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Does Learning the Social Model Improve Behavior towards Persons with Disabilities? A Randomized Experiment for Taxi Drivers in South Africa

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Abstract

This study examines the impacts of a training program related to the social model of disability, called Disability Equality Training (DET), using the method of randomized control trials. The targets of the study were taxi drivers in South Africa. This study collected the data on their understanding of disability and actual services toward passengers with disabilities through questionnaire and mystery shopper surveys. The main findings are that DET significantly encouraged taxi drivers to understand the social model, and that the combination of DET and practical support training had a significant impact on the time spent by drivers to support passengers with disabilities. These imply that learning the social model could lead to an improvement in the understanding of disability and, in part, actual behavior towards persons with disabilities.

Keywords: Disability equality training, Impact evaluation, Randomized control trials, Mystery shopper survey, South Africa

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1. Introduction

In pursuit of an inclusive society the majority group must deepen their understanding of minority group(s), the difficulties they face, and the causes of these. A fundamental and practical question in the field of disability and development is how to define disability, which profoundly affects our understanding of persons with disabilities and views on the measures to be taken to disability issues. The straightforward definition of disability is to consider it as physical, mental, or intellectual impairment, i.e., limitations in physical or intellectual functioning or mental disorders. This definition is called the individual or medical model of disability because it places disability within individuals. Medical treatment and rehabilitation are the direct solution to disability issues proposed by the individual model. Behind this solution, there is a thought that persons with disabilities have to be adapted to their surroundings through the recovery of their bodily or mental functions.

However, the individual model has been criticized for a long time by the disability rights movement. The most famous statement against the individual model is found in the "Fundamental Principles of Disability" of the Union of the Physically Impaired Against Segregation (UPIAS), a disability rights organization in the United Kingdom. It claimed that "In our view, it is society which disables physically impaired people. Disability is something imposed on top of our impairments by the way we are unnecessarily isolated and excluded from full participation in society. […] Thus we define impairment as lacking part of or all of a limb, or having a defective limb, organ or mechanism of the body; and disability as the disadvantage or restriction of activity caused by a contemporary social organisation which takes no or little account of people who have physical impairments and thus excludes them from participation in the mainstream of social activities." (UPIAS 1976, 14).[1] This definition, thereafter called the social model of disability, was accepted and developed in the disability rights movement by international disability

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[1] The statement refers to physical impairment only because UPIAS is an organization for physically impaired people. However, the current social model of disability is not restricted to physical impairment.

rights/disabled people's organizations and had a large influence on international agreements and initiatives such as the World Programme of Action and the International Year of Disabled Persons in 1982 and the International Decade of Disabled Persons from 1983 to 1993. The United Nations Convention on the Rights of Persons with Disabilities adopted in 2006 speculates in the preamble (e) that: "disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others." Therefore, the social model demands work on society as well, but not only on persons with disabilities, to remove the causes of their disadvantage during various phases of their lives. It can be considered as a basis for the legislation and regulations already adopted in many countries for inclusive education, equal employment opportunities, anti-discrimination, physical and information accessibility, and so on.

The basic concept of the social model has been disseminated and supported among governments, international organizations, and practitioners and researchers in the field of disability. However, the individual model seems to still be predominant over the social model among the non-professional public. Even if disability policies based on the social model are constructed and implemented, their effectiveness heavily depends on whether the public holds to the views of the social model. Changes in public attitudes and behavior and their proactive actions are essential for the social participation of persons with disabilities, but difficult to achieve if the public supports the individual model and leaves disability issues to medical and rehabilitation services.

This study was aimed at rigorously evaluating a training program to change the viewpoint of the public from the individual model to the social model, called Disability Equality Training (DET, hereafter). DET was initially conducted by the group of persons with disabilities in the United Kingdom in the 1970s, and its structure was formalized in 1985 (Gillespie-Sells and Campbell 1991). The main objectives of DET are to make participants discover the existence of disabilities in society that persons with impairments face and to encourage them to take action to

remove these by themselves. Since DET has its roots in the disability rights movement, it focuses not only on the acquisition of the viewpoints of the social model but also on the understanding of actions based on this model and implementing these actions in the participants' environment. DET used to be implemented mainly in the United Kingdom and is currently conducted in other countries by international organizations and development aid agencies (Harris and Enfield 2003; JICA 2015). In particular, the Japan International Cooperation Agency (JICA) has adopted DET in projects related to disability and social development and worked on the training of DET facilitators and the development of manuals since 2004 (JICA 2015).

This study evaluates DET in the site of the "Project for the Promotion of Empowerment of Persons with Disabilities and Disability Mainstreaming" conducted by JICA in South Africa (the JICA project, hereafter), using the method of randomized control trials. The targets of the evaluation were taxi drivers within the project site. This study randomly assigned two types of interventions, practical support training only and both practical support training and DET, and collected the data for the evaluation before and after the interventions. The data on the understanding of disability was collected through questionnaire surveys. In addition, the data on actual taxi services relating to passengers with disabilities were also collected by using the mystery shopper survey. More specifically, this study hired six local people who had visual or hearing impairment or used a wheelchair and asked them to catch and get into taxis and observe the services of taxi drivers without telling them that their services were being evaluated. This data collection method is close to the one of Ge et al. (2016). In that study a field experiment was conducted to measure the racial and gender discrimination levels of drivers of transportation network companies in two cities of the United States. The research assistants with a randomly determined name repeatedly got into taxis and collected data on waiting and riding times and the frequency of cancellations, and so on. This study attempted to find any changes in taxi services by implementing similar experiments before and after the interventions.

To my knowledge this study is the first to rigorously evaluate the impact of DET using a randomized control trial. García, Díaz, and Rodríguez (2009) conducted a systematic review of such programs since the 1970s that were aimed at changing attitudes towards persons with disabilities. Most of the reviewed programs focused on providing the opportunity to contact persons with disabilities and/or information on disability through films, books, tales and so on. These programs, categorized as disability awareness programs, are fundamentally different from DET as explained below. García et al. (2009) indicated as a limitation of the literature the limited number of evaluations based on an experimental design. Among others, this study has two features that are distinct from previous studies. While the main targets of existing studies have been children at primary and secondary school (García et al. 2009) or young students (Lindsay and Edwards 2012), this study targets taxi drivers, with whom persons with disabilities would often interact in their daily life. The other difference is that this study examines the impact of DET not only on attitudes self-reported in a questionnaire survey but also on actual behavior as captured by the method of mystery shopper survey. Therefore, this study contributes to the literature in terms of evaluating DET using an experimental method, targeting a population not covered so far, and using more objective data for the evaluation.

The remainder of this paper is organized as follows: Section 2 explains the details of DET and the background of the study site and targets; Section 3 introduces the evaluation design and the data collection surveys; Section 4 and 5 explain the empirical methodology and show the regression results for the impacts on attitudes and behaviors of taxi drivers, respectively; and Section 6 concludes with the implications of the findings.

2. Background

2.1 Disability equality training

DET is a training program based on the social model of disability. The core purposes are "to

facilitate participants to have an alternative view of disability, so as to examine it as a social issue" and "to facilitate participants to develop their own concrete action plans to break down barriers which hinder participation of disabled people in relation to their own work and daily lives" (Kuno 2009, 42). McLaughlin and Kuno (2008) highlight the features of DET by comparing it to other types of awareness program based on simulation exercises, the so-called Disability Awareness Training (DAT). In DAT, the participants experience functional difficulties, for example by riding a wheelchair or having their eyes covered, and learn about the functional limitations of persons with disabilities and how to help them when they are in trouble. Put differently, McLaughlin and Kuno (2008) explain that DAT emphasizes "A functional aspect, NOT a social one," "Inability of individuals, NOT capability," and "What is a barrier, NOT why it is made," and that learning only how to react towards persons with disabilities leads to maintaining barriers in society. On the other hand, in DET, the participants become aware of the existence and causes of disability in the form of discrimination, social exclusion, and participation restriction through participatory learning and discussion workshops. This self-discovery of barriers in society makes them recognize themselves as a discriminator and change agent and take proactive action following their action plans that have been developed in the training. DET is facilitated by persons with disabilities because they have experience of disability in society and are supposed to be able to provide appropriate training to participants. The quality of facilitators is one of the important factors for DET because its workshop style requires the skills of facilitation and experiences of training to a certain degree.

The theory of change that this study is based upon is as follows. The direct outcome from participation in DET is to understand disability as socially constructed and then what kind of actions are needed in terms of the social model to change this situation. These motivate participants' behavioral change. However, it seems to be not easy for people to take action without practical knowledge about how to deal with disability in society. Thus, the participants are expected to be enabled to take action once they are offered knowledge about practical

support. In addition, their impression of persons with disabilities is expected to improve through the interaction with the DET facilitator with disabilities, and this may indirectly contribute to behavioral change. Following this theory of change, the evaluation design and data necessary to evaluate the impact of DET were determined as explained below.

2.2 Site and targets of this study

The disability prevalence rate based on the United Nations disability index is 7.7 percent in South Africa according to Community Survey 2016, the latest large sample survey carried out in 2016 (Statistics South Africa 2018a). The South African constitution stipulates the prohibition of discrimination based on disability as well as race or gender. The South African government ratified the United Nations Convention on the Rights of Persons with Disabilities in 2007 and has been working on disability issues before and after the ratification by legislating on the prohibition of discrimination based on disability and promotion of equality, advocating the inclusion of disability issues in the national plans, and providing social security programs such as disability grants. However, disability policies in South Africa have been criticized in terms of their implementation (Dube 2005). For example, the government set the official goal for the employment rate of persons with disabilities in the public sector at 2 percent by 2005. However, they did not achieve that goal and the average employment rate in the public sector remained just 0.39 percent in the fiscal year of 2012 (Government of South Africa 2015). In the systematic review of disability-related social protection programs in low- and middle-income countries by Banks et al. (2017), several papers verified the exclusion of persons with disabilities from disability grant and care dependency grant programs and indicated their limited effects on poverty reduction. In South Africa, disability is strongly associated with several disadvantages such as education among school-aged children and youth, employment, income, and other low socioeconomic status indicators (DSD, DWCPD, and UNICEF 2012; Graham et

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al. 2014; Igei 2017, 2018; Statistics South Africa 2018a).

The site of this study is the Qwaqwa area in Maluti-a-Phofung local municipality, Free State Province, South Africa, which is one of the activity sites of the JICA project mentioned above. According to Community Survey 2016, the population of Maluti-a-Phofung is about 350,000, the third-largest municipality in Free State Province, and 99% of them are Black Africans (Statistics South Africa 2018b). The poverty headcount ratio of Maluti-a-Phofung was 8.1 percent in 2016, higher than the average in Free State Province (5.5 percent), but not so high when compared to other municipalities in other provinces, e.g., the ratios of all municipalities in Limpopo Province exceeded 10% (Statistics South Africa 2016). Statistics South Africa (2018b) reports that 30.4% and 18.8% of households in Maluti-a-Phofung had experienced running out of money to buy food and skipping a meal respectively during the year preceding the Community Survey of 2016. Both ratios were higher than the averages in Free State and other provinces (Statistics South Africa 2016). Thus, it can be said that the poverty condition in Maluti-a-Phofung is relatively worse than that in Free State Province, but not so bad compared to other places in South Africa. The Qwaqwa area is located at the center of Maluti-a-Phofung and has the municipality office, other administrative branch offices, a large hospital, shopping centers, and transportation terminals for long- and short-distance buses and taxis. According to my calculation using the microdata of Community Survey 2016, the disability prevalence rate based on the United Nations disability index in Maluti-a-Phofung is 13.3%, which is higher than in Free State (11.0%) and the whole of South Africa (7.7 percent) as reported in Statistics South Africa (2018a).[2] About 75% of persons with disabilities have at least some difficulty in seeing, and more than 50% of them have at least some difficulty in remembering or walking in Maluti-a-Phofung. The proportion of those who have multiple difficulties reaches 80%.

A preliminary survey was conducted at the study site in November 2016. This was designed to enable understanding of the lives and challenges of persons with disabilities in their

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[2] These data were downloaded from https://www.datafirst.uct.ac.za/dataportal/index.php/catalog/611.

daily lives through group discussions and face-to-face interviews with local people, basically those with disabilities. In this survey, persons with disabilities at the study site were found to confront a wide range of difficulties. As a result of consideration not only of the actual challenges[3] but also of the likelihood of obtaining more objective data in simpler ways as much as possible given time schedules, costs, and human resources for data collection surveys, this study chose taxi drivers as the target. Taxi services are an essential means of transportation for those with disabilities in the study site. The local administrative offices, a hospital, a welfare center where vocational training is provided for those with disabilities, and supermarkets are located in the central area of the study site. To move to these places, taxis are the most popular means of transportation because other public transportation services are not available. The people with disabilities interviewed stated that they rarely encountered a refusal to pick up them or unreasonable fares imposed by taxi drivers, but noted that they often received unkind service and sometimes felt the negative attitudes of taxi drivers toward them. In the second preliminary survey in May 2017, the actual situation of the taxi services at the study site was confirmed through a meeting with the officials of the Qwaqwa branch of the taxi association, the South Africa National Taxi Council, and obtained their permission and cooperation for this impact evaluation.

Two types of taxi services are available at the study site. They differ in the type of motor vehicles and the total number of drivers in service. The first type of taxi uses a sedan car and is called as "four-plus-one taxi" as it permits four passengers at maximum. The estimated number of four-plus-one taxis in service is about 200 according to the taxi association officials. The other type of taxi uses a mini-bus car and is called "Quantum taxi," deriving from the brand name of the mini-bus car used. The maximum number of passengers is about 10, and the number of Quantum taxis in service is three or four times as much as the four-plus-one taxis.

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[3] Other than taxi services, the interviewees mentioned problems of access to education and employment opportunities, accessibility of buildings including governmental offices, availability of assistive devices, and the services of social workers.

However, this study selected four-plus-one taxi drivers as the target. The first reason was that the sample size of this study was set in advance at about 150-200, and the maximum number of participants of this study was set as about 100 in total due to time and budget constraints. Another, more substantial reason is that four-plus-one taxi drivers are closer to passengers so that it might be easier to observe their behavior in the field survey and four-plus-one taxi drivers might have more motivation to practice what they learned from the interventions seen in this study. Besides, it might be possible to decrease the possibility for other passengers to support persons with disabilities before taxi drivers take action.

Four-plus-one taxis depart with passengers from two terminals, "Setsing taxi rank" and "Itshokolele taxi rank," in the center of the study site to the suburbs and come back to either of these taxi ranks by picking up passengers on the way. Figure 1 shows the location of the two taxi ranks and six taxi routes. Each driver has their own route prescribed by the taxi association and basically uses the same four-plus-one car they are leasing from car owners. The one-way fare is fixed at 10 South African Rands (0.9 US dollars, approximately). Passengers can stop and get on taxis anywhere if there is a vacant seat. The local demand for taxi services including four-plus-one taxis is so high that a third terminal is under construction as of the date of the field surveys of this study and illegal taxi drivers who are not officially permitted to operate do exist according to the taxi association officials.

3. Evaluation design and field surveys

3.1 Interventions

This study evaluates the impacts of two types of interventions on the four-plus-one taxi drivers' understanding of disability and their behavior towards persons with disabilities. The first intervention is to participate in practical support training only, and the second intervention is to participate in both practical support training and disability equality training (DET). Practical

support training is a half-day training session conducted by JICA project experts in which participants learn how to support persons with visual or hearing impairment, or wheelchair users in their services, e.g., when getting on and off, guiding about the destination, and so on, through role-playing and discussions together with persons having the above three types of impairments. After this practical support training, taxi drivers assigned to the group of the second intervention participated in one-day DET implemented by a female local DET facilitator who uses a wheelchair and participated in a two-week DET facilitator training course in 2014, with the support of JICA project experts.[4] In this DET, participants learned what is disability, where disability can be found, and what are the problems persons with disabilities face, through discussion, analysis of videos prepared as training material, and Q&A sessions. Then they considered appropriate action to solve these problems and drew up their action list to enhance the usability of taxi services by passengers with disabilities. The two types of interventions were implemented from the 19th to the 21st of September 2017. Two treatment groups received practical support training on separate days. To reduce the nonattendance of drivers as much as possible, the training sessions were held during their not busy times (10 am to 3 pm from Tuesday to Thursday) and an allowance for transportation, a lunch box, and a certificate were provided for the participants.

The sample drivers were randomly assigned to the two treatment and one control groups; a group that could participate only in practical support training, another group who could participate in both practical support training and DET, and the other group who could not participate in any training. More specifically, this study adopted stratified randomization, regarding the taxi routes as strata. In other words, treatment status was randomly determined among drivers who use the same taxi route. Although the choice of taxi route was expected to not influence drivers' attitudes towards disability issues, stratifying on taxi routes is essential in the

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[4] Aforementioned, the contents and effectiveness of DET depend on the quality of facilitators. Since the number of the facilitators of DET and the opportunities of DET are still limited in South Africa, there is a possibility that the quality of DET might have not been sufficiently secured in this study.

impact evaluation of the behavior of taxi drivers towards passengers with disabilities. As explained in detail below, the data on the actual behavior of taxi drivers towards passengers with disabilities was collected by the direct examination of enumerators with disabilities. Since the enumerators cannot choose which taxi they get into, it is necessary to evenly collect data from taxi drivers in the treatment and control groups for each taxi route.

3.2 Data

The data on the understanding of disability was collected based on the questionnaire survey, and the data on actual taxi services for passengers with disabilities was collected based on the mystery shopper survey. Figure 2 presents the timeline of this study. As for the determination of the subjects of this study, the population list of four-plus-one taxi drivers could not be used in advance because the taxi association and any other authorities did not possess it. Additionally, the taxi association officials warned that many taxi drivers designated as participants might not attend training by prioritizing their work if selected without respecting their willingness. Thus, this study called for participation at first and randomly chose the participants among those who expressed an interest in training to decrease the possibility of the nonparticipation of selected drivers, i.e., to mitigate the influence of non-compliance by treatment groups.

In July 2017, this study approached taxi drivers about their participation in the training and questionnaire survey through an announcement by the taxi association and by directly inviting them one by one at both taxi ranks. When calling for registration, taxi drivers were given a prepared information sheet stating that they had an opportunity to receive disability-related training two months later, but they would be divided into groups and the training would be separately provided for each group at a different date due to space and budget considerations.[5]

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[5] After the completion of endline surveys, the JICA project experts provided DET for the control group and out-of-sample taxi drivers who desired to participate. Almost all of the drivers in the control group participated in this training.

They were asked only for registration for participation in the training and their cooperation on the questionnaire survey, but were not informed of the mystery shopper survey. The questionnaire survey was conducted in a face-to-face interview using a structured questionnaire translated into the local language, Southern Sotho. This baseline questionnaire survey collected the drivers' personal information including the taxi route, taxi rank, and car number of the taxi they were using and asked questions about their understanding of the social model, actions based on this model, and their impressions of persons with disabilities in general. In total, 127 drivers were registered as the sample for this study.

It should be noted here that this sample of drivers did not represent the population of drivers at the study site, and that the registered drivers were expected to have a higher interest in the disability issue. This indicates that the findings of this study cannot be simply generalized to other taxi drivers in the study site or other taxi drivers in other places within and outside South Africa. In other words, the external validity of the findings of this study may be limited. However, the internal validity of this study's impact evaluation is guaranteed, i.e., it is still possible to estimate the causal impact of the interventions by using the method of randomized control trials. While the registered drivers with a higher interest in the disability issues seemed to more easily change their attitudes and behavior after the interventions, they may already have had positive attitudes and behavior toward persons with disabilities and there may be no room for improvement through the interventions. Thus, it was not obvious in advance whether the sampling in this study overestimated or underestimated the impact of the interventions.

In parallel with the registration of drivers and the baseline questionnaire survey, a baseline mystery shopper survey was conducted from the 10th to the 21st of July 2017 to collect data on the actual behavior of taxi drivers towards passengers with disabilities. In this mystery shopper survey, enumerators with disabilities caught four-plus-one taxis and observed the services of the drivers following a check-list without telling them that their services are being evaluated. To recruit the enumerators, interviews with about 20 applicants were carried out in

cooperation with JICA project experts and six local people with disabilities were selected. Among these, two (a male and a female) had visual impairment, two (a male and a female) had hearing impairment, and two (a male and a female) were wheelchair users. The reason to choose these three types of enumerators was that the behavior of taxi drivers may differ by the type of disability of passengers and these three types of disability account for the largest proportion of persons with disabilities in Maluti-a-Phofung.[6,7] The enumerators were organized into three pairs (a male with visual impairment and a female wheelchair user; a female with visual impairment and a male wheelchair user; a male and a female with hearing impairment). Three local research assistants without disabilities accompanied each pair to support the survey. This group of two enumerators and a research assistant is "a survey team" hereafter.[8]

Each enumerator had the task to get on a four-plus-one taxi twice in the morning and twice in the afternoon per day during the 10 weekdays of the survey. Each survey team went to each waiting point in the taxi route determined in advance by a hired car. The taxi route was determined in rotation each time of the survey so that the enumerators could evenly catch taxis on all taxi routes. In each route, a waiting point was roughly determined at the side of the road leading to the taxi ranks, taking into consideration the tradeoff between the possibility of finding a taxi with vacant seats and the time to move to that point. The farther away from the taxi ranks the waiting point is, the more easily he/she can find a vacant taxi, but imposed a larger burden on the survey teams when transporting them. The research assistants were allowed to slightly change the waiting point every time because taxi drivers might feel suspicious about the enumerators if they were to try to find a taxi many times at the same place. After determining the waiting point, each

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[6] According to Community Survey 2016, among the persons with disabilities in Maluti-a-Phofung, about 75% have at least some difficulty in seeing, about 40% have at least some difficulty in hearing, and about 50% have at least some difficulty in walking.

[7] The enumerators with visual impairment use a taxi in their daily lives. When they catch a taxi, they indicate their intention to get on by pointing an index finger at the ground.

[8] This study was conducted basically with local persons with disabilities. Other than the six enumerators of the mystery shopper survey, two physically impaired persons as the enumerators of the questionnaire survey and another two physically impaired persons for data entry of the completed questionnaires and mystery shopper survey were hired.

enumerator waited for and caught only a four-plus-one taxi. After the enumerators caught a vacant taxi, they examined the driver's services to them following the check-list attached in the Appendix to this paper. This list and survey protocol differed by the types of impairment of the enumerators. Just after the enumerators got off the taxi at the place determined in advance, they were supposed to report the results of this examination by calling to a data entering staff in the case of visually impaired enumerators and wheel-chair users, or by sending a text message in the case of hearing-impaired enumerators.

The task of the research assistants was to support the enumerators in conducting the mystery shopper survey, e.g., sending them to the waiting points on the taxi routes by hired cars and picking up them after the survey. In addition, they took a video of the whole situation from the beginning (starting to wait for a taxi) to the end (getting on a taxi) every time the survey was carried out. The recorded videos were used to obtain information about the car number of the taxi the enumerators caught, the time taken by them to catch a taxi, the actual services of the taxi drivers, and so on. The research assistants took notes about the car number and the rough time of starting and finishing the survey to add to the information of the recorded videos.

To measure the attitudes and behavior of the sampled taxi drivers, the same questionnaire and mystery shopper surveys were repeated after the training from September to October 2017. The endline questionnaire survey of the treatment groups were conducted just after each end of intervention using the group interview method due to the reason for implementation,[9] i.e., the participants were asked to fill in the questionnaire by themselves under monitoring by JICA project experts. The drivers of the control group were approached at the two taxi ranks and a face-to-face interview conducted using the same questionnaire as those for the treatment groups. This difference in the method of the endline questionnaire survey between the treatment and control groups may have affected the precision and magnitude of the estimated impacts of the

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[9] The main reason for separate surveys for the treatment and control groups is the time constraint allowed for the implementation of the survey. The activities of the JICA project were planned to begin from October 2017.

interventions. The measurement errors may be higher in the treatment group because they may not have understood the questions well. On the other hand, the responses in the control group may be influenced by the existence of the enumerators, i.e., the social desirability bias seems to be higher in the control group. These possibilities are considered to make the estimates of the impact of interventions coarser (larger standard errors of the estimates) and smaller.

In parallel with the questionnaire survey, the endline mystery shopper survey was held in the same way as the baseline survey from 27th September to 10th October 2017. Therefore, this study only examines the short-run impacts of each intervention because the endline data was collected within a maximum of three weeks after the intervention. Since the impacts seem to diminish over time, the estimates of the impacts of interventions in this study can be interpreted as the maximum impacts.

4. Empirical analysis of the impacts on the attitudes of taxi drivers

4.1 Descriptive analysis

Table 1 reports the sample size by the initial treatment status and the attendance status of the samples of the endline survey. CG, TG1, and TG2 stand for the initial treatment status, the control group, and the first and second treatment groups, respectively. Since the attrition rate in the endline survey was low (4.7%=6/127) and did not differ much by treatment status, the effects of this attrition can be ignored. In the sample of drivers some did not comply with the assignment of treatment status; 5 drivers in the first treatment group participated in both training sessions by ignoring the assignment, and 7 and 11 drivers did not appear at the training site in the first and second treatment groups, respectively. This noncompliance problem is considered in the empirical analysis below.

Table 2 shows the results of a balance test between the two treatment and control groups. In addition to the basic characteristics of the drivers, the degree of their understanding of the

social model of disability, the actions to be taken based on the social model, and the impressions of persons with disabilities revealed by the baseline survey are compared.[10] This study attempted to measure the understanding of the social model by bipolar questions asking the respondents to choose which of two sentences they agree with and how much. For example, two sentences, "*Disability is in the individual.*" and "*Disability is in society.*", are located on both sides of a single line in the questionnaire, and the five options, "*Strongly agree with the left (sentence),*" "*Agree with the left,*" "*Neutral,*" "*Agree with the right,*" and "*Strongly agree with the right*" are located between the two sentences. The response to each question was scored from one to five points depending on how strongly they agreed with the sentence describing the social model.

Panel B of Table 2 shows the sentences reflecting the social model. The words in italics in those sentences are replaced by the words in parentheses to construct the sentences matched against those of the social model.[11] The understanding of the actions to be taken based on the social model was assessed by noting how much the respondents agreed with the sentences presented in panel C of Table 2. Five choices of response were provided to them: "*Strongly disagree,*" "*Disagree,*" "*Neutral,*" "*Agree,*" to "*Strongly agree.*" The response to each sentence was scored from one to five points depending on how strongly they agreed with the sentence about action based on the social model. The sentences with a mark of (-) are meant to be against the action based on the social model so the responses to these sentences were reverse scored.

Lastly, the impressions of persons with disabilities were measured by using the Semantic Differential method developed by Osgood, Suci, and Tannenbaum (1957). The Semantic Differential method is one of the most popular instruments to measure attitudes toward persons

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[10] The questions about the understanding of the social model of disability and the actions to be taken based on it were originally prepared for this study after consulting with the project experts and a JICA senior advisor on disability. A pre-test of the questionnaire was held for the participants in another DET in the project conducted in Gauteng before this study. At this pre-test, the respondents understood the meaning of questions, sentences, and the pairs of words well, and suggested some points for revision. Then, the revised questionnaire was tested in a pilot survey of a few drivers out of the sample just before the baseline survey, and the questionnaire finalized.

[11] In the survey, it was randomly determined by each pair of sentences which sentences of the social model and its opposite were located at the left- or right-hand side to reduce the order effect of the questions.

with disabilities (Scior 2011; Takahashi 2018; Vignes et al. 2008). As with the questions on the understanding of the social model, the respondents were shown a pair of adjectives located on both sides of a single line and asked to choose which and how much those adjectives applied to their impressions of persons with disabilities using the five options from "*Strongly agree with the left (adjective)*" to "*Strongly agree with the right*." The pairs of adjectives presented in panel D can be categorized into three dimensions: evaluation ("Good - Bad" and "Positive - Negative"), potency ("Strong - Weak" and "Gentle - Forceful"), and activity ("Active - Inactive," "Calm - Restless," and "Quiet - Loud"). The response to each pair was scored from one to five points depending on the level of "positive" impressions the respondents had towards persons with disabilities.

The fourth (fifth) column in Table 2 gives the p-values from the results of statistical tests on the difference in the means of variables at the baseline survey between the first (second) treatment and control groups. Route fixed effects were included for the tests except for the test on the route variables, and the robust standard error was used for all tests. Almost all of the mean differences are not statistically significant at the five percent level. Therefore, it can be said that there was no systematic difference between the treatment and control groups before the intervention.

Figure 3 shows the changes in the understanding of the social model. As explained above, the understanding of the social model was scored from one to five points. The average scores of each group (presented by "CG," "TG1," and "TG2") for each sentence are presented at the dots in Figure 3. The difference in the scores of an individual between the baseline and endline surveys for each group was tested using the Wilcoxon signed-rank test and an arrow was drawn when it was statistically significant at the 5 percent level. This also applies to the data in Figure 4 and Figure **5**. As shown by the results of the first and second sentences, only the second treatment group who participated in DET significantly changed their understanding of disability in the direction towards the social model. Regarding the feeling of the relevancy of the disability issue

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(the third sentences), both the treatment groups statistically significantly improved. As for the other two sentences about the feature of disability, there was no significant change in the scores for any groups.

Figure 4 presents the changes in the understanding of action based on the social model. While the scores of the second treatment groups did not significantly change for all sentences, those of the control group significantly changed for the first sentence and those of the first treatment group significantly changed for the first, second, and sixth sentences. Since the first, second, and sixth sentences are related to actions based on the medical model of disability, the change in the direction towards disagreement is desirable for this study. Thus, the first treatment and control groups improved their understanding of action based on the social model. The scores of the second treatment group for the first and second sentences also changed in the same direction as the other two groups, but their magnitudes were not statistically significant.

Figure 5 shows the changes in the impressions of persons with disabilities. Regarding most of the pairs of adjectives, the impressions of persons with disabilities changed for the better, not only in the treatment groups but also in the control group. The impressions of the first treatment group significantly improved for the pairs of "Positive – Negative" and "Good – Bad," and those of the second treatment group significantly improved for the pairs of "Positive – Negative," "Strong – Weak," "Restless – Calm," and "Forceful – Gentle." These improvements in the impression are considered to be brought about by understanding the experience of difficulties that persons with disabilities have, making contact with local persons with disabilities during the training sessions and learning the social model in the second treatment group. The changes in the impressions of the control group are statistically significant for the pairs of "Positive – Negative" and "Strong – Weak." One of the possible reasons why the control group improved their impressions even without any intervention is the spillover of the contents of the training from the treatment groups. In addition, the drivers in the control group might just alter their responses to

the survey about socially desirable manners by mistakenly believing that this would lead to receiving other interventions in this study. The possibility of spillover is discussed below.

4.2 Regression model

The following Analysis of Covariance model was estimated for each dependent variable of the understanding of the social model, the actions to be taken based on this model, and their impressions of persons with disabilities, using the ordinary least squares method:

$$y_i^{end} = \beta_0 + \beta_1 TG1_i + \beta_2 TG2_i + X_i\gamma + \delta y_i^{base} + \alpha_i^{route} + \varepsilon_i$$

where y_i^{end} and y_i^{base} are the dependent variables at the endline and baseline surveys, respectively; the other covariates, X_i, include age, years of schooling, years of experience of driving taxis, the experience of illnesses or injuries, and the number of acquaintances with disabilities; α_i^{route} is the fixed effect of the taxi route taken by each driver; and $TG1_i$ and $TG2_i$ are the initial treatment status randomly determined.

As confirmed by Table 1, the actual training attendance status of drivers differed from the assigned treatment status. Thus, the estimates of β_1 and β_2 represent the impact of assignment to each treatment group, called the intention-to-treat effect (ITT). Although the ITT does not correspond to the impact of participation in the training sessions, it is practically insightful in that it reflects the overall impacts of the training when this is opened to all potential beneficiaries and some of them participate in it. As another option for the estimation of the training impacts, the local average treatment effect (LATE) was estimated by the regression model by replacing $TG1_i$ and $TG2_i$ with the actual training attendance through the two-stage least squares, using the assigned treatment status as an instrumental variable for actual training attendance. It should be noted that the LATE is a valid estimate of the training impact only among those who complied with our assignment of the treatment status. Since the potential training impact may be different between those who complied and those who did not, LATE cannot be simply generalized to the

overall population. However, it was estimated in this paper because it shows the impact of attendance in the training sessions even for a part of the population.

In addition to the ITT and LATE of each intervention, the statistical significance of the difference in the estimated impacts between the two interventions was tested to investigate the impact of DET by re-setting $TG1_i$ as a reference category in the regression models. Lastly, the adjusted p-values that were robust to the multiple hypothesis testing were computed following the procedure suggested by Romano and Wolf (2016). They update the classic Bonferroni or Holm correction by considering dependence among test statistics. The p-values are adjusted within each category of dependent variables and ITT or LATE estimates with 1,000 bootstrap replications.

4.3 Regression results

Table 3 shows the regression results for the impact of each intervention on the understanding of the social model. The first three columns report the estimates of ITT, and the remaining three columns report the estimates of LATE. The statistical significance is examined by the p-values adjusted for multiple hypothesis testing through the procedure of Romano and Wolf (2016). As in the columns 1 and 4, both the ITT and LATE of the first intervention (practical support training only) were not statistically significant except for the "Relevant to me" sentence. On the other hand, those of the second intervention (practical support training and DET) were significant for the sentences of "In society" and "Social issue" (columns 2 and 5). The impacts of DET obtained by comparing the estimates between the two treatment groups were also significant for the sentences of "In society" and "Social issue" (columns 3 and 6). Therefore, as expected, DET was found to have significant impacts on the understanding of the fundamental concept of the social model that disability is socially constructed, whereas the practical support training did not. Among the insignificant results, as described by Figure 3, the improvement of the score of the control group for the "Relevant to me" sentence may be a possible reason for the insignificant

impact for this sentence. Regarding the "Restricted" and "Can be improved" sentences, the scores of all groups did not change between the baseline and endline surveys. The indirect way of asking the questions might have yielded insignificant results for these sentences.

Table 4 shows the regression results for the impacts on the understanding of action based on the social model. The impacts of both interventions were found to be weak; the first intervention is found to have significant impacts on the agreement with the "I can do something" sentence and the disagreement with the "Responsibility of person with disabilities" sentence both at the 10% level. The second intervention was found to have significant impacts on the agreement with the "I can do something" sentence and the agreement with the "Self-effort is essential" sentence both at the 10% level, in which the latter result indicates that the second treatment group is more likely to think that the efforts of persons with disabilities, but not of the society, are necessary to overcome their disadvantages. Lastly, there was no significant result for the impact of DET (columns 3 and 6). Since we confirmed above the impact of DET on the understanding of the social model, this result implies that DET in the second intervention did not have an impact up to the understanding of action based on the social model. It can be said from the results of the agreement with the "I can do something" sentence that practical support training may be sufficient for the participants to recognize themselves as a change agent. The weak results in this empirical analysis may be attributed to the ambiguity of the reverse sentences devised for the survey. Operation, rehabilitation, and self-effort and responsibility of persons with disabilities are not entirely denied by the social model and considered to be helpful to resolve disability issues in some cases. Therefore, the expression of sentences might have meant that the treatment groups, especially the second one, found it difficult to disagree with the reverse sentences.

Table 5 shows the regression results for the impacts on the general impressions towards persons with disabilities. Significant impacts at the conventional significance level were obtained only for the "Good" item for the first treatment group and the "Gentle" item for the second treatment group. As described by Figure 5, although the impressions of persons with disabilities

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improved before and after the interventions within each treatment group, the regression analysis did not yield significant results because the impressions of the control group also improved possibly due to the spillover of the contents of the training from the treatment groups or an intentional change in responses to receive intervention in future. The sample of this study is the taxi drivers who showed interest in the training. Almost all of the control group participated in the DET provided after the endline surveys. This implies that spillover or intentional changes in responses are likely to happen. Therefore, it seems to be difficult to draw any inferences from the impacts of the first and second interventions on the impression of persons with disabilities. As for the impact of DET, there is no significant result in columns 3 and 6, indicating that DET does not have a large additional influence on the impressions of persons with disabilities relative to practical support training.[12]

5. Empirical analysis on the impacts on behaviors of taxi drivers

5.1 Descriptive analysis

Table 6 reports the number of observations from the baseline and endline mystery shopper surveys by the status of attendance at training sessions, taxi route, and enumerator. The total number of observations was 240 at the baseline survey, which was equally divided by taxi route and enumerator. The target number of observations at the endline survey was 240, but the actual number was limited to 198 because of bad weather and a one-day nonparticipation of an enumerator for a personally urgent reason.[13] Another unexpected problem of the mystery shopper surveys is that most of the observations came from taxi drivers out of the sample of the

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[12] The subgroup analyses for all ITT estimates was conducted by including the interaction dummies of the treatment status and a subgroup dummy based on age, years of schooling, and experience of illnesses or injuries, and the number of acquaintances with disabilities. However, no consistently significant differences in ITT by any subgroups were found, though these results are not reported in the result tables in this paper due to space constraints.

[13] In both baseline and endline surveys, there were a few cases where the taxi drivers picked up our enumerators twice. However, as these are rare in both surveys, such observations were kept in the sample and not explicitly dealt with in the empirical analyses.

questionnaire survey. The enumerators could not choose a taxi they got into by themselves, and unfortunately we had no effective solution that would enable them to conduct a survey only for the sample drivers in a natural setting as much as possible. Figure 6 summarizes the composition of observations from the mystery shopper surveys. At first, the population of taxi drivers at the study site was divided into registered and not registered drivers i.e., the sample or out-of-sample of the questionnaire survey. Then, the sample drivers were randomly separated into three groups based on treatment status, and some of them appeared in the mystery shopper survey. On the other hand, some of the out-of-sample drivers were also captured by the mystery shopper survey. The out-of-sample drivers include those who refused to participate in this study and/or others such as illegal drivers that we could not make contact at the time of registration of the study participants. According to the information from a local taxi association, the number of legal drivers is at most 200 in the study site. Since this study covered more than half of the legal drivers (127 of 200), most of the out-of-sample observations of the mystery shopper survey seem to be ones obtained from illegal taxi drivers. The regression model was run considering this composition of the observations of the mystery shopper surveys.

Regarding the sampling in the mystery shopper survey, selection bias is suspected, that is, taxi drivers discriminating against passengers with disabilities might have passed by the enumerators and taxi drivers with an understanding of disability might have picked up them. To check this, we counted in the videos taken by the assistants the number of taxis that passed by the enumerators before they got one, and found that enumerators were passed by 1.78 and 2.76 taxis on average for each ride in the baseline and endline surveys, respectively.[14] As the average number of passing cars including taxis was larger at the endline survey (18.2) than the baseline survey (14.5), the increase in the number of passing taxis is attributable to the seasonal change in

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[14] We can identify a taxi in the videos because the legal taxis in the study site have a yellow signboard on the roof or the engine hood. Basically, the roads were uncongested. The average number of passing cars including taxis per minute was 3.31 and 3.81 in the baseline and endline survey. Thus, we could easily and correctly count them.

the traffic conditions, but not only to the discriminatory attitudes of taxi drivers. Although about 2-3 taxis passed by enumerators, we also detected in the videos that some of them might not have stopped because all of their seats were occupied. As a rough estimate from the videos, the case where taxis were not fully occupied passed by enumerators accounts for only 12.7% and 14.4% of all the rides in the baseline and endline surveys, respectively. Therefore, although the bias from self-selection in the mystery shopper survey might potentially exist, it seems to be not so large as to alter the whole interpretation of the findings of this paper.

Table 7 shows the variables about the behaviors of taxi drivers and reports the results of the baseline and endline mystery shopper surveys. The score of services is the proportion of the desirable services of taxi drivers for passengers with disabilities that the enumerators of this study directly could confirm from among the check-list. In all observations, the drivers conducted 55.4% of the desired services at the baseline survey, which improved to 67.2% in the endline survey. The average score was higher when the enumerator was visually impaired or a wheelchair user than when hearing-impaired in both baseline and endline surveys. We can also confirm that the average score was higher for both treatment groups than the control group and the non-sample group in both baseline and endline surveys.

Subjective attitudes, measured by the feeling of enumerators about the attitudes of a driver, take the value from 1 ("Very negative") to 5 ("Very positive"). The results are similar to those of the score on services. The average attitudes improved in the endline survey on all observations and at all subgroups of drivers and were higher for the treatment groups in both baseline and endline surveys. The enumerators were told in advance that their responses would be used as data in the analysis of the impact evaluation of the interventions in this study, but did not know about the treatment status of the drivers of the taxis they got into during the survey. Thus, their prejudice in favor of this study, if any, was not expected to affect their scoring of drivers' attitudes.

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The remaining two variables were constructed from the videos of the enumerators getting into taxis. The first variable, the proportion of taxi drivers who got out a taxi to support enumerators, was created only in the case of visually impaired enumerators and wheelchair users. At the baseline survey, only 38% of drivers got out of their taxi to support visually impaired enumerators, whereas almost all drivers did this for wheelchair users. However, the proportion reached almost 100% at the endline survey even for the control group and the non-sample group. There must have been a spillover of information on supporting passengers with disabilities from the treatment groups to these groups, though this was not directly confirmed during the study. As this variable cannot be used in the regression for the impact evaluation, it was decided to focus on the other variable, that is, how many seconds it took for a driver to get out, which was also created only in the case of visually impaired enumerators and wheelchair users.[15] The average time was 6.52 seconds at all observations of the baseline survey, which increased to 9.23 seconds at the endline survey. The average time was larger for visually impaired enumerators than wheelchair users. This result seems to be intuitively understandable because it is slightly more difficult for taxi drivers to judge by appearance the need for support in the case of visually impaired passengers than wheelchair users. Among the subgroup of drivers, the average time is the shortest for the second treatment group in all observations of the endline survey.

For the regression analysis, all variables in Table 7 except for the proportion of taxi drivers who got out a taxi to support were used as the dependent variable, and not disaggregated by the type of enumerator due to secure an appropriate number of observations for a reliable analysis.

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[15] The time was measured from the videos by a research assistant who was not informed of the treatment status of taxi drivers in the videos to remove the possibility of bias in the measurement. In addition, since only this person measured the time, this measurement is considered to be consistent in all observations.

5.2 Regression model

The following difference-in-difference model for each dependent variable was estimated using all observations of the mystery shopper survey including those of the out-of-sample:

$$y_{it} = \beta_0 + \beta_1 TG1_i \times ES_t + \beta_2 TG2_i \times ES_t + \beta_3 QS_i \times ES_t$$

$$+\beta_4 QS_i + \beta_5 TG1_i + \beta_6 TG2_i + \beta_7 ES_t + X_{it}\gamma + \varepsilon_{it}$$

where ES_t is a dummy variable indicating observations at the endline survey and QS_i is a dummy variable that takes one for the observations from the sample of the questionnaire survey and zero for those from the out-of-sample. To control for the traffic conditions that might affect the behaviors of taxi drivers, the covariates related to the road conditions, X_{it}, such as the number of cars passing before the enumerators caught a taxi, a dummy variable indicating the survey at the morning, dummy variables for each day of the week, and the strata fixed effects constructed by enumerators and taxi routes were incorporated.

The estimates of β_1 and β_2 represent the impact of the first and second intervention because by applying the difference-in-difference method,

$$E(y^{TG1,ES}) - E(y^{TG1,BS}) - \left(E(y^{CG,ES}) - E(y^{CG,BS})\right)$$

$$= \beta_1 + \beta_3 + \beta_7 - (\beta_3 + \beta_7) = \beta_1$$

$$E(y^{TG2,ES}) - E(y^{TG2,BS}) - \left(E(y^{CG,ES}) - E(y^{CG,BS})\right)$$

$$= \beta_2 + \beta_3 + \beta_7 - (\beta_3 + \beta_7) = \beta_2$$

Since $TG1_i$ and $TG2_i$ are the initial treatment status randomly determined, β_1 and β_2 are the ITT estimator. It was not possible to estimate the local average treatment effect reflecting the actual attendance status due to the limited number of observations. In the same way as the regression for the impacts on attitudes of taxi drivers, I estimate the impacts of DET, $\beta_2 - \beta_1$, by re-setting $TG1_i$ as a reference category in the regression models.

The estimate of β_3 represents the spillover effect for the control group because

$$E(y^{CG,ES}) - E(y^{CG,BS}) - \left(E(y^{Out-of-sample,ES}) - E(y^{Out-of-sample,BS})\right)$$

$$= \beta_3 + \beta_7 - \beta_7 = \beta_3$$

Then, the estimate of β_4 represents the selection effect for the sample of the questionnaire sample because

$$E(y^{CG,BS}) - E(y^{Out-of-sample,BS}) = \beta_0 + \beta_4 - \beta_0 = \beta_4$$

5.3 Regression results

Table 8 shows the regression results for the impacts on the behavior of taxi drivers. The estimated impacts on the scores of services are negligible and not statistically significant for both interventions and the DET, and the spillover effect into the control group and the selection effect could be ignored. The estimated impacts of both interventions on the subjective attitudes were not statistically significant. The negative spillover effect and the positive selection effect were estimated, but both were not statistically significant. Lastly, the impact on the time for a driver to get out to support an enumerator was statistically significant only for the second intervention. Since the average time of all observations at the baseline survey was 6.52 seconds, the magnitude of the estimated impact, 6.474 seconds, seems to be practically meaningful.[16] The impact of DET was estimated to be slightly larger than that of the second intervention, but not statistically significant. Similarly, the estimate of the spillover effect was large, but not statistically significant. These insignificant results can be attributed to the low power of the test due to the small sample size. Among other variables, though not reported in Table 8, the estimates of the time trend, β_7, were found to be positive and statistically significant for all outcomes, which indicates that the behavior of out-of-sample drivers was better in the endline survey than the baseline survey. This may be one of the reasons for the insignificant results of the spillover effect into the control group. The reason for the improvement in the behavior of out-of-sample drivers may be explained by the

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[16] As the sensitivity analysis for the outliers in the variable of time for a driver to get out, I trimmed the top 1 percent or 2 percent of the distribution of the variable and ran the same regression. This confirmed that the statistical significance did not change.

spillover from the treatment groups or other events in the study site that increase the attention paid to disability issues, though I could not confirm both.

In the regression for the behaviors of taxi drivers, the combination of the practical support training and DET is found to have a significant impact on the time spent by drivers to get out to support enumerators. In the previous section, we confirmed that the combination of practical support training and DET had a significant impact on the understanding of the social model, whereas the intervention of practical support training only did not. Therefore, by combining these results, it can be said that participation in both the practical support training and DET partially changed the behavior of taxi drivers towards passengers with disabilities.

6. Conclusions

The definition of and views about disability profoundly affect the understanding of persons with disabilities and the measures to be taken to reduce disability problems. The social model of disability is one of the definitions of disability that is internationally supported as a basis for the legislation and regulations adopted in many countries. However, the social model is not found to be predominant among the non-professional public. This study rigorously evaluated the impacts of DET, a training program to obtain the social model perspective and action, on the understanding of disability of taxi drivers in South Africa and the actual service given to passengers with disabilities, using the method of randomized control trials. From the regression analyses this study found that DET significantly encouraged taxi drivers to develop an understanding of the social model. This study also found that the combination of DET and practical support training had a statistically significant impact on the time spent by drivers to get out to support enumerators with disabilities, which can be considered as one of the important behavioral changes of taxi drivers. These findings can be considered as modest evidence for DET because their participation in practical support training only did not have a significant impact on

the behavior of taxi drivers. Putting these results together, this study found that learning the social model could lead to a partial improvement in taxi drivers' behavior towards persons with disabilities.

This study contributes to the literature on disability in that it rigorously evaluated the impact of a training program on disability issues on the behavior of participants based on data collected by the method of mystery shopper survey. However, there are several limitations in this study that mainly result from its evaluation design. Firstly, since the population of the sample analyses in this study were taxi drivers who desired to participate in the training provided by the study, its findings cannot be simply generalized to other taxi drivers at the study site, and also to other taxi drivers in other places within and outside South Africa. Secondly, this study chose taxi drivers as its target in terms of the actual conditions at the study sites, the likelihood that we would be able to obtain more objective data, and so on. Therefore, it remains unclear whether DET would have a similar impact on the behavior of other types of people. Lastly, this study examined the very short-run impacts of DET and practical support training. Thus, it is of practical importance to show how long the impacts persist. These problems should be addressed by future research with appropriate evaluation designs.

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Table 1. Sample size and initial and actual treatment status

	CG	TG1	TG2	Total
Number of observations of the baseline survey	44	41	42	127
Number of observations of the endline survey	42	40	39	121
Attendance status of the samples of the endline survey				
Did not participate	42	7	11	60
Participated in PST	0	28	0	28
Participated in PST & DET	0	5	28	33

Source: Prepared by the author.

Table 2. Balance test between the treatment and control groups

	CG	TG1	TG2	p-value: (1)-(2)	p-value: (1)-(3)
	(1)	(2)	(3)		
A. Basic characteristics					
Route: Monontsha	9.5%	7.5%	7.7%	0.746	0.772
Mabolela	21.4%	22.5%	23.1%	0.908	0.861
Phuthaditjhaba	14.3%	15.0%	20.5%	0.928	0.468
Uniqwa	4.8%	5.0%	5.1%	0.961	0.940
Blugumbush	16.7%	15.0%	10.3%	0.839	0.403
Mandela Park	33.3%	35.0%	33.3%	0.876	1.000
Setsing taxi rank	57.1%	55.0%	59.0%	0.675	0.880
Age	36.4	36.4	35.6	0.996	0.581
Years of schooling	11.1	11.2	11.1	0.841	0.920
Experience as a driver (in years)	8.95	8.65	8.05	0.850	0.468
Experience of illnesses/injuries	19.0%	25.0%	15.4%	0.553	0.722
Number of acquaintances with disabilities	14.9	14.3	8.6	0.839	0.015
B. Understanding of the social model					
Disability is in *the individual*. (*society*)	3.762	3.600	3.308	0.547	0.076
Disability is a *social* issue. (*medical*)	3.667	3.825	3.282	0.560	0.127
Disability issue is *relevant* to me. (*irrelevant*)	3.357	3.225	3.385	0.669	0.673
Disability means being *restricted*. (*unable*)	2.810	2.750	2.744	0.792	0.635
Disability *can be improved*. (*is fixed*)	2.595	2.725	2.667	0.572	0.635
C. Understanding of action					
Deaf persons should have operation to be able to hear.(-)	2.929	2.950	3.513	0.963	0.022
Wheelchair users should be rehabilitated to walk.(-)	2.881	2.200	2.615	0.001	0.256
Rehabilitation should be promoted more to resolve the problems of persons with disabilities.(-)	2.262	1.975	2.205	0.127	0.774
The self-effort of persons with disabilities is essential for participation in society.(-)	2.262	2.050	2.051	0.232	0.251
I can do something to resolve disability problems.	3.786	3.975	3.795	0.288	0.992
Persons with disabilities have a responsibility to resolve disability problems. (-)	2.786	2.400	2.769	0.119	0.973
D. Impressions towards persons with disabilities					
Good - Bad	3.048	3.450	3.436	0.148	0.116
Positive - Negative	2.714	2.825	2.974	0.688	0.291
Strong - Weak	2.857	3.200	2.846	0.232	0.779
Gentle - Forceful	3.548	3.525	3.282	0.961	0.443
Active - Inactive	3.333	3.325	3.564	0.975	0.297
Calm - Restless	2.976	2.725	2.744	0.386	0.295
Quiet - Loud	3.500	3.750	3.667	0.356	0.668
Number of observations	42	40	39		

Note: The p-values are from the results of t-tests on the difference in means between the treatment and control groups. The route fixed effects are included in the tests except for the test on the route variables, and the robust standard error is used for all tests.

Table 3. Regression results for the impacts on the understanding of the social model

	ITT			LATE		
	TG1	TG2	TG2-TG1	TG1	TG2	TG2-TG1
	(1)	(2)	(3)	(4)	(5)	(6)
In society	0.030	1.102***	1.072***	-0.235	1.568***	1.804***
	(0.334)	(0.310)	(0.337)	(0.419)	(0.381)	(0.456)
	[0.929, 0.973]	[0.001, 0.000]	[0.002, 0.005]	[0.574, 0.913]	[0.000, 0.001]	[0.000, 0.002]
Social issue	0.270	1.014***	0.744**	0.133	1.485***	1.352**
	(0.266)	(0.251)	(0.265)	(0.334)	(0.325)	(0.376)
	[0.312, 0.681]	[0.000, 0.000]	[0.006, 0.038]	[0.689, 0.913]	[0.000, 0.001]	[0.000, 0.012]
Relevant to me	0.592*	0.304	-0.288	0.763*	0.447	-0.316
	(0.236)	(0.249)	(0.286)	(0.291)	(0.320)	(0.393)
	[0.014, 0.062]	[0.225, 0.330]	[0.316, 0.715]	[0.009, 0.059]	[0.162, 0.230]	[0.421, 0.737]
Restricted	-0.496	-0.135	0.362	-0.670	-0.205	0.465
	(0.289)	(0.332)	(0.348)	(0.349)	(0.456)	(0.513)
	[0.089, 0.257]	[0.686, 0.726]	[0.301, 0.507]	[0.055, 0.171]	[0.654, 0.718]	[0.365, 0.565]
Can be improved	0.073	0.241	0.168	0.045	0.353	0.308
	(0.311)	(0.297)	(0.329)	(0.388)	(0.412)	(0.483)
	[0.815, 0.973]	[0.420, 0.576]	[0.612, 0.715]	[0.908, 0.934]	[0.392, 0.568]	[0.523, 0.737]

Note: The number of observations is 121 for all regressions. Each dependent variable is constructed so that a higher value means stronger agreement with the social model. Covariates include the value of the dependent variable at the baseline survey, age, years of schooling, years of experience of a taxi driver, the experience of illnesses or injuries, the number of acquaintances with disabilities, and the fixed effect of the taxi route. Those in parentheses are robust standard errors. The left in brackets are p-values obtained with the robust standard errors in parentheses, and the right is Romano and Wolf (2016)'s p-values for the multiple test hypothesis based on the robust standard errors with 1,000 bootstrap replications. *** $p<0.01$, ** $p<0.05$, * $p<0.1$, where the p-values are those of Romano and Wolf (2016).

Table 4. Regression results for the impacts on the understanding of action

	ITT			LATE		
	TG1	TG2	TG2-TG1	TG1	TG2	TG2-TG1
	(1)	(2)	(3)	(4)	(5)	(6)
Operation of deaf persons	0.214	0.375	0.161	0.214	0.530	0.316
	(0.260)	(0.255)	(0.293)	(0.330)	(0.317)	(0.396)
	[0.411, 0.662]	[0.145, 0.221]	[0.584, 0.917]	[0.516, 0.696]	[0.095, 0.152]	[0.426, 0.779]
Rehabilitation of wheelchair users	0.417	0.243	-0.175	0.530	0.357	-0.173
	(0.314)	(0.269)	(0.321)	(0.397)	(0.369)	(0.465)
	[0.187, 0.427]	[0.369, 0.821]	[0.588, 0.926]	[0.181, 0.427]	[0.333, 0.806]	[0.710, 0.958]
Promotion of rehabilitation	-0.167	-0.037	0.130	-0.224	-0.054	0.170
	(0.246)	(0.262)	(0.280)	(0.305)	(0.358)	(0.417)
	[0.500, 0.662]	[0.888, 0.874]	[0.644, 0.940]	[0.462, 0.696]	[0.880, 0.863]	[0.683, 0.958]
Self-effort is essential	-0.531	-0.613*	-0.082	-0.608	-0.911*	-0.303
	(0.249)	(0.270)	(0.268)	(0.307)	(0.360)	(0.385)
	[0.036, 0.135]	[0.025, 0.079]	[0.761, 0.964]	[0.048, 0.198]	[0.011, 0.069]	[0.432, 0.958]
I can do something	0.576*	0.521*	-0.055	0.699*	0.766*	0.067
	(0.234)	(0.242)	(0.219)	(0.284)	(0.318)	(0.303)
	[0.016, 0.060]	[0.034, 0.079]	[0.803, 0.996]	[0.014, 0.095]	[0.016, 0.069]	[0.825, 0.958]
Responsibility of person with disabilities	0.670*	0.092	-0.579	0.909*	0.136	-0.774
	(0.243)	(0.227)	(0.255)	(0.309)	(0.314)	(0.378)
	[0.007, 0.060]	[0.687, 0.874]	[0.025, 0.221]	[0.003, 0.052]	[0.666, 0.863]	[0.041, 0.325]

Note: The number of observations is 121 for all regressions. Each dependent variable is constructed so that a higher value means stronger agreement with the action based on the social model. Covariates include the value of the dependent variable at the baseline survey, age, years of schooling, years of experience of a taxi driver, the experience of illnesses or injuries, the number of acquaintances with disabilities, and the fixed effect of the taxi route. Those in parentheses are robust standard errors. The left in brackets are p-values obtained with the robust standard errors in parentheses, and the right is Romano and Wolf (2016) p-values for the multiple test hypothesis based on the robust standard errors with 1,000 bootstrap replications. *** p<0.01, ** p<0.05, * p<0.1, where the p-values are those of Romano and Wolf (2016).

Table 5. Regression results for the impacts on the impressions of persons with disabilities

	ITT			LATE		
	TG1	TG2	TG2-TG1	TG1	TG2	TG2-TG1
	(1)	(2)	(3)	(4)	(5)	(6)
Positive	0.144	0.039	-0.105	0.194	0.057	-0.137
	(0.272)	(0.287)	(0.263)	(0.333)	(0.395)	(0.398)
	[0.597, 0.839]	[0.891, 0.906]	[0.691, 0.963]	[0.560, 0.859]	[0.885, 0.897]	[0.731, 0.960]
Strong	0.093	0.225	0.132	0.076	0.329	0.253
	(0.328)	(0.311)	(0.354)	(0.416)	(0.415)	(0.506)
	[0.778, 0.885]	[0.471, 0.906]	[0.710, 0.963]	[0.856, 0.948]	[0.427, 0.897]	[0.616, 0.960]
Calm	0.423	0.534	0.111	0.474	0.800	0.326
	(0.290)	(0.325)	(0.342)	(0.359)	(0.442)	(0.502)
	[0.148, 0.585]	[0.103, 0.219]	[0.747, 0.963]	[0.187, 0.722]	[0.070, 0.163]	[0.517, 0.960]
Gentle	0.339	0.666**	0.328	0.317	0.973**	0.657
	(0.263)	(0.251)	(0.247)	(0.332)	(0.325)	(0.349)
	[0.201, 0.609]	[0.009, 0.017]	[0.187, 0.507]	[0.340, 0.722]	[0.003, 0.014]	[0.060, 0.281]
Good	0.727**	0.472	-0.255	0.912**	0.692	-0.220
	(0.226)	(0.261)	(0.265)	(0.282)	(0.327)	(0.368)
	[0.002, 0.011]	[0.073, 0.161]	[0.339, 0.881]	[0.001, 0.021]	[0.035, 0.107]	[0.550, 0.960]
Active	-0.257	-0.171	0.086	-0.321	-0.254	0.068
	(0.247)	(0.288)	(0.273)	(0.305)	(0.413)	(0.435)
	[0.301, 0.731]	[0.554, 0.906]	[0.754, 0.953]	[0.292, 0.722]	[0.539, 0.897]	[0.876, 0.960]
Quiet	0.276	-0.305	-0.581	0.469	-0.444	-0.913
	(0.240)	(0.252)	(0.275)	(0.299)	(0.335)	(0.392)
	[0.252, 0.731]	[0.228, 0.895]	[0.037, 0.507]	[0.117, 0.722]	[0.184, 0.868]	[0.020, 0.442]

Note: The number of observations is 121 for all regressions. Each dependent variable is constructed so that a higher value means better impressions towards persons with disabilities. Covariates include the value of the dependent variable at the baseline survey, age, years of schooling, years of experience of a taxi driver, the experience of illnesses or injuries, the number of acquaintances with disabilities, and the fixed effect of the taxi route. Those in parentheses are robust standard errors. The left in brackets are p-values obtained with the robust standard errors in parentheses, and the right is Romano and Wolf (2016) p-values for the multiple test hypothesis based on the robust standard errors with 1,000 bootstrap replications. *** $p<0.01$, ** $p<0.05$, * $p<0.1$, where the p-values are those of Romano and Wolf (2016).

Table 6. Number of observations of mystery shopper surveys

	Baseline survey					Endline survey				
	All	CG	TG1	TG2	Out-of-sample	All	CG	TG1	TG2	Out-of-sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Number of observations	240	28	18	38	156	198	22	17	20	139
Attendance status of drivers										
Did not participate	195	28	4	7	156	165	22	1	3	139
Participated in PST	12	0	12	0	0	13	0	13	0	0
Participated in PST & DET	33	0	2	31	0	20	0	3	17	0
By route:										
Monontsha	40	1	0	0	39	36	3	1	2	30
Mabolela	40	7	3	13	17	32	4	5	2	21
Phuthaditjhaba	40	3	4	8	25	37	2	2	2	31
Uniqwa	40	3	5	8	24	31	4	2	10	15
Blugumbush	40	4	1	3	32	32	3	1	1	27
Mandela Park	40	10	5	6	19	30	6	6	3	15
By enumerator:										
Visually impaired (Male)	40	6	2	6	26	34	3	5	4	22
Visually impaired (Female)	40	7	3	2	28	35	4	1	3	27
Hearing-impaired (Male)	40	4	6	4	26	35	3	5	3	24
Hearing-impaired (Female)	40	4	5	5	26	28	3	1	0	24
Wheelchair user (Male)	40	5	0	11	24	32	2	2	3	25
Wheelchair user (Female)	40	2	2	10	26	34	7	3	7	17

Source: Prepared by the author.

Table 7. Results of the baseline and endline mystery shopper surveys

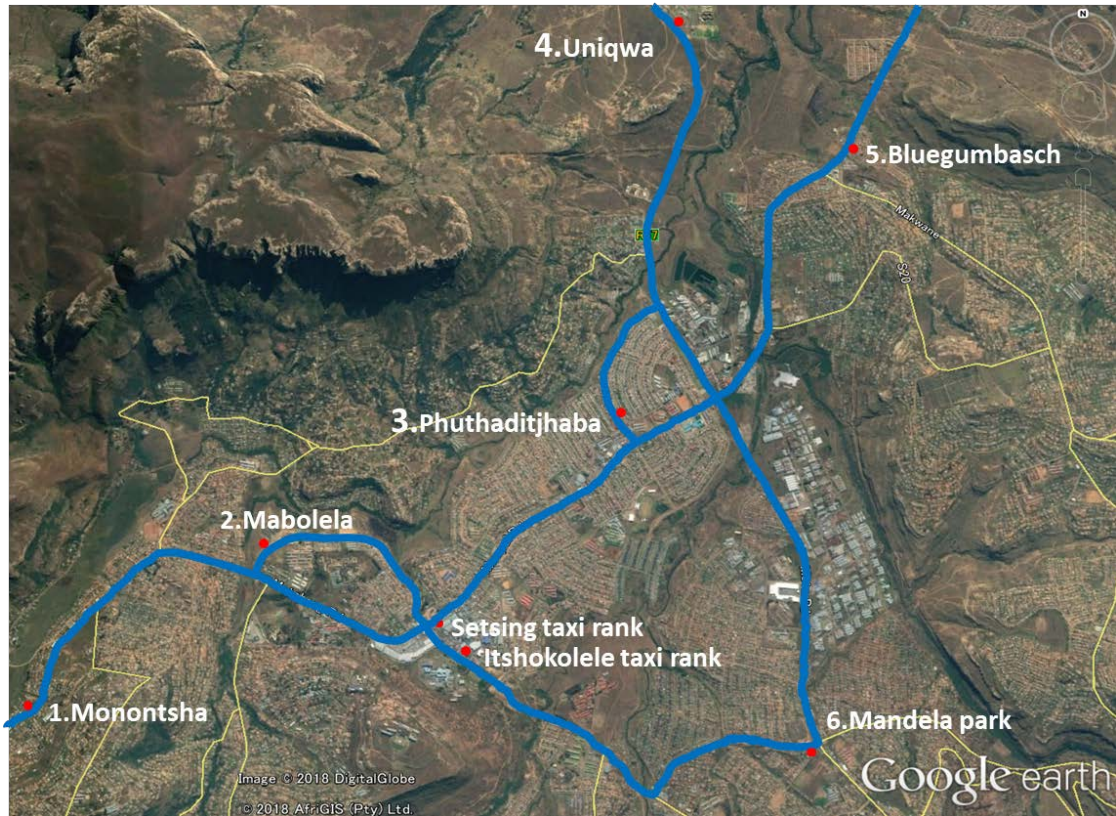|	Baseline survey					Endline survey				
	All	CG	TG1	TG2	Out-of-sample	All	CG	TG1	TG2	Out-of-sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Average score of services (%)	55.4	49.7	57.2	64.9	53.9	67.2	62.7	78.0	76.8	65.2
Visually impaired	56.7	52.1	64.4	69.4	55.1	79.9	81.0	85.2	84.1	78.5
Hearing-impaired	42.0	30.0	47.3	44.4	42.3	40.6	16.7	56.7	53.3	40.8
Wheelchair user	67.7	67.9	93.8	72.0	64.8	79.4	79.2	95.0	78.8	77.7
Average subjective attitudes of drivers (Min=1, Max=5)	3.46	3.54	3.56	3.71	3.37	4.04	3.82	4.24	4.20	4.03
Visually impaired	3.50	3.54	3.40	3.88	3.44	4.28	4.29	4.33	4.43	4.24
Hearing-impaired	3.24	3.00	3.45	3.33	3.21	3.69	3.17	3.83	4.00	3.72
Wheelchair user	3.64	4.14	4.50	3.81	3.46	4.12	3.89	4.60	4.10	4.12
Proportion of taxi drivers who got out a taxi to support (%)	69.4	50.0	42.9	88.5	69.8	98.4	100.0	100.0	100.0	97.7
Visually impaired	38.0	18.2	20.0	57.1	41.7	98.5	100.0	100.0	100.0	97.9
Wheelchair user	98.7	100.0	100.0	100.0	97.9	98.4	100.0	100.0	100.0	97.5
Average time for a driver to get out (seconds)	6.52	5.88	5.33	7.26	6.40	9.23	5.47	4.40	3.50	11.65
Visually impaired	9.32	14.0	9.00	12.8	8.24	14.05	7.83	5.60	5.86	17.16
Wheelchair user	5.46	3.17	3.50	6.11	5.57	4.25	3.89	3.20	1.67	5.11

Source: Prepared by the author.

Table 8. Regression results for the impacts on the behavior of taxi drivers

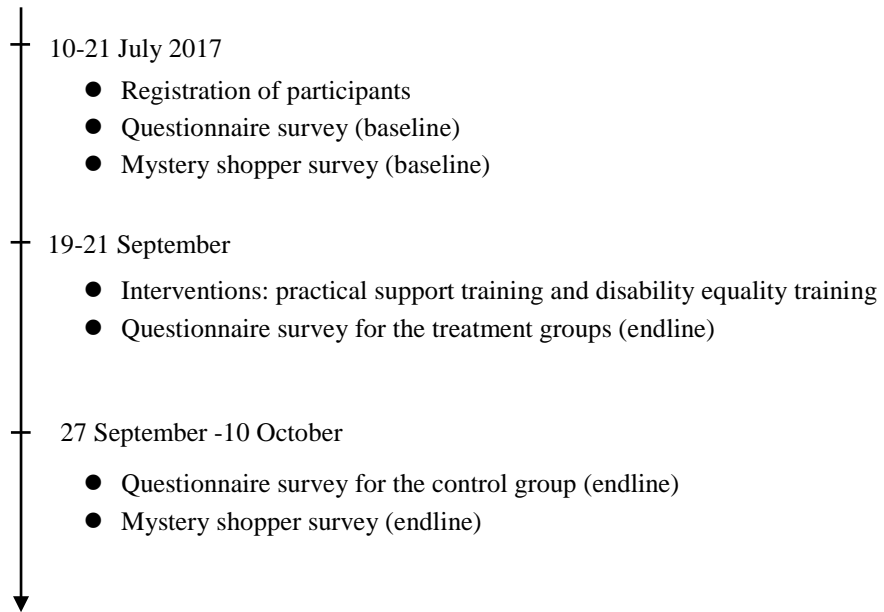| | N | ITT | | | Spillover effect | Selection effect |
		TG1 $\widehat{\beta_1}$	TG2 $\widehat{\beta_2}$	TG2-TG1 $\widehat{\beta_2} - \widehat{\beta_1}$	$\widehat{\beta_3}$	$\widehat{\beta_4}$
	(1)	(2)	(3)	(4)	(5)	(6)
Score of services	424	0.023	0.032	0.009	-0.008	-0.017
		(0.159)	(0.121)	(0.117)	(0.078)	(0.062)
Subjective attitudes	421	0.200	0.278	0.078	-0.230	0.184
		(0.730)	(0.542)	(0.523)	(0.480)	(0.325)
Time for a driver to get out	222	0.062	-6.474**	-6.536	-4.663	0.500
		(3.911)	(3.017)	(5.023)	(3.102)	(1.837)

Note: Covariates include the number of cars passing before the enumerators caught a taxi, a dummy variable indicating the survey in the morning, dummy variables for each day of the week, and the strata fixed effects constructed by enumerators and taxi routes. Those in parentheses are standard errors clustered by enumerator-taxi route strata. ** $p<0.05$.
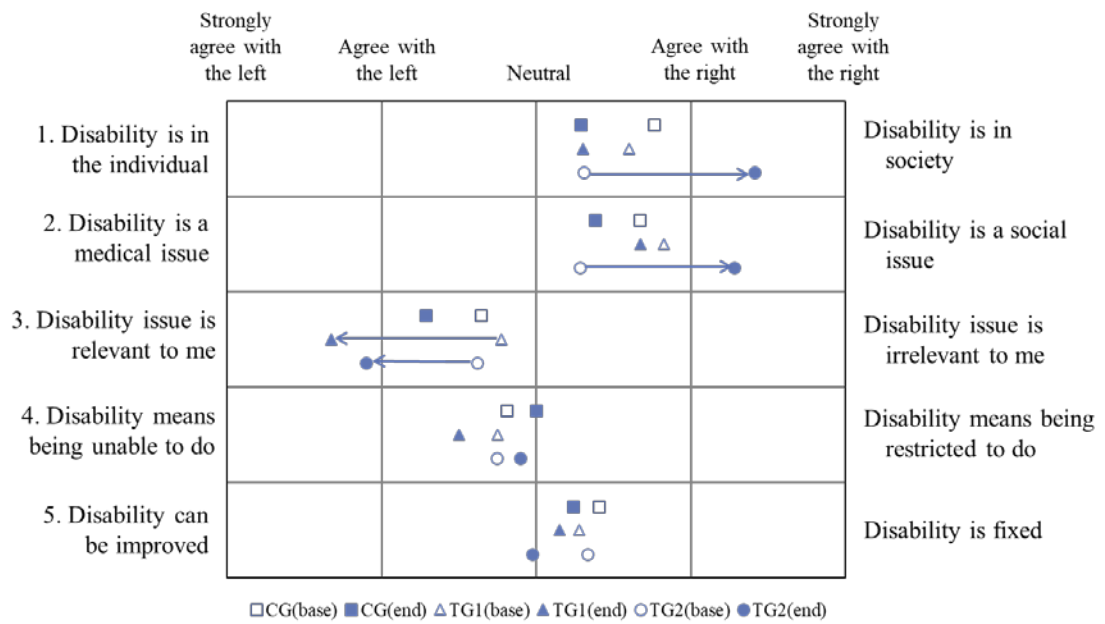
Figure 1. Main routes of four-plus-one taxi

Source: Prepared by the author.

Figure 2. Timeline of this study

10-21 July 2017
- Registration of participants
- Questionnaire survey (baseline)
- Mystery shopper survey (baseline)

19-21 September
- Interventions: practical support training and disability equality training
- Questionnaire survey for the treatment groups (endline)

27 September -10 October
- Questionnaire survey for the control group (endline)
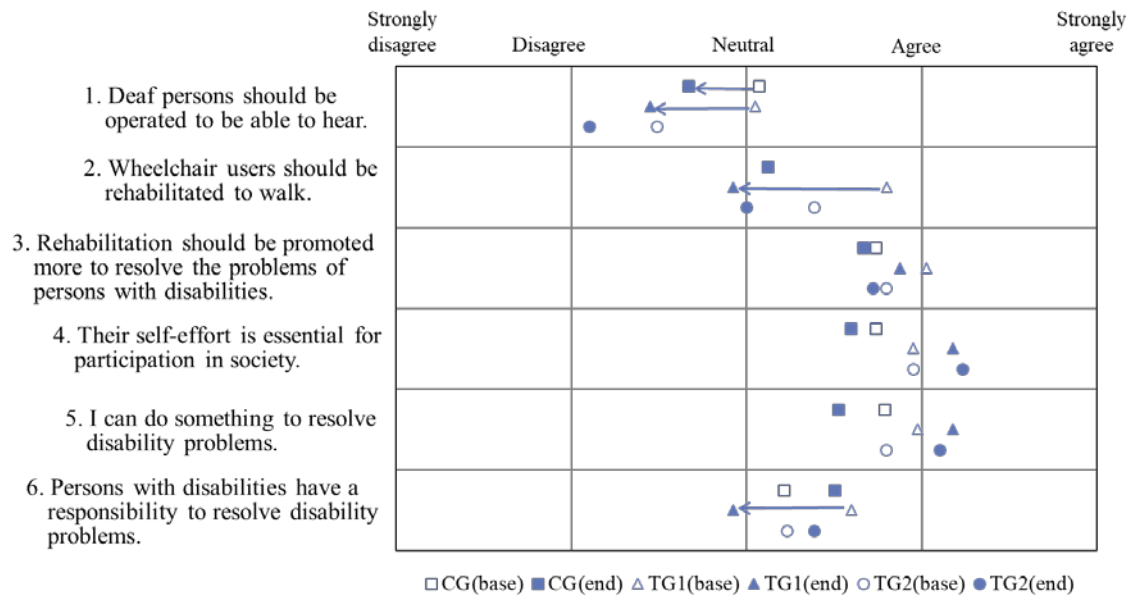- Mystery shopper survey (endline)

Source: Prepared by the author.

Figure 3. Understanding of the social model in the baseline and endline surveys

	Strongly agree with the left	Agree with the left	Neutral	Agree with the right	Strongly agree with the right	

1. Disability is in the individual — Disability is in society

2. Disability is a medical issue — Disability is a social issue

3. Disability issue is relevant to me — Disability issue is irrelevant to me

4. Disability means being unable to do — Disability means being restricted to do

5. Disability can be improved — Disability is fixed

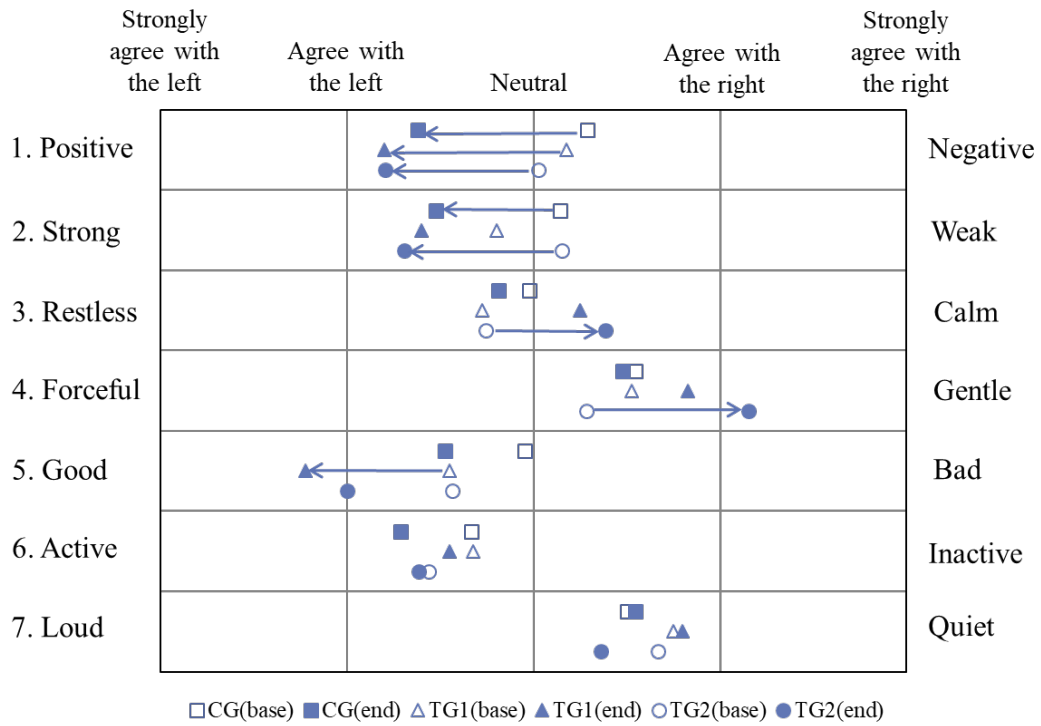□CG(base) ■CG(end) △TG1(base) ▲TG1(end) ○TG2(base) ●TG2(end)

Note: Arrows mean that the result of the Wilcoxon signed-rank test indicates a statistically significant difference in the responses between the baseline and endline surveys at the 5% level.

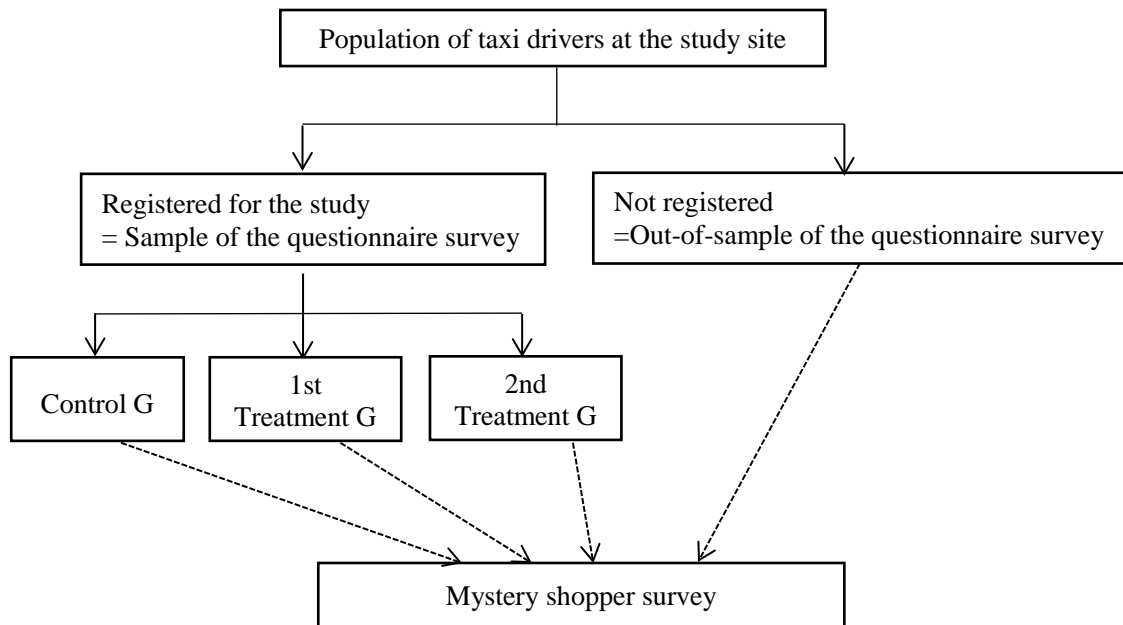# Figure 4. Understanding of action at the baseline and endline surveys

Note: Arrows mean that the result of the Wilcoxon signed-rank test indicates a statistically significant difference in the responses between the baseline and endline surveys at the 5% level.

Figure 5. Impressions towards persons with disabilities at the baseline and endline surveys

Note: Arrows mean that the result of the Wilcoxon signed-rank test indicates a statistically significant difference in the responses between the baseline and endline surveys at the 5% level.

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Figure 6. Composition of the observations of the mystery shopper surveys

Source: Prepared by the author.

Appendix. The check-list and survey protocol of the mystery shopper survey

To all enumerators, please confirm and remember the following indicators and process of the survey you should report and follow. You should not take a note on the taxi. Please behave as usual when getting in, in the taxi, and getting off. We would like you to report the result of your survey just after getting out of the taxi by sending an SMS message to a data entry operator or by directly telling a data entry operator on the phone.

1. Wheelchair user
<Before you get in the taxi>
Please wait for 5 seconds without saying anything to the driver.
    1-1. Did the driver ask you about your need for support?   Yes / No
If no, please tell the driver to support you.
    1-2. Did the driver get out of the car to support you?   Yes / No
If the driver refuses to support, please tell the driver that you will find another taxi, and quit this survey. Please report the indicator above to a data entry operator before starting to wait for another taxi.

If the driver comes to support you,
    1-3. Did the driver ask you where you want to sit?   Yes / No
    1-4. Did the driver ask you whether you can open the door or not?   Yes / No
    1-5. Did the driver ask you whether you need support for transferring or not? Yes / No

Please leave your bag in your wheelchair.
    1-6. Did the driver give you the bag?   Yes / No

<When you get out of the taxi>
    1-7. Did the driver ask you about your need for support?   Yes / No

If no, please tell the driver to support you.
    1-8. Did the driver put on the wheelchair brake before transferring?   Yes / No
    1-9. How did you feel about the attitude of the driver?
        Very negative/Negative/Neither positive nor negative/Positive/Very positive

2. Persons with visual impairment
<Before you get in the taxi>
Please wait for 5 seconds without saying anything to the driver even after you notice that the taxi has stopped.
    2-1. Did the driver ask you whether you want to get in the taxi or not?   Yes / No

If no, please tell the driver that you want to get in the taxi and ask whether the taxi goes to the destination you want to go to.
    2-2. Did the driver ask you about your need for support?   Yes / No

If no, please tell the driver to support you.
If the driver asks you what kinds of support you need, please tell the driver "Everything" (not mentioning specific support).
    2-3. Did the driver get out of the car to support you?   Yes / No

If the driver refuses to support, please tell the driver that you will find another taxi, and quit this survey. Please report the indicator above to a data entry operator before starting to wait for another taxi.

If the driver comes to support you,
    2-4. Did the driver tell you the taxi environment (e.g., available seats, number of passengers)?
        Yes / No
    2-5. Did the driver open the door?   Yes / No
    2-6. Did the driver assist you to touch the door frame?   Yes / No
    2-7. Did the driver assist you to touch the seat?   Yes / No

<When you get off the taxi>
Please ask the driver how to get to the municipal office.
    2-8. Did the driver give you satisfactory information?   Yes / No
    2-9. Did the driver ask someone to take you to your destination?   Yes / No
    2-10. How did you feel about the attitudes of the driver?
        Very negative/Negative/Neither positive nor negative/Positive/Very positive

3. Persons with hearing impairment
<Before you get in the taxi >
Please try to tell the driver you are a deaf person and want to go to the municipal office by sign language.
    3-1. Did the driver respond to you by oral communication?   Yes / No
    3-2. Did the driver respond to you by body language/gesture?   Yes / No
    3-3. Did the driver respond to you by using paper and pen?   Yes / No
    3-4. Did the driver respond to you by using his cell phone?
        Yes / No
Please inform the driver of your destination on your cell phone.

<When you get out of the taxi >
Please ask the driver how to get to the municipal office by cell phone.
    3-5. Did the driver respond to you by oral communication?   Yes / No
    3-6. Did the driver respond to you by body language/gesture?   Yes / No
    3-7. Did the driver respond to you by using paper and pen?   Yes / No
    3-8. Did the driver respond to you by using your/his cell phone?   Yes / No
    3-9. Did the driver give you satisfactory information?   Yes / No
    3-10. How did you feel about the attitude of the driver?
        Very negative/Negative/Neither positive nor negative/Positive/Very positive

Abstruct (in Japanese)

要約

　本研究では、ランダム化比較試験の手法を用いて、障害の社会モデルに関する障害平等研修（Disability Equality Training, DET）と呼ばれる研修プログラムのインパクト評価を行った。調査の対象は南アフリカのタクシー運転手で、本研究は質問紙調査で彼らの障害への理解のデータを、覆面調査を通じて障害のある乗客に対する実際のサービスのデータをそれぞれ研修の前後に収集した。分析の結果、DET がタクシー運転手の社会モデルの理解向上を促したことが確認された。また、DET と実践的支援研修の両方を受けた場合、障害のある乗客をサポートするためにかかる時間が統計的に有意に下がったことも示された。これらの結果は、障害の社会モデルを学習することが、障害に関する理解を向上させ、障害者に対する行動を部分的に改善させうることを示唆している。

キーワード: 障害平等研修，インパクト評価，ランダム化比較試験，覆面調査，南アフリカ

Working Papers from the same research project

"An Empirical Study on the Poverty and Employment of Persons with Disabilities in South Africa"

JICA-RI Working Paper No. 142

Untangling Disability and Poverty: A Matching Approach Using Large-scale Data in South Africa

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JICA-RI Working Paper No. 168

Were the Adverse Effects of Disability on Employment Mitigated during 2002-2015 in South Africa?: A Pseudo-Panel Approach

Kengo Igei