden et al., 2017).

Countering assumptions about one's capabilities is an ongoing challenge for people with disabilities in educational, work, and transportation settings. Supporting competence in transportation requires more than eliminating barriers, but also providing social supports like training and soft infrastructure supports like multiple formats of travel and navigational information. If perceivable and understandable information is not provided before and during trips, carrying out the multiple steps of trip planning and execution is difficult or impossible. While online transportation information is becoming more commonplace, the availability of complete information can vary greatly depending on location (Bigby et al., 2017). People with disabilities do not always have access to the internet at home or to smartphones that can aid them in accessing information and executing the steps of a planned trip (Morris, Sweatman, Jones, & Center, 2017). Furthermore, online information can often be difficult for people with low vision to access (Griffin-Shirley et al., 2017). Waara, Risser, and Agneta (2013) found an additional

digital divide for older people with age-related and acquired disabilities. More than half of the study population responded that they used the internet to find travel information and plan ahead. However, when segmenting the survey results into three age brackets (<65, 65-74, and >75), the authors found that more than half of the participants who found travel information online were participants in the youngest age bracket (52.8%), with fewer in the middle age bracket (35.9%), and even fewer in the oldest age bracket (11.1%). Focus groups revealed that online information about booking services for access needs was not always complete, that there was sometimes too much information obscuring relevant details, or that information was difficult to access or engage with.

Classroom training and field trips conducted by Lubin et al. (2017) with seniors in New Jersey showed that self-reported skills assessments after the training showed an increase in the number of affirmative answers about knowing how to plan trips, and greater awareness of lifts on buses, reduced fare tickets, priority seating, and fare requirements. Other findings from the post-field trip survey included a high percentage (86%) of participants "feeling more confident getting around independently," 28% feeling "able to get to more places I need or want to travel to," and 24% being able to "pursue new opportunities," which suggest that multiple basic psychological needs in transportation were fulfilled through the training.

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 offer opportunities for technologies to support people with disabilities through the development of mobile tools for guided mobility and navigation, customization of information, and monitoring by caretakers (Carmien et al., 2005). These tools can help people without disabilities save time and cognitive and affective effort in planning and executing non-routine travel (Grotenhuis, Wiegman, & Rietveld, 2007), but many of these tools were not designed with the needs of people with disabilities in mind.

Feelings of competence in transportation are thwarted when individuals with disabilities lack training and support for developing navigation skills or when transit information does not exist, is difficult to access, or when too much information obscures relevant details. Travel training can be very effective but may not have an impact if travel information is inconsistent or incorrect. Providing support for competence in travel depends on the development of accessible and comprehensible information delivered in multiple formats before and during travel. Still, there are ample opportunities to increase awareness about using public transportation, including where to find additional information when accessibility needs are a concern, other tools for accessing information that is unavailable during travel, and details about financial supports for transportation.

Goals of the Study

The previous and current study's overarching goal is to take a universal approach to disability (Zola, 2005) and use the self-determination framework to measure how transportation

can thwart basic psychological needs for people with disabilities. I also want to examine the extent of information gaps related to using and affording transportation and develop an online training intervention to address those gaps.

Goal 1: Develop a measure of transportation barriers that thwart the fulfillment of basic psychological needs and see if people with disabilities experience more difficulty with these barriers than people without disabilities and if there are group differences between Social Security benefits recipients and disabled non-recipients.

Goal 2: Examine the relative importance of transportation issues in relation to other barriers to work.

Goal 3: Expand on survey improvements to understand the informational gaps about SSA and transit agency programs, deductions, and discounts revealed in the first survey.

Goal 4: Detail the development of an online Moodle training course for Social Security benefits recipients in NYC and present preliminary results from an intervention study.

Research Questions and Hypotheses

This study uses nested comparison groups to examine whether transportation or work issues impact disabled and participants without disabilities differently and if there are additional group differences between Social Security benefits recipients and disabled non-recipients. Details about why benefits recipients do not take advantage of SSA work programs or deductions, or transit programs and discounts are explored through survey responses and a small number of participants who completed an online training course and answered related questionnaires.

RQ1: Are there group differences in how disabled and participants without disabilities rate their difficulty with transportation? Are there differences in transportation difficulties between Social Security benefits recipients and disabled non-recipients?

H1: Participants with disabilities will have greater difficulty with transportation than participants without disabilities, and Social Security benefits recipients will have greater difficulty with transportation than disabled non-recipients.

RQ2: Which barriers to work are the most challenging for participants with disabilities, including Social Security recipients and non-recipients?

H2: The top three barriers of discrimination, lack of education, and transportation will be the most highly ranked among all participants with disabilities.

RQ3: What are the reasons people don't take advantage of IRWE deductions, transit discounts, or other financial supports?

RQ4: Is there evidence of a benefit of the training?

The third and fourth research questions are exploratory and do not have associated hypotheses.

Research Design, Methods, and Analytic Strategy

This project builds on the work of a previously funded ARDRAW project, *Understanding Transportation Challenges for People with Disabilities Returning to Work*, which surveyed people with disabilities, including Social Security benefits recipients, and people without disabilities in the New York metropolitan area. The goal of both surveys was to develop

a measure of transportation factors that thwart the fulfillment of basic psychological needs in transportation, examine group differences among disabled and participants without disabilities, and examine whether Social Security benefits recipients felt these challenges to a greater extent than their disabled counterparts.

Another goal of the survey was to measure awareness of work-incentive programs and other financial support for transportation through deductions for transportation expenses and transit discounts for people with disabilities. The first survey measures were revised to improve a scale of transportation barriers, test different disability measurements, and collect more in-depth information about the use and knowledge of benefits that Social Security benefits recipients are aware of. I also describe the development process of an informational intervention in the form of an online training course and present preliminary results from a small number of participants who have completed part of the study.

Participants

For the survey, adults over the age of 18 who live in the New York metropolitan area were recruited using snowball sampling to have similar-sized groups of people with and without disabilities. A total of 269 participants completed the second survey, including participants without disabilities ($n = 126$), disabled Social Security benefits recipients ($n = 66$), and disabled non-recipients ($n = 77$). Social Security benefits recipients were enrolled in Supplemental Security Income (SSI) ($n = 37$) or Social Security Disability Income (SSDI) ($n = 33$), with four participants being enrolled in both programs. See Table 1 for participant profiles and Table 2 for disability types among survey participants.

The training was developed and tested in several phases, starting with seeking advice from seven disabled advocates through one-on-one interviews (see Appendix A for interview questions). In collaboration with a colleague working on a documentary film project about public transportation challenges for people with disabilities, video interviews and ride-alongs were recorded. Ten people with different disabilities participated in the conversations and offered their advice for traveling, navigating, self-advocacy, and dealing with other passengers while using public transportation (see Appendix B for links to video clips). In-person focus groups about the Moodle training course content were conducted with 23 disabled adults in conjunction with a related travel diary pilot study intended to collect data about participants' daily travel. Participants were recruited for three 3-hour feedback sessions through word of mouth and local disability service providers. The original full intervention study, which included the travel diary component, proved to be too challenging to find interested participants. Six eligible intervention study participants (Social Security benefits recipients living in New York City) pilot-tested the Moodle training course and provided feedback on useability and accessibility.

Procedures for the informational intervention were simplified to include surveys before and after the training and a maintenance survey several months later. Participants were offered an incentive of \$65 for completing all steps of the study, including completing the second survey, completing the 1-2 hour online training course, completing an exit survey immediately after the training, and completing the maintenance survey several months later. Because the

training was centered around transportation, recruiting was delayed from early spring to mid-summer because of COVID-19. Of ($n = 61$) participants who completed the screening form, only a small portion ($n = 14$) completed most of the study's required components. Preliminary results are presented in the results section.

Measures

The previous study's initial survey and revised survey (Survey 2) included demographic questions, disability questions, and the revised transportation barriers measure. They were also asked questions about awareness of SSA programs and transit discounts for people with disabilities, and how they would rate difficulty with common barriers to work and their motivation to work.

Washington Group Extended Question Set on Functioning

The second survey used an adapted measure of disability based on the short set and extended set from the Washington Group on Disability Statistics (Groce & Mont, 2017), which measure disability types and severity based on common functional limitations. The two question sets overlap, with the majority of items intended to measure the degree of difficulty with six kinds of functioning including a) seeing, even if wearing glasses, b) hearing, even if using a hearing aid, c) walking or climbing steps, d) remembering or concentrating, e) self-care, including washing all over or dressing, and f) communicating, for example understanding or being understood. Responses were recorded on a four-point Likert scale, from "no difficulty" to "cannot do it at all." Additional questions touched on mental health disabilities like depression and anxiety and other disabilities like pain and fatigue. While the more granular details of the extended set of questions were not relevant to the study, the short set of questions failed to capture mental health disabilities that may have an impact on travel behaviors, so a hybrid set of items combining the short and extended sets were asked of participants who responded that their daily activities were limited (see Appendix C. Disability Measures)

Transportation Thwarting Basic Psychological Needs (TTBPN) scale

Questions about travel barriers from the previous survey were revised for the second survey. In the revised measure, some items were reworded to have broader applicability, and the revised measure allowed participants to choose if an item "doesn't apply to me." There was no way of knowing if participants who responded as experiencing "no difficulty" responded to issues that did not apply to them at all rather than as not having any difficulty with issues relevant to their experiences. Additionally, some TTBPN scale items were developed to apply to either urban or suburban and rural locales. Still, there were not enough participants in a non-urban sample to make comparisons. There was high internal consistency for the initial TTBPN scale ($\alpha = 0.92$) in the initial survey ($n = 286$). Confirmatory factor analysis revealed that some items did not cohere with the latent variables of autonomy, relatedness, and competence, so some items were changed between the surveys. There were improvements in the internal consistency of the revised TTBPN ($\alpha = .94$) and individual subscales having excellent or good reliability (autonomy $\alpha = .91$; relatedness $\alpha = .81$; competence $\alpha = .84$) (see Table 3 for the revised TTBPN

measure).

Social Security Status, SSA Program, and Transit Discount Awareness

Participants were asked if they were enrolled in Supplemental Security Income (SSI) or Social Security Disability Income (SSDI) in addition to other programs. These included a) Ticket to Work (TTW), b) Plan to Achieve Self-Support (PASS), c) Achieving a Better Life Experience (ABLE) program, d) Medicaid Buy-In Program for Working People with Disabilities (M-BI), and e) Work Incentives Planning and Assistance (WIPA). Participants were also asked about their awareness of deductions for qualifying work expenses through a) Impairment-Related Work Expenses (IRWE)/Blind Work Expenses (BWE), and through b) PASS and c) ABLE programs, and d) transit programs and discounts for people with disabilities. For participants who were aware of any of the benefits, a follow-up question asked if they were currently participating in the program/receiving the benefit, needed more details, planned to apply for the program or benefit in the future, or if they were aware but had no plans to participate.

Barriers to Work

There were additional questions with 5-point ratings of common barriers to work, including benefit loss (healthcare, etc.) due to not working enough, or benefit loss (healthcare, etc.) due to working or earning too much, balancing health/disability with work, lacking proper accommodations, not having reliable transportation options, not having the right skills or education, or discrimination by potential employers.

Procedure

The online survey was conducted using Qualtrics software and was open to participants over several months from November 2019 to March 2020 and in conjunction with the intervention study. Large-print paper copies were provided or conducted by phone upon request to accommodate people with disabilities who had difficulty completing an online survey.

Participants were asked to complete the survey and given anonymous credentials for the Moodle website for the intervention study. Each of the four topic areas included a short quiz or questionnaire to confirm participation in the course's entirety and to support retention of the information presented in the course.

Analytic Strategy

Some questions did not require responses from participants to encourage greater participation in the survey. Complete cases were used in the case of missing values for mean scale calculations.

Tests of Assumptions

The MVN package in R (Korkmaz et al., 2014) was used to analyze the TTBN scale's univariate normality using the Shapiro-Wilks test and multivariate normality of the data using the Mardia test of multivariate normality. The MissMech package in R was used to analyze multivariate normality using a multiple imputation method for simulating missing values (Jamshidian et al., 2014). The data were not multivariate normal on the Mardia test ($p > 0.05$).

The univariate test of skewness and kurtosis showed that many of the items were skewed but were within a range of +1 to -1, so were treated as approximately normal.

Missing Data

Because the TTBP scale was modified to include a "does not apply" option, these responses were treated as missing data (see Table 4 for each item's number of responses). Rather than using listwise deletion for incomplete cases, full information maximum likelihood (FIML) was used for model estimation to impute missing values based on the observed values. Average scores on the transportation barriers scale were not normally distributed, so nonparametric hypothesis tests were conducted to answer the first research question. Because of a sample size that wasn't conducive to multiple comparisons, descriptive statistics were calculated for ordinal barriers to work variables and ranked for Social Security benefits recipients, disabled non-recipients, and participants without disabilities.

Results

Development of the TTBP Scale

The lavaan package in R (Rosseel et al., 2017) was used to fit a 3-factor confirmatory factor analysis for the TTBP scale for both surveys. Results from the second survey are presented below.

Model Specification and Identification

The baseline models included standardized estimates for all of the scale items and covariances for subscales where appropriate. Item responses on the TTBP scale were on a 5-point range with one indicating "not difficult at all" and five indicating "very difficult," with a "does not apply to me" option. Fit statistics for the model were calculated and compared to the following cut-off levels; a) Satorra-Bentler χ^2 ($S-B\chi^2$) test statistic (Satorra & Bentler, 1994), which deems a significant ($p \leq .05$) χ^2 as a poor fit but can be sensitive to sample size (Brown, 2006); b) Root Mean Square Error of Approximation (RMSEA) which has a reasonably good fit if values are between .05 and .08 (lower is better) (Brown, 2006); c) Comparative Fit Index (CFI) with values $\geq .90$ indicating reasonably good fit (Finch & French, 2015); and d) Standardized Root Mean Square Residual (SRMR), with values $\leq .08$ suggesting good model fit to the data (Hu & Bentler, 1999).

Model manipulation. Modification indices showed that some items on the TTBP subscales were highly correlated. For items that were similar in wording, the item with the weaker factor loading was removed. The standardized fit statistics for the selected items improved from the first model, ($S-B \chi^2 = 102.08$, $p < .001$, RMSEA=.09, CFI=.0.94, SRMR=.048), but did not meet the cutoff for RMSEA of < 0.08 . The model met cutoffs of CFI ≥ 0.9 , and SRMR ≤ 0.08 for acceptable fit. Complete factor loadings are presented in Table 5.

Indicator, composite, convergent, and discriminant validity. Validity was assessed for both models for indicator reliability (IR), the composite reliability (CR) for each latent variable, the average variance extracted (AVE) (Fornell & Larcker, 1981), and the heterotrait-monotrait ratio (HTMT) (Voorhees et al., 2016). Scale reliabilities for the 3-factor models were calculated, using the square of the standardized factor loadings for the overall scale and each subscale. The

TTBPN scale had an overall composite reliability score of .95. The subscales had acceptable composite reliability scores (autonomy = .88, relatedness = .83, competence = .85) and acceptable AVE scores (autonomy = .66, relatedness = .55, competence = .58).

Group Differences in Transportation Challenges

To test the hypothesis that participants with disabilities would have greater difficulty with transportation than participants without disabilities, and Social Security benefits recipients will have greater difficulty with transportation than disabled non-recipients, Mann-Whitney tests of independent samples were conducted among each comparison group. Transportation barriers (measured by the TTBPN scale) were greater for participants with disabilities ($Mdn = 2.67$) than for participants without disabilities ($Mdn = 2$), $U = 8969$, $p < .001$, $r = .334$. Social Security benefits recipients reported lower scores on the transportation barriers scale ($Mdn = 2.38$) compared to disabled non-recipients ($Mdn = 2.67$), but this difference was not statistically significant $U = 1422.5$, $p = .425$, $r = .075$. Therefore, the first hypothesis was only partially supported.

Descriptive statistics were computed for each group to answer which barriers to work were most challenging for participants with disabilities, including Social Security recipients and non-recipients, (see Table 6 for complete results). Social Security benefits recipients ranked their top three barriers to work as "discrimination by potential employers," "possibility of losing healthcare/benefits if I work too much," and "not having reliable transportation options." Disabled non-recipients also ranked transportation problems as their third-highest barrier to work, along with "difficulty getting the accommodations I need to do the job," and "discrimination by potential employers" as their top two barriers to work.

Awareness of SSA Programs and Financial Support for Transportation

To explore awareness of various transportation supports available through SSA and transit agencies, along with the reasons people don't take advantage of these supports, percentages of survey respondents indicating their awareness (Y/N) for the various programs were calculated (see Table 7 for results). Proportions were also calculated for responses to the follow-up question, which asked participants if they were a "current participant," "not aware of all the details," "aware with plans to participate in the future," or "aware with no plans to participate in the future." Awareness of SSA programs was low among Social Security benefits recipients, with 25.8% aware of the Ticket to Work program, 19.7% aware of Medicaid Buy-In program, 13.6% aware of the PASS program, 9% being aware of ABLE accounts, and only 6% aware of Work Incentives Planning & Assistance. There were similarly low rates of awareness of transportation-related deductions. For transit benefits, just over half (56%) were aware of reduced-fare Metrocards, 37.9% were aware of free MetroCards for paratransit Customers, 25.8% were aware of paratransit service, and 21.2% were aware of reduced fares on off-peak commuter rail service. Of those who were aware of programs, most responses on the follow-up question indicated that participants had no plans to participate in PASS, ABLE, WIPA, deductions for work expenses through IRWE/BWE, ABLE, or PASS. Most participants who were aware of transit discounts were already taking advantage of reduced-fare MetroCards and

rail discounts. A high percent (48%) were already receiving a free MetroCard for paratransit customers (see Table 8 for complete results).

Potential Benefits of the Training Program

Creating awareness of these various benefits was one of the goals of developing the informational intervention. Study participants were asked about their knowledge of programs before their training and discounts or programs they intended to apply for in the future. The number of participants who were aware of financial support was generally higher for transit-related benefits than SSA programs, which echoed the survey results (see Table 9 for preliminary results). About a third of the training participants also indicated that they planned to apply for one of the transportation discount programs addressed in the study. During the three focus group sessions and pilot study, several participants also indicated that they learned new information that they intended to research in more detail. The Moodle online training platform's benefit is the ability to program quizzes or short surveys into the interface, so course content can be referred to when answering questions. A brief survey was included in the "financial support for transportation" section and asked participants to rate how much different SSA transportation deductions help them afford transportation on a 3-point scale (1= not at all, 2 = somewhat but not enough, 3 = a lot). The overwhelming majority who completed this short survey said that deductions didn't help them at all (see Table 10). An open-ended question asked about deductions that would be helpful. Several participants said they wished "transportation costs were fully covered," another expressed interest in "family expenses related to transportation," an "Access-A-Ride voucher program for work," and another wanted tolls to be covered.

An exit survey question asked participants to rate the informativeness of specific topics of the training. Transportation and disability rights had the average highest rating (8.73/10), followed by navigation tips and information about travel in NYC (8.57/10) and financial support for transportation (8.27/10) (see Table 11). An additional observation of the potential training benefits was found when exploring quiz responses. Three short quizzes (4 questions each) were designed to confirm full participation and aid in information retention. There were no requirements for minimum scores on the quizzes, and participants were informed that their grades would not impact their incentive payment. After submitting each quiz, participants could view their incorrect and correct responses. Half of the participants ($n = 7$) repeated at least one of the three quizzes—sometimes more than once—to improve their scores.

Discussion

The scale development results show that the TTBP scale was internally consistent with composite, convergent, and discriminant validity, and the measure adequately captures a 3-factor structure of factors that thwart autonomy, relatedness, and competence fulfillment in transportation environments. Participants with disabilities had significantly higher scores on the TTBP scale than participants without disabilities. Social Security benefits recipients had a lower mean score on the TTBP measure than disabled non-recipients, but this difference wasn't statistically significant. Ranking work issues by their average rating among Social Security benefits recipients, disabled non-recipients, and participants without disabilities showed that the

top concerns varied by group, with discrimination and transportation being among the top three work barriers for participants with disabilities. Fear of losing benefits by working too much ranked in the top three obstacles for Social Security benefits recipients, while lack of accommodations was a greater barrier for disabled non-recipients.

Awareness of SSA programs and eligible transportation deductions through IRWE and other programs was generally very low. A large proportion of those who were aware of the programs had no plans to take advantage. For those who responded that they were not planning to take advantage of available programs or financial support, responses to an open-ended follow-up question fell into four categories: lack of interest, ineligibility, concern about losing benefits, and confusion over program details. A small number of survey participants indicated that they were aware of some of the programs, deductions, or discounts and intended to take advantage in the future.

While the sample of training participants is too small to draw conclusions about the responses to questionnaires in the survey, preliminary results show promise for benefiting some Social Security benefits recipients who indicated that they would be likely to recommend the training to others. Other feedback from focus groups and pilot participants was that information about SSA programs and deductions was challenging to find or understand. Many were concerned about earning too much, which was also reflected in the survey responses about work barriers. Eligible transportation deductions were not beneficial to most of the survey or intervention study participants. When asked about the types of transportation expenses they wanted to deduct, most of the training participants simply wanted all of their work transportation expenses to be deductible. Some wanted other family-related transportation expenses to be covered. All but one training participant found that eligible deductions for transportation through IRWE/BWE, PASS, and ABLE helped them afford transportation.

Limitations

The survey sample size was too small for multiple comparisons of work problems and their associations with outcome variables like motivation to work in relation to other challenges. The wording of the question changed between survey iterations (work motivation and challenges were combined into one item in the first survey). Similarly, the training study sample size is too small to make valid conclusions about the Moodle course's impact.

The CFA model had an adequate fit for several fit statistics but did not meet cut-offs for more conservative measures. Missing values on some scale measures may have biased the estimate, and additional tests for measurement invariance among the groups may also explain the lack of fit. For some of the survey items, the "not applicable" cases could hypothetically be explained by other variables in the survey, like disability status or public transit availability for others. Most social scientists encounter missing data, often as a result of research design. In this case, the missingness leads to more precision in the observed variables but reduces statistical power. Some missing values may also be based on individual choices, like driving as a primary transportation mode, even where public transit is available. Future research should determine a process for handling missing values on certain items, which might be treated as missing at random

(MAR) and imputed based on other explanatory variables (Schafer & Graham, 2002). However, the use of ordinal measurements for the scale items presents additional challenges for multiple imputations (Chen et al., 2005).

Relevance to Policy Makers

Transportation barriers continue to be a challenge for people with disabilities and are consistently ranked here and in prior literature as a top barrier to employment. These results provide some evidence that there is low awareness of SSA work programs and the support systems intended to help Social Security benefits recipients return to work. Among study participants who were aware of back-to-work programs and supports, most had no plans to take advantage for reasons including confusion over the program details or perceived ineligibility. More research is needed to understand where these confusions exist and if there are ways to make existing resources easier to understand or to advertise where to find assistance for navigating the details.

There was also very low awareness of eligible transportation-related expenses that can be deducted from earnings, but of those who reported awareness, most provided follow-up responses that their costs were not eligible for deduction. Asked in a different way for training participants, only one person said the deductions helped them afford transportation. SSA should consider expanding transportation deductions to cover all work-related transportation costs.

There was a greater awareness of transit agency programs and discounts than SSA programs and deductions among the survey participants. Many of those who were aware also responded that they were already benefiting from the programs and discounts. Still, many survey respondents were unaware of some discounts or not sure about the details, pointing to a need to publicize these discounts further and clarify the details even further.

The transportation barriers scale shows some promise as a way to gauge the level of difficulty that people with disabilities encounter regularly, and problems measured by the scale impacted people without disabilities to a lesser degree. Because these challenges appear to be occurring primarily for people with disabilities, the importance of addressing the problems may not be as apparent to transit agencies who may be focused on their broader customer base. Because nondisabled survey respondents still reported overall average scores on the transportation barriers scale that were higher than 1 (indicating no difficulty; *Mdn* = 2), there is some indication that the problems may be more universal than they are perceived.

Future Directions

The relevance of this work is challenging to convey, given the current state of the economy. The perceived feasibility of remote work has changed drastically in the face of COVID-19. While it is too soon to predict if these changes will become permanent, remote work and education will likely become more normalized post-pandemic. While this may benefit many people with disabilities, there are still technology gaps for those with limited incomes. Ensuring access to computers and the internet was one of many challenges that disability service providers were focused on during the crisis. Several internet service providers temporarily offered free service to low-income families. There will be a long-term need for ensuring that Social Security

benefits recipients can stay connected if they have hopes for entering the labor force in a society that is based less on working from an office and commuting. Deductions for internet service as an eligible impairment-related work expense could pay dividends for SSI and SSDI recipients who wish to further their education or return to the labor force.

Conclusion

Average overall ratings on a transportation barrier measure showed significant group differences in scores between disabled and participants without disabilities. As a group, disabled survey participants experienced more difficulty with many transportation barriers that impact feelings of autonomy, relatedness, and competence. SSA work-incentive programs that allow deductions for transportation from earnings don't appear to be aligned with some Social Security benefits recipients' needs, as evidenced by low awareness and even lower usage rates among survey respondents. Early results from a training intervention show some promise for closing gaps in knowledge about financial support for transportation through SSA and transit agency discounts. Still, more research is needed to confirm the training's impact. SSA Policy-makers should clarify confusion around current programs and consider the usefulness of transportation and communication technology deductions given the workplace's shifting realities.

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Tables**Table 1***Participant demographic profiles*

	<i>SSA Beneficiary</i>	<i>Disabled Non-Beneficiary</i>	<i>Nondisabled</i>
<i>Gender</i>			
Female	42 (62.7%)	56 (72.7%)	71 (56.3%)
Male	25 (37.3%)	19 (24.7%)	41 (32.5%)
Not specified	0 (0.0%)	2 (2.6%)	14 (11.1%)
<i>Race/Ethnicity</i>			
Not specified	6 (9.0%)	4 (5.2%)	37 (29.4%)
White	24 (35.8%)	46 (59.7%)	40 (31.7%)
Non-white	37 (55.2%)	27 (35.1%)	49 (38.9%)
<i>Education</i>			
High school or less	24 (35.8%)	19 (24.7%)	22 (17.5%)
College	15 (22.4%)	23 (29.9%)	57 (45.2%)
Advanced degree	5 (7.5%)	28 (36.4%)	24 (19.0%)
Not specified	23 (34.3%)	7 (9.1%)	23 (18.3%)
<i>Household Income Range</i>			
<10,000	8 (11.9%)	5 (6.5%)	8 (6.3%)
10,000-30,000	15 (22.4%)	15 (19.5%)	20 (15.9%)
100,000+	1 (1.5%)	13 (16.9%)	16 (12.7%)
30,000 - 70,000	9 (13.4%)	19 (24.7%)	27 (21.4%)
Not specified	34 (50.7%)	25 (32.5%)	55 (43.7%)

Table 2*Disability types among survey participants (n = 134)*

Disability Type	SSA Beneficiary	Disabled Non-Beneficiary
Seeing	31	34
Hearing	9	18
Walking	39	34
Remembering or Concentrating	29	36
Self-Care	26	23
Communicating	17	11
Severe Depression	5	18
Severe Anxiety	5	19
Severe Pain	10	19
Severe Fatigue	11	32

Note: Categories are not mutually exclusive.

Table 3

Survey 2 Transportation Thwarting Basic Psychological Needs (TTBPN) Items ($\alpha = .94$)

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

Response scale: (0) This doesn't apply to me (1) very easy (2) moderately easy (3) neither easy nor difficult (4) moderately difficult (5) very difficult

U = items for people living in an urban location, S = items for people living in a suburban or rural location

Autonomy ($\alpha = .91$)

* A1 (U/S) Having adequate options for transportation

A2 (U/S) Being able to afford transportation

A3 (U) Getting reliable public transit service

* A4 (U) The terrain or distance between home and bus stop or subway station

A5 (U/S) The distance I have to travel between home and places of interest

A6 (U/S) Physical barriers between my home and work or other destinations

Relatedness ($\alpha = .81$)

* R1 (U/S) Asking for help if I'm lost

R2 (U) Communicating with transit staff

R3 (U) Feeling respected by transit staff

R4 (U/S) Getting access to designated facilities like seating, elevators, restrooms, or parking

* R5 (U/S) Having the same transportation options as my peers

R6 (U/S) Feeling like I'm part of a community when I'm traveling

Competence ($\alpha = .84$)

C1 (U/S) Planning routes or scheduling rides

C2 (U/S) Finding information about service delays or changes

C3 (U/S) Navigating to unfamiliar places

C4 (U/S) Understanding signage, schedules, or maps

** indicates items that were removed for the final measure*

Table 4

Descriptive Statistics for TTBPN Observed Variables

	<i>n</i>	<i>Mean</i>	<i>SD</i>	<i>skew</i>	<i>kurtosis</i>	<i>SE</i>
A1-T	198	1.68	1.15	1.61	1.44	0.08
A2-T	207	2.11	1.14	0.88	-0.17	0.08
A3-T	211	2.4	1.27	0.56	-0.78	0.09
A4-T	206	1.95	1.2	1.03	-0.17	0.08
A5-T	207	2.32	1.23	0.59	-0.75	0.09

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A6-T	195	2.15	1.25	0.79	-0.52	0.09
R1-T	200	1.89	1.06	1.24	0.9	0.08
R2-T	202	2.25	1.17	0.57	-0.69	0.08
R3-T	204	2.39	1.2	0.49	-0.68	0.08
R4-T	190	2.71	1.31	0.14	-1.22	0.1
R5-T	202	2.27	1.36	0.69	-0.88	0.1
R6-T	201	2.51	1.27	0.29	-1.03	0.09
C1-T	209	1.94	1.11	1.11	0.35	0.08
C2-T	209	2.51	1.3	0.38	-1.14	0.09
C3-T	210	2.45	1.25	0.58	-0.74	0.09
C4-T	208	2.22	1.27	0.83	-0.48	0.09

Table 5

Survey 2 TTBN Final Model Parameters Estimates

	<i>Estimate</i>	<i>SE</i>	<i>z-value</i>	<i>CI lower</i>	<i>CI upper</i>
<i>Autonomy (thwarting)</i>					
A3-T	0.874	0.071	14.188	0.864	1.141
A4-T	0.815	0.073	14.003	0.88	1.166
A5-T	0.808	0.08	12.595	0.855	1.171
A6-T	0.766	0.085	11.051	0.772	1.104
<i>Relatedness (thwarting)</i>					
R2-T	0.667	0.078	9.998	0.626	0.932
R3-T	0.71	0.082	10.616	0.708	1.029
R4-T	0.731	0.082	11.526	0.786	1.107
R6-T	0.754	0.084	11.409	0.797	1.127
<i>Competence (thwarting)</i>					
C1-T	0.856	0.075	12.659	0.806	1.102
C2-T	0.751	0.079	12.381	0.824	1.135
C3-T	0.802	0.071	14.497	0.888	1.166
C4-T	0.621	0.106	7.75	0.612	1.026
<i>Covariances:</i>					
AUT: REL	0.773	0.056	13.843	0.663	0.882
AUT: COM	0.809	0.052	15.56	0.707	0.91
REL: COM	0.865	0.053	16.388	0.762	0.968

Table 6*Descriptive statistics for common barriers to work ranked by group*

<i>SSA Beneficiary Work Barriers</i>	<i>n</i>	<i>Mean</i>	<i>SD</i>
Discrimination by potential employers	45	3.02	1.34
Possibility of losing healthcare/benefits if I work too much	45	3.0	1.49
Not having reliable transportation options	45	2.98	1.69
Not having the right skills or education for the jobs I want	45	2.8	1.49
Difficulty getting the accommodations I need to do the job	45	2.64	1.25
Balancing my disability or health with work	45	2.44	1.1
Possibility of losing healthcare/ benefits if I don't work enough	45	2.33	1.46
<i>Disabled Non-Beneficiary Work Barriers</i>			
Difficulty getting the accommodations I need to do the job	75	3.13	1.38
Discrimination by potential employers	75	3.09	1.53
Not having reliable transportation options	75	3.05	1.43
Balancing my disability or health with work	75	3.0	1.22
Not having the right skills or education for the jobs I want	75	2.95	1.54
Possibility of losing healthcare/benefits if I don't work enough	75	2.8	1.46
Possibility of losing healthcare/benefits if I work too much	75	2.41	1.33
<i>Participants Without Disabilities Work Barriers</i>			
Discrimination by potential employers	113	3.27	1.41
Not having the right skills or education for the jobs I want	113	3.08	1.47
Difficulty getting the accommodations I need to do the job	113	2.94	1.08
Possibility of losing healthcare/benefits if I don't work enough	113	2.74	1.41
Not having reliable transportation options	113	2.7	1.43
Possibility of losing healthcare/benefits if I work too much	113	2.55	1.44

Table 7*Awareness of SSA return to work programs, eligible transportation deductions, and public transit services and discounts among Social Security benefits recipients (n = 66)*

<i>SSA Program</i>	<i># Aware</i>	<i>% Aware</i>
Ticket to Work	17	25.76%
Plan to Achieve Self-Support (PASS)	9	13.64%
Achieving a Better Life Experience (ABLE)	6	9.09%
Medicaid Buy-In	13	19.70%
Work Incentives Planning & Assistance (WIPA)	4	6.06%

<i>SSA Transportation-Related Deductions</i>	<i># Aware</i>	<i>% Aware</i>
IRWE/BWE	7	10.61%
ABLE Transportation Deductions	8	12.12%
PASSA Deductions	6	9.09%

<i>Transit Discounts</i>	<i># Aware</i>	<i>% Aware</i>
Reduced Fare MetroCard	37	56.06%
Reduced Fare Off-Peak Commuter Rail	14	21.21%
Free MetroCard for Paratransit Customers	25	37.88%

Table 8

Level of awareness for SSA and other benefits programs, eligible transportation deductions, and transit programs and discounts for disabled passengers among respondents who indicated they were aware of each program or benefit.

<i>Knowledge of SSA Programs</i>	<i>TTW</i>	<i>PASS</i>	<i>ABLE</i>	<i>M-BI</i>	<i>WIPA</i>
Current participant	2 (11.8%)	1 (11.1%)	1 (16.7%)	4 (30.8%)	0 (0.0%)
Not aware of details	5 (29.4%)	2 (22.2%)	1 (16.7%)	4 (30.8%)	2 (50.0%)
Aware and plan to participate	3 (17.6%)	1 (11.1%)	1 (16.7%)	2 (15.4%)	0 (0.0%)
Aware, no plans to participate	6 (35.3%)	5 (55.6%)	3 (50.0%)	3 (23.1%)	2 (50.0%)

<i>Knowledge of Transportation Deductions</i>	<i>IRWE/BWE</i>	<i>ABLE</i>	<i>PASS</i>
Current participant	2 (28.6%)	2 (25.0%)	1 (16.7%)
Not aware of details	1 (14.3%)	1 (12.5%)	1 (16.7%)
Aware and plan to participate	1 (14.3%)	1 (12.5%)	0 (0.0%)
Aware, no plans to participate	4 (57.1%)	4 (50.0%)	4 (66.7%)

<i>Knowledge of Transit Programs/Discounts</i>	<i>RFMC</i>	<i>RFCR</i>	<i>FMC</i>
Current participant	26 (70.3%)	9 (64.3%)	12 (48.0%)
Not aware of details	3 (8.1%)	2 (14.3%)	6 (24.0%)
Aware and plan to participate	4 (10.8%)	1 (7.1%)	1 (4.0%)
Aware, no plans to participate	3 (8.1%)	2 (14.3%)	6 (24.0%)

TTW = Ticket to Work; PASSA = Plan to Achieve Self-Support; ABLE = Achieving a Better Life Experience, M-BI = Medicaid Buy-In; WIPA = Work Incentives Planning and Assistance RFMC = Reduced-Fare MetroCard; RFCR = Reduced-Fare Commuter Rail; FMC = Free MetroCard for paratransit passengers for use on subways and buses.

Table 9

Awareness of SSA and transit programs and discounts among training participants (n = 14)

<i>Which of these programs or discounts did you know about before this training?</i>	
Impairment related work expenses (IRWE)	2
Blind Work Expenses (BWE)	3
PASSA Plan to Achieve Self Support	3
ABLE Account	4
Reduced Fare MetroCard for people with disabilities	8
Fair Fares program for low income individuals	5
Access-a-Ride	9
AAR MetroCard	6
<i>If you do not currently receive these discounts, do you plan to apply for them in the future? (Yes)</i>	
Reduced Fare MetroCard	4
AAR MetroCard	4
NYC Ferry Reduced Fare Card	3
Fair Fares	3
None of the above	4

Note: categories are not mutually exclusive

Table 10

Usefulness of eligible transportation deductions among training participants (n = 11)

	<i>How much do these programs through SSA help you afford transportation to work?</i>		
	Not at all	Somewhat, but not enough	A lot
Impairment related work expenses (IRWE)	10	1	0
Blind Work Expenses (BWE)	11	0	0
Plan to Achieve Self Support (PASS)	10	1	0
ABLE Account	10	0	1

Note: some responses were missing for the exit survey

Table 11*Training ratings for individual training topics*

On a scale of 1-10 with 1 = not informative and 10 = extremely informative, how would you rate each module? (n = 14)

	Average Rating
Transportation and Disability Rights	8.73
Overview of Accessible Transportation Options	8.55
Navigation Tips and Tools	8.55
Financial Support for Transportation	8.27
How likely are you to recommend this training?	8.27

Appendices

A. Questions for disabled advocates (for training course development)

1. What modes of transportation do you use most often? (Subway, bus, AAR, walking, bicycling, driving, etc.)
2. How did you first learn to use that transportation mode? How old were you? Who taught you or helped you?
3. Do you face any challenges using transportation? What are they?
4. Are any of these challenges related to or made worse by your disability? If so, how?
5. Do you have any specific tips for using public transportation? Is there anything you find that is still confusing?
6. Was there anything you wish someone had told you when you were first learning how to use public transportation (or other transportation)?
7. What format of training would be most useful (online, app-based, print)? What type of resources? What information should be included in these materials?
8. What would be a good way to share these tips?
9. Do you think a video of someone else's experiences and insights would have helped you when you were first learning to get around? What kind of helpful information could you envision being part of a video?
10. How do you find information about public transportation? (if applicable)
11. Are specific sources particularly helpful? If so, why?
12. Are specific sources unhelpful or confusing? If so, why?
13. Do you use mobile apps to get around? Which ones have you tried? (which are helpful / unhelpful and why)
14. What do you do when you run into an unexpected obstacle or service change?
15. Do you have tips for people with the same disability you have?
16. Do you have tips for communicating or finding information about service changes?

B. Links to Training Videos

- [Introduction](#)
- [Advocacy](#)
- [Tips for Traveling in NYC](#)
- [Navigation Tips](#)
- [Dealing with People](#)

C. Survey 2: Disability Measures

1. How much are your daily activities limited because of ANY of these reasons?

- blindness or low vision;
 - deafness or hard of hearing;
 - communication; mobility;
 - upper body functioning;
 - remembering or concentrating;
 - anxiety or depression;
 - pain;
 - fatigue
- Severely limited
- Limited but not severely
- Not limited at all

(Adapted from Washington Group Long-Form)

2. Do you have difficulty doing these activities?

Response scale: (0) No difficulty, (1) Some difficulty, (2) A lot of difficulty, (3) Cannot do it at all

- Seeing, even if wearing glasses?
- Hearing, even if using a hearing aid?
- Walking or climbing steps?
- Remembering or concentrating?
- Communicating with your usual language, (for example understanding or being understood by others)?
- Self-care, such as washing all over or dressing?

3. How often do you feel worried, nervous or anxious?

Response scale: (0) Never, (1) A few times a year, (2) Monthly, (3) Weekly, (4) Daily

3a. Thinking about the last time you felt worried, nervous, or anxious, how would you describe the level of these feelings?

Response scale: (1) A little, (2) Somewhere in between a little and a lot, (3) A lot

4. How often do you feel depressed?

Response scale: (0) Never, (1) A few times a year, (2) Monthly, (3) Weekly, (4) Daily

4a. Thinking about the last time you felt depressed, how depressed did you feel?

Response scale: (1) A little, (2) Somewhere in between a little and a lot, (3) A lot

5. In the past 3 months, how often did you have pain?

Response scale: (0) Never, (1) Some days, (2) Most days, (3) Every day

- 5a. Thinking about the last time you had pain, how much pain did you have?

(1) A little, (2) Somewhere in between a little and a lot, (3) A lot

6. In the past 3 months, how often did you feel very tired or exhausted?

Response scale: (0) Never, (1) Some days, (2) Most days, (3) Every day

- 6a. Thinking about the last time you felt this way, how would you describe the level of tiredness?

Response scale: (1) A little, (2) Somewhere in between a little and a lot, (3) A lot