Dette udvidet resumè er udgivet i det elektroniske tidsskrift **Artikler fra Trafikdage på Aalborg Universitet**
(Proceedings from the Annual Transport Conference at Aalborg University)
ISSN 1603-9696
https://journals.aau.dk/index.php/td

Does Transit Oriented Development (TOD) increase ridership?

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Introduction and Background

Attractive public transport (PT) systems can be a solution to urban challenges such as congestion and pollution while providing mobility to a wide range of users. Transit-oriented development (TOD) is a strategy and concept to promote higher PT use instead of cars (Cervero et al., 2002). However, whether this design creates a safe urban environment and makes PT more attractive remains a question (Ibraeva et al., 2020).

Built environment (BE) characteristics have a significant influence on PT ridership (Taylor and Fink, 2013). High population density and mixed land use are some of the most relevant promoters of PT (De Witte et al., 2013; Taylor and Fink, 2013) as well as being key premises of TOD (Cervero et al., 2002). Neighbourhoods designed according to TOD principles have the PT station at the core, surrounded by a dense mix of housing, offices, and public space (Cervero et al., 2002). Furthermore, shops are placed en route to the PT station to create human activity and provide the opportunity to run errands along the way. Pedestrian/cyclist activity is supported by, for example, wide sidewalks and high-quality bicycle facilities (Pojani and Stead, 2015).

There are several studies investigating how TOD influences travel behaviour. For example, Kamruzzaman et al. (2014) found that living in a "residential TOD" significantly increases the likelihood to choose public transport over cars, compared to those who live in non-TODs in Brisbane, Australia. Nasri and Zhang (2014) reported similar findings from the USA. In Washington D.C. people living in TOD areas covered 38% fewer kilometres by car whereas in Baltimore this value was 21% (Nasri and Zhang, 2014). There is, however, still need for research on how TOD characteristics on the destination influence mode choice in addition to the origin’s properties (Ibraeva et al., 2020).

Safety is another predictor of public transport use (Abdul Hamid et al., 2015; Ingvardson and Nielsen, 2021). Unsafe environments can lead people to alter their routes, avoid certain modes/times of the day, prefer private modes instead of PT, or cancel the trip completely when there is no other alternative (Loukaitou-Sideris et al., 2009; Lubitow et al., 2017). Access/egress legs are vulnerable to safety problems, especially when covered on foot (Crime Concern, 2004) and could play a determining role on altering/cancelling the trip. TOD can help achieve safer neighbourhoods, e.g., by designing bright paths without entrapment, creating visual connection around stations and paying attention to the placement of parking lots (Pojani and Stead, 2015). Nevertheless, TOD's potential impact on safety at neighbourhoods around stations is also understudied (Ibraeva et al., 2020).

This study contributes to the literature by analysing in detail the relationship between TOD, perceived safety around stations and public transport ridership in the Greater Copenhagen area, Denmark. Urban development in this region was driven along the "five fingers" representing five local commuter rail (S-train) lines with TOD features (Egnsplankontoret, 1949), hence ensuring a relevant TOD-case. Specifically, we build upon Pojani and Stead's (2015) TOD guidelines in a two-fold manner. First, we explore the relationship between perceived safety and TOD using site observations and survey data on perceived safety from 83 PT stations. Second, we analyse how TOD characteristics and perceived safety together influence PT ridership by estimating mode choice models using a large-scale travel survey dataset with 27,560 trips. The model formulation explicitly includes other relevant determinants of ridership in addition to built environment and perceived safety, i.e., system characteristics and socio-demographics.

Data and Method

Site observations and survey data set the basis of our analysis. We made site observations at 83 train stations in the Greater Copenhagen area, serving mostly S-trains, followed by regional trains. Under the site observations, we assigned scores based on Pojani and Stead's (2015) guideline to measure the TOD characteristics around stations. We excluded dimension 9 called "Process" in our study and only included the first eight dimensions as we focus only on the design elements of TOD. Table 1 shows the dimensions from this guideline which we used in our study. Dimensions 1-8 have several sub-dimensions, and the total TOD score is calculated as a sum of 47 sub-dimensions. In addition to the dimensions in **Error! Reference source not found.**, we created and measured thirteen more dimensions (Table 2) which are suitable to the Danish urban context, and which we expect to influence perceived safety as well as PT ridership.

Table 1 TOD dimensions used in the study (see Pojani and Stead (2015) for detailed explanation)

• Dimension 1: Scale and density • Dimension 2: Public spaces for human use • Dimension 3: Safety • Dimension 4: Variety and complexity	• Dimension 5: Connections • Dimension 6: Pedestrian/cyclist orientation • Dimension 7: Transit in the urban pattern • Dimension 8: Car movement and parking

Table 2 Additional BE variables

Category of additional dimensions	Dimension
At & near the station	• Pedestrian precinct next to station • Large indoor mall next to station • Bicycle paths along main access road network • Seperate path network leading to station (1=in all direction, 0=none at all) • Free Park&Ride next to station • Free Park&Ride with longer walk to station • Underground station
Share of different functions in the neighbourhood (These dimensions add up to 100%)	• Share of dense urban settlement • Share of spread urban settlement • Share of one-family housing • Share of accessible green areas (parks, forests, etc.) • Share of parking lots, roads, rail yards etc.

	• Share of non-accessible open areas (sportfields, agriculture, etc.)

We obtained perceived safety at S-train stations on a 0-10 scale from survey data collected by Passagerpulsen (Forbrugerrådet Tænk, 2019) between 2016-2018. In order to account for the socio-economic status around neighbourhoods, we used income data from Statistics Denmark (2022). This dataset provides the income per capita in the neighbourhood (DKK/year) measured in 2015.

Table 3 describes the average perceived safety at the stations as well as neighbourhood income and TOD values in the surrounding area. Here, the weighted TOD score is a sum of 47 sub-dimensions converted to a score between 0-100.

Table 3 Descriptive statistics of perceived safety, neighbourhood income and weighted TOD score

Variable	Min	Mean	Max	Std. dev.
Perceived safety (Range: 0-10)	6.660	7.600	8.419	0.398
Income per capita (1000 DKK / year)	117.300	193.300	351.800	33.210
Weighted TOD score (Range: 0-100)	12.770	53.150	92.550	19.542

We present a detailed breakdown of TOD dimensions and additional BE variables Table 4, Table 5 and Table 6. On average, "pedestrian/cyclist orientation" is the most fulfilled TOD dimension while "public spaces for human use" is the least.

Table 4 Description of TOD dimensions (all dimensions are in a range of 0-1)

TOD dimension	Min.	Mean	Max.	Std. dev.
Scale and density	0	0.480	1	0.328
Public spaces for human use	0	0.382	1	0.319
Safety	0.083	0.567	1	0.246
Variety and complexity	0	0.523	1	0.256
Connections	0	0.618	1	0.281
Pedestrian/cyclist orientation	0.200	0.678	1	0.220
Transit in the urban pattern	0	0.547	1	0.277
Car movement and parking	0.111	0.514	1	0.197

Table 5 Description of additional BE variables

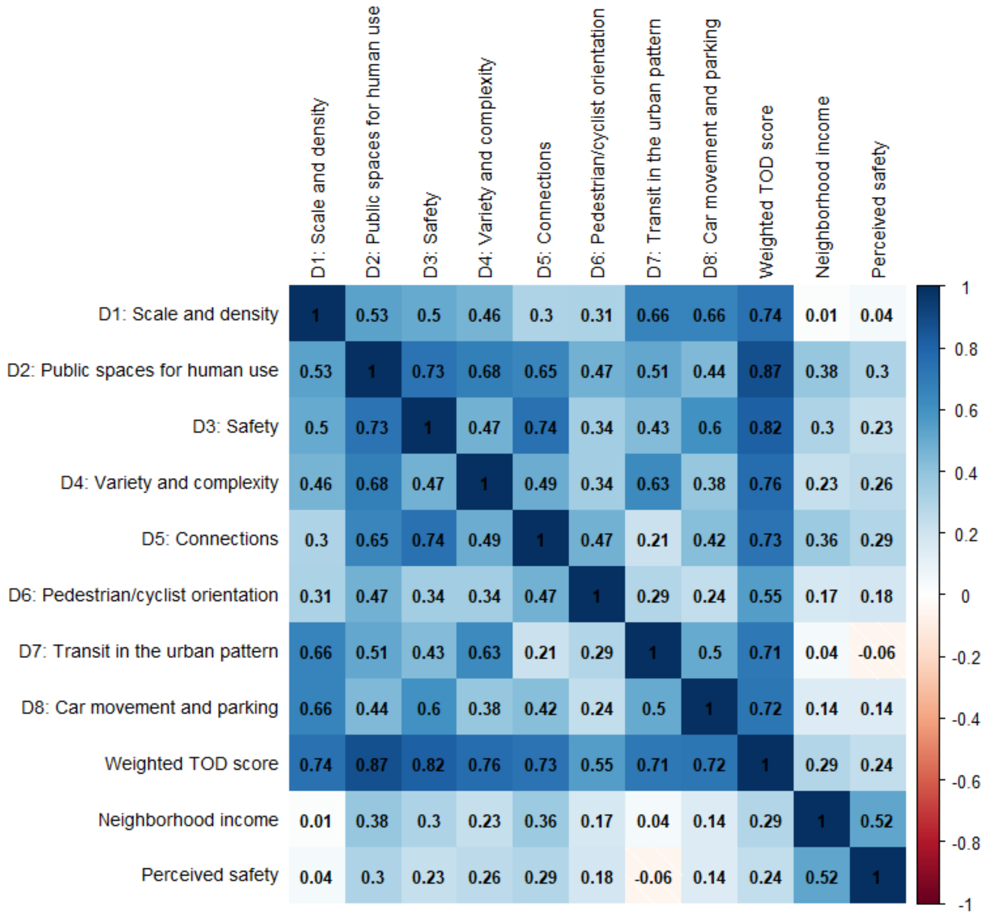
Additional BE variables	Min.	Mean	Max.	Std. dev.
Pedestrian precinct next to station	0	0.076	1	0.225
Large indoor mall next to station	0	0.104	1	0.239
Bicycle paths along main access road network	0	0.765	1	0.286
Seperate path network leading to station (1=in all direction, 0=none at all)	0	0.265	1	0.272
Share of dense urban settlement	0	0.192	0.850	1.000
Share of spread urban settlement	0	0.184	0.700	0.226
Share of one-family housing	0	0.293	0.900	0.154
Share of accessible green areas (parks, forests, etc.)	0	0.113	0.600	0.229
Share of parking lots, roads, rail yards etc.	0	0.121	0.300	0.132
Share of non-accessible open areas (sportfields, agriculture, etc.)	0	0.097	0.800	0.064

Table 6 Description of additional BE variables (continued)

Additional BE variables	No	Yes
Free Park&Ride next to station	58	23
Free Park&Ride with longer walk to station	40	43

Underground station*	77	5

* One station has platforms both over and underground.



	D1: Scale and density	D2: Public spaces for human use	D3: Safety	D4: Variety and complexity	D5: Connections	D6: Pedestrian/cyclist orientation	D7: Transit in the urban pattern	D8: Car movement and parking	Weighted TOD score	Neighborhood income	Perceived safety
D1: Scale and density	1	0.53	0.5	0.46	0.3	0.31	0.66	0.66	0.74	0.01	0.04
D2: Public spaces for human use	0.53	1	0.73	0.68	0.65	0.47	0.51	0.44	0.87	0.38	0.3
D3: Safety	0.5	0.73	1	0.47	0.74	0.34	0.43	0.6	0.82	0.3	0.23
D4: Variety and complexity	0.46	0.68	0.47	1	0.49	0.34	0.63	0.38	0.76	0.23	0.26
D5: Connections	0.3	0.65	0.74	0.49	1	0.47	0.21	0.42	0.73	0.36	0.29
D6: Pedestrian/cyclist orientation	0.31	0.47	0.34	0.34	0.47	1	0.29	0.24	0.55	0.17	0.18
D7: Transit in the urban pattern	0.66	0.51	0.43	0.63	0.21	0.29	1	0.5	0.71	0.04	-0.06
D8: Car movement and parking	0.66	0.44	0.6	0.38	0.42	0.24	0.5	1	0.72	0.14	0.14
Weighted TOD score	0.74	0.87	0.82	0.76	0.73	0.55	0.71	0.72	1	0.29	0.24
Neighborhood income	0.01	0.38	0.3	0.23	0.36	0.17	0.04	0.14	0.29	1	0.52
Perceived safety	0.04	0.3	0.23	0.26	0.29	0.18	-0.06	0.14	0.24	0.52	1

Figure 1 Correlation between TOD dimensions, neighbourhood income and perceived safety

Figure 1 shows the correlation between the scores of each TOD dimension, perceived safety and neighbourhood income per capita. There is overall rather high correlation among the TOD dimensions. However, "car movement and parking" correlates the least with the other dimensions. Dimensions 2 and 5 are slightly correlated with perceived safety, which has a strong correlation with neighbourhood income.

To explore the effect of TOD on perceived safety, we ran multivariable linear regression (MLR) models where perceived safety was the dependent variable. We initially introduced the eight TOD dimensions, neighbourhood income and additional BE variables as explanatory variables to the model. We also controlled for the rail lines (Køge Bugt, Roskilde, Farum, Frederikssund, Hillerød, Helsingør) with reference to the central line using dummy variables, to account for spatial correlation along the lines. Later, applying backwards selection, we reduced to a final MLR model.

As the next step, we built the PT ridership model using the Danish National Travel Survey (TU) data from 2009-2018 (Christiansen and Skougaard, 2015). We eliminated (i) trips under 2 km due to their significantly different mode choice compared to longer trips (see Ingvardson and Nielsen (2021)), (ii) trips where the nearest public transport station was further than 2 km, (iii) and individuals without income data. The resulting full sample includes 37,335 trips made by 17,037 individuals. In our models with TOD and perceived safety, we used a smaller dataset as these variables were not available for all stations. This reduced sample includes 27,560 trips made by 15,061 individuals. We compared sample statistics to official sources and saw that both the full sample and the smaller TOD&Safety sample are highly similar to the Danish population (Statistics Denmark, 2022).

We employed binary logistic regression models to identify which factors influence individuals' choice of public transport. In these models, PT choice is the dependent variable represented in binary form (1: trip made with PT, 0: other mode). We first set up a basis model in the full sample where only variables of level of service, distance to PT and individual characteristics were present. Later, we constructed the same model in the reduced dataset to check if the key parameter estimates are consistent. Lastly, we added perceived safety, TOD dimensions and additional BE variables.

Results

First, we present the MLR model results, where perceived safety is the dependent variable (Table 7**Error! Reference source not found.**). The full model shows that stations at Køge Bugt line have a significantly lower perceived safety level compared to the central stations. Furthermore, neighbourhood income has a positive significant effect on perceived safety. However, none of the TOD or BE variables are significant. After the stepwise regression, only two out of eight TOD dimensions remain in the model and "variety and complexity" dimension becomes almost significant with a positive estimate. Neighbourhood income again has a significant and positive effect on perceived safety. Among the additional BE variables, having a higher share of paths leading to the station significantly increases perceived safety, while increasing share of spread urban areas has a significant negative effect. Underground stations also had an almost significant and negative effect on perceived safety.

Table 7 MLR model results (Dependent var.: perceived safety, Estimates in bold have p-value <=0.05)

	Full MLR Model			Reduced MLR Model		
Variable	Estimate	Std. Error	P-value	Estimate	Std. Error	P-value
Intercept	**7.064**	0.419	0.000	**7.114**	0.281	0.000
D1: Scale and density	-0.120	0.218	0.584	-	-	-
D2: Public spaces for human use	0.002	0.232	0.992	-	-	-
D3: Safety	0.082	0.342	0.810	-	-	-
D4: Variety and complexity	0.229	0.247	0.359	0.269	0.138	0.055
D5: Connections	-0.038	0.250	0.881	-	-	-
D6: Pedestrian/cyclist orientation	-0.182	0.221	0.416	-0.211	0.160	0.192
D7: Transit in the urban pattern	0.115	0.252	0.651	-	-	-
D8: Car movement and parking	0.135	0.315	0.671	-	-	-
Køge Bugt Line	**-0.420**	0.150	0.007	**-0.428**	0.098	0.000
Roskilde Line	-0.013	0.159	0.933	-	-	-
Farum Line	0.232	0.182	0.207	**0.228**	0.106	0.036
Frederikssunds Line	0.162	0.147	0.274	0.150	0.089	0.096
Hillerød Line	0.221	0.148	0.141	**0.224**	0.102	0.031
Helsingør Line	-0.123	0.196	0.534	-	-	-
Neighborhood income (1000 DKK/capita)	**0.010**	0.002	0.026	**0.010**	0.001	0.002
Fragmented suburb (Ref: Dense urban area and Coherent suburb)	-0.032	0.130	0.807	-	-	-
Pedestrian precinct next to station	0.171	0.216	0.434	0.265	0.162	0.106
Large indoor mall next to station	-0.046	0.197	0.814	-	-	-
Bicycle paths along main access road network	-0.237	0.162	0.150	-0.160	0.114	0.164
Separate path network leading to station (1=in all direction, 0=none at all)	0.314	0.186	0.097	**0.253**	0.116	0.033
Free Park&Ride next to station	-0.037	0.113	0.746	-	-	-
Free Park&Ride with longer walk to station	0.004	0.105	0.971	-	-	-
Both overground and underground	-0.272	0.176	0.129	-0.186	0.131	0.159
Underground	-0.544	0.367	0.144	-0.571	0.303	0.064
Share of spread urban settlement	-0.534	0.364	0.148	**-0.507**	0.216	0.022

Share of one-family housing	-0.280	0.325	0.394	-0.225	0.163	0.171
Share of accessible green areas (parks, forests, etc.)	-0.062	0.442	0.889	-	-	-
Share of parking lots, roads, rail yards etc.	0.427	0.979	0.665	-	-	-
Share of non-accessible open areas (sportfields, agriculture, etc.)	-0.065	0.477	0.893	-	-	-
N = 83	**Adjusted R2 = 0.489**			**Adjusted R2 = 0.586**		

Second, we show the results of our choice models (Table 8). Here, Model 1 is the base model in the full dataset and Model 2 is the same model in the reduced dataset. The two models had consistent parameter estimates. We observed expected results for trip distance, PT/car travel time ratio, car ownership and income, where increasing values discouraged PT use. Men were less likely to choose PT than women and educational trips were more likely to be conducted with public transport. Lastly, shorter headway at both trip ends made PT more attractive.

Next, we first introduced the following variables to Model 2: perceived safety, interaction terms for trip distance with car and bicycle ownership (to account for captive users), the eight TOD dimensions, and the additional BE variables. Almost all TOD and BE variables were insignificant and thus removed from the model, resulting in Model 3. In this model, the interaction terms imply that at longer distances PT is unattractive compared to cars, but more attractive compared to bicycles. Individuals travelling from stations with perceived safety levels lower than 7/10 were less likely to choose PT at the 90% significance level. Lastly, the only remaining TOD dimension “pedestrian/cyclist orientation” had a negative parameter estimate with a p-value of 0.16.

Table 8 Binary logistic regression model results (Dependent variable: Choice of PT vs. all other modes, Estimates in bold have p-value <=0.05)

Variable	Category	Choice model 1 (N=37335)			Choice model 2 (N=27560)			Choice model 3 (N=27560)		
		Estimate	Odds ratio	P-value	Estimate	Odds ratio	P-value	Estimate	Odds ratio	P-value
Intercept	-	**1.839**	6.288	0.000	**1.626**	5.081	0.000	**1.913**	6.771	0.000
Trip purpose (ref: work)	Educational	**0.506**	1.659	0.000	**0.533**	1.705	0.000	**0.495**	1.640	0.000
	Errand	**-0.885**	0.413	0.000	**-0.914**	0.401	0.000	**-0.957**	0.384	0.000
	Leisure	**-0.635**	0.530	0.000	**-0.652**	0.521	0.000	**-0.694**	0.500	0.000
	Business	**-0.900**	0.407	0.000	**-0.915**	0.400	0.000	**-0.942**	0.390	0.000
Trip distance (km)	-	**0.043**	1.044	0.000	**0.056**	1.057	0.000	**0.040**	1.041	0.000
LoS ratio (PT/car)	-	**-0.670**	0.512	0.000	**-0.647**	0.523	0.000	**-0.616**	0.540	0.000
Driving license (ref: no)	Yes	**-1.146**	0.318	0.000	**-1.221**	0.295	0.000	**-1.235**	0.291	0.000
Age (ref: over 67)	0-15 years	**-0.785**	0.456	0.000	**-0.721**	0.486	0.000	**-0.719**	0.487	0.000
	16-25 years	**0.299**	1.349	0.021	**0.441**	1.555	0.005	**0.459**	1.583	0.004
	26-35 years	-0.111	0.895	0.372	-0.044	0.957	0.769	-0.034	0.967	0.823
	36-45 years	-0.071	0.931	0.564	0.027	1.028	0.853	0.016	1.016	0.917
	46-67 years	-0.010	0.990	0.928	0.067	1.069	0.630	0.060	1.062	0.668
Gender (ref: female)	Male	**-0.222**	0.801	0.000	**-0.206**	0.814	0.000	**-0.202**	0.817	0.000
Education (ref: lower than secondary school)	University short	**-0.201**	0.818	0.015	**-0.203**	0.817	0.041	-0.175	0.840	0.081
	University medium	-0.012	0.988	0.818	0.017	1.017	0.783	0.032	1.033	0.612
	University long	**0.118**	1.125	0.047	**0.216**	1.241	0.003	**0.219**	1.245	0.003
	Other education	-0.062	0.940	0.616	0.043	1.044	0.760	0.004	1.004	0.978
	Vocational	**-0.297**	0.743	0.000	**-0.277**	0.758	0.000	**-0.281**	0.755	0.000
Employment (ref: employed)	Student	**-0.541**	0.582	0.000	**-0.531**	0.588	0.000	**-0.496**	0.609	0.000

	Pensionist	**0.373**	1.451	0.001	**0.430**	1.537	0.001	**0.407**	1.503	0.002
	Unemployed	0.003	1.003	0.980	0.153	1.165	0.245	0.139	1.149	0.298
Car ownership (ref: no)	Yes	**-1.273**	0.280	0.000	**-1.349**	0.259	0.000	**-0.858**	0.424	0.000
Bicycle ownership (ref: no)	Yes	**-0.193**	0.824	0.000	**-0.134**	0.874	0.006	**-0.873**	0.418	0.000
Service headway at origin (ref: over 15 minutes)	Service headway <5 min (orig.)	**0.448**	1.565	0.000	**0.547**	1.727	0.000	**0.574**	1.775	0.000
	Service headway 5-10 min (orig.)	**0.330**	1.391	0.000	**0.417**	1.518	0.000	**0.451**	1.570	0.000
	Service headway 11-15 min (orig.)	**0.269**	1.309	0.002	0.250	1.284	0.052	**0.279**	1.322	0.034
Service headway at destination (ref: over 15 minutes)	Service headway <5 min (dest.)	**0.335**	1.398	0.000	**0.382**	1.465	0.000	**0.375**	1.454	0.000
	Service headway 5-10 min (dest.)	**0.213**	1.237	0.000	**0.213**	1.238	0.001	**0.197**	1.218	0.002
	Service headway 11-15 min (dest.)	0.158	1.171	0.051	0.122	1.130	0.216	0.089	1.093	0.377
Population density	-	**0.000**	1.000	0.000	**0.000**	1.000	0.000	**0.000**	1.000	0.000
Income (1000 DKK per year)	-	**-0.002**	0.998	0.000	**-0.002**	0.998	0.000	**-0.002**	0.998	0.000
Bicycle ownership*Trip distance		-						**0.066**	1.069	0.000
Car ownership*Trip distance		-						**-0.052**	0.949	0.000
Perceived safety (ref:>=7/10)	Perceived safety, < 7/10	-						-0.146	0.864	0.087
Pedestrian/cyclist orientation		-						-0.189	0.828	0.155
Year fixed effects	-	No			No			No		
Geographical fixed effects	-	Yes			Yes			Yes		
Number of observations		37335			27560			27560		
Log likelihood		-13109.41			-9223.76			-9085.50		
R^2 (Nagelkerke)		0.349			0.370			0.383		

Discsussion and Future Work

The MLR models on perceived safety showed that there are some geographic trends along rail lines as well as a strong effect of neighbourhood income. The latter could be a result of individuals with high income moving to places where they perceive as safer environments. TOD dimensions had a limited effect, probably due to the high correlation among them. This can be due to planners/decisionmakers behind the development around a given station either considering most TOD dimensions simultaneously or not at all. Having variety and complexity in the urban design was the only significant TOD dimension, implying that stations surrounded by interesting landscapes and buildings as well as a mix of different social groups can benefit from improved perceived safety. Spread urban areas and underground stations were other parameters which reduced perceived safety in line with our expectations.

The final choice model showed that perceived safety at the station influences PT ridership in line with findings from other recent studies (Cottrill et al., 2020; Ingvardson and Nielsen, 2021). TOD, however, had limited effects on PT ridership, as the only TOD variable in the final choice model was "pedestrian/cyclist orientation" with an unexpected and insignificant estimate. High service frequency and being close to stations are some of the key features of TOD which we included in the model separately, resulting in very significant parameter estimates. These features might be more important than those covered by the eight TOD dimensions when determining mode choice. The negative sign of the "pedestrian/cyclist orientation" dimension could be linked to a higher share of active travel instead of PT, as this parameter implies improved walking and cycling infrastructure.

Currently, we are designing a full choice model which compares all travel modes instead of a binary model to have a better understanding of TOD effects on mode choice. The outcome of this study will be a guideline with detailed design attributes for station surroundings which can increase PT ridership while achieving safer travel environments. This outcome can be useful for policy makers, municipalities, and public transport authorities at early design phases.

Acknowledgements

This study was conducted as a part of Seamless sustainable everyday urban mobility (EASIER), funded by ERA-NET Cofund Urban Accessibility and Connectivity (Grant no. 875022) and Innovation Fund Denmark (Project no. 81641). The authors would like to thank these parties for funding.

References

Abdul Hamid, N., Tan, P.-L., Mohamad Zali, M. F., Rahamat, N. U., & Abd Aziz, N. (2015). Safety and Security Needs of Commuter Rail Services - Travellers' Perceptions. *Journal of the Eastern Asia Society for Transportation Studies*, *11*, 1495–1506. https://doi.org/10.11175/EASTS.11.1495

Cervero, R., Ferrell, C., & Murphy, S. (2002). Transit-Oriented Development and Joint Development in the United States: A Literature Review. *Research Results Digest*, *52*. http://citeseerx.ist.psu.edu/viewdoc/summary? doi=10.1.1.186.4058

Christiansen, H., & Skougaard, B. Z. (2015). *Documentation of the Danish National Travel Survey* (tech. rep.). Technical University of Denmark Department of Transport.

Cottrill, C. D., Brooke, S., Mulley, C., Nelson, J. D., & Wright, S. (2020). Can multi-modal integration provide enhanced public transport service provision to address the needs of vulnerable populations? *Research in Transportation Economics*, *83*. https://doi.org/10.1016/J.RETREC.2020.100954

Crime Concern. (2004). *People's Perceptions of Personal Security and Their Concerns About Crime on Public Transport: Research Findings* (tech. rep.). Department for Transport. http://www.dft.gov.uk/stellent/groups/dft_mobility/documents/page/dft_mobility_028689.pdf

De Witte, A., Hollevoet, J., Dobruszkes, F., Hubert, M., & Macharis, C. (2013). Linking modal choice to motility: A comprehensive review. *Transportation Research Part A: Policy and Practice*, *49*, 329–341. https://doi.org/10. 1016/J.TRA.2013.01.009

Egnsplankontoret. (1949). Copenhagen Regional Plan: A Summary of the Preliminary Proposal 1948-49.

Forbrugerrådet Tænk. (2019). *Passagerernes tilfredshed med tryghed på stationer* (tech. rep. September). https: //passagerpulsen.taenk.dk/bliv- klogere/undersoegelse- passagerernes- tilfredshed- med-trygheden- paastationerne

Ibraeva, A., Correia, G. H. d. A., Silva, C., & Antunes, A. P. (2020). Transit-oriented development: A review of research achievements and challenges. *Transportation Research Part A: Policy and Practice*, *132*, 110–130. https://doi.org/10.1016/J.TRA.2019.10.018

Ingvardson, J. B., & Nielsen, O. A. (2021). The influence of vicinity to stations, station characteristics and perceived safety on public transport mode choice: a case study from Copenhagen. *Public Transport*, 1–22. https://doi.org/10.1007/s12469-021-00285-x

Kamruzzaman, M., Baker, D., Washington, S., & Turrell, G. (2014). Advance transit oriented development typology:

case study in Brisbane, Australia. *Journal of Transport Geography*, *34*, 54–70. https://doi.org/10.1016/J. JTRANGEO.2013.11.002

Loukaitou-Sideris, A., Bornstein, A., Fink, C., Samuels, L., & Gerami, S. (2009). *How To Ease Women's Fear of Transportation Environments: Case Studies and Best Practices* (tech. rep.). Mineta Transportation Institute. http://transweb.sjsu.edu/MTIportal/research/publications/documents/2611-women-transportation.pdf

Lubitow, A., Carathers, J., Kelly, M., & Abelson, M. (2017). Transmobilities: mobility, harassment, and violence experienced by transgender and gender nonconforming public transit riders in Portland, Oregon. *A Journal of Feminist Geography*, *24*(10), 1398–1418. https://doi.org/10.1080/0966369X.2017.1382451

Nasri, A., & Zhang, L. (2014). The analysis of transit-oriented development (TOD) in Washington, D.C. and Baltimore metropolitan areas. *Transport Policy*, *32*, 172–179. https://doi.org/10.1016/J.TRANPOL.2013.12.009

Pojani, D., & Stead, D. (2015). Transit-Oriented Design in the Netherlands: *http://dx.doi.org.proxy.findit.cvt.dk/10.1177/0739456X15573263*, *35*(2), 131–144. https : / / doi . org / 10 . 1177/0739456X15573263

Statistics Denmark. (2022). Statistics Denmark. https://www.dst.dk/en

Taylor, B. D., & Fink, C. N. (2013). Explaining transit ridership: What has the evidence shown? *http://dx.doi.org/10.1179/1942786712Z.0000000003*, *5*(1), 15–26. https://doi.org/10.1179/1942786712Z. 0000000003