Transferring matters:

An analysis of the influence of transfers on trip satisfaction

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INTRODUCTION

Conventional wisdom in public transport planning suggests that transfers should be minimized due to negative perceptions associated with them.

However, little scholarly attention has been paid to the association between number and type of transfers and overall satisfaction with public transport services.

The **aim of this study** is to answer the following three **research questions:**

(1) Are people that require transfers on their daily commute less satisfied with their trips compared to their non-transferring counterparts?

(2) How many transfers appear to be too many transfers to remain satisfied with a trip?

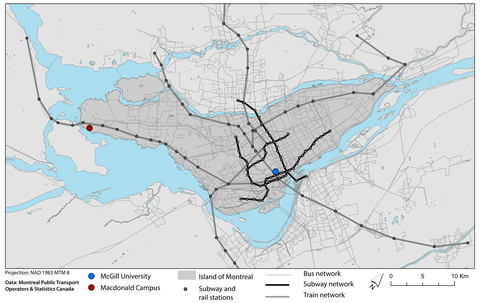
(3) Do mode-specific transfers have differential impacts on overall satisfaction levels?

STUDY CONTEXT AND DATA

The data for this study are derived from the **2017/18 McGill University Travel Survey,** which include:

- Detailed trip characteristics, including **number of bus routes, train lines** and **subway lines** used to complete their last trip
- Overall trip satisfaction
- Personal characteristics

Montreal Public Transport Network



ANALYSIS

1 Descriptive statistics

Evaluating satisfaction levels and trip characteristics by number of transfers and mode-specific transfers

	N	Average satisfaction	Average travel time (min)	Average trip distance (km)
Comparing trip details by number of transfers				
0 transfer	598	4.13	49.47	12.26
1 transfer	433	3.90	58.61	14.01
2 or more transfers	311	3.20	79.66	17.59
All respondents	1,342	3.44	72.06	16.27
Trips with zero transfers				
Train only	144	4.17	71.77	23.15
Bus only	247	3.96	40.69	7.12
Subway only	207	4.25	35.94	6.53
Mode-specific transfers				
Bus-bus	154	3.48	62.24	11.47
Subway-subway	425	3.88	53.08	11.26
Bus-subway	414	3.73	58.91	12.93
Bus-train	40	3.60	87.00	26.12
Train-subway	51	3.69	77.65	25.32

Statistical significance of difference in mean satisfaction levels of trips, using a Chi-square test

Number of transfers			
	0 transfers	1 transfer	2 or more transfers
0 transfers	---		
1 transfer	0.23**	---	
2 or more transfers	0.7***	0.24**	---

Trips with zero transfers			
	Train	Bus	Subway
Train	---		
Bus	0.21*	---	
Subway	0.08	0.29*	---

Mode-specific transfers					
	Bus-bus	Subway-subway	Bus-subway	Bus-train	Train-subway
Bus-bus	---				
Subway-subway	0.40***	---			
Bus-subway	0.25**	0.15	---		
Bus-train	0.12	0.28	0.13	---	
Train-subway	0.21	0.19	0.04*	0.09	---

In the case of a statistically significant difference, the level of significance is represented as follows:
*** Significant at 99% ** Significant at 95% * Significant at 90%

- Satisfaction decreases with number of transfers
- Differences in satisfaction levels are observed when examining trends in average satisfaction according to mode-specific types of transfers

2 Logistic regression models

Satisfaction with last trip model

Variable	Odds Ratio	Sig. †	95% Conf. interval	
Personal characteristics				
Car ownership	1.25		0.92	1.71
Household size	0.97		0.86	1.09
Child at home	1.08		0.76	1.55
Female	0.72	**	0.54	0.95
Other (ref = male)	1.42		0.24	8.38
Age	1.01	*	1.00	1.03
High income	1.55		0.89	2.69
Medium income (ref = low income)	1.48	*	0.99	2.21
Trip characteristics				
Fall trip	1.43	**	1.10	1.85
Downtown campus	2.53	*	0.83	7.66
Travel during peak hour	0.97		0.72	1.31
Travel time (minutes)	0.95	***	0.93	0.97
Travel time squared	1.01	***	1.00	1.01
Number of transfers (ref = 0 transfers)				
One transfer	1.02		0.75	1.39
Two or more transfers	0.68	**	0.49	0.96
Constant	3.77	*	0.95	14.98
AIC	1445.329			
BIC	1528.56			
Log likelihood	-706.66			
Observations	1,342			

Model results:

- Trips involving 1 transfer compared to 0 transfers have the same odds of being satisfied
- The odds of being satisfied drops by 32% when 2 transfers or more are required in a trip compared to 0 transfers
- Travel time decreased the odds of satisfaction by 5% for every additional minute spent travelling

Satisfaction with last trip with mode-specific controls

Variable	Odds Ratio	Sig. †	95% Conf. Interval	
Personal characteristics				
Car ownership	1.21		0.89	1.66
Household size	0.97		0.86	1.09
Child at home	1.09		0.76	1.57
Female	0.73	**	0.55	0.96
Other (ref = male)	1.30		0.23	7.47
Age	1.01	*	1.00	1.03
High income	1.53		0.88	2.67
Medium income (ref = low income)	1.48	*	0.99	2.21
Trip characteristics				
Fall trip	1.38	**	1.06	1.79
Downtown campus	2.44		0.79	7.55
Travel during peak hour	0.94		0.70	1.28
Travel time (min)	0.95	***	0.93	0.97
Travel time squared	1.01	**	1.00	1.01
Type of transfer				
Bus-bus transfer	0.63	**	0.43	0.92
Subway-subway transfer	1.03		0.76	1.40
Bus-subway transfer	0.73	**	0.54	0.97
Bus-train transfer	1.12		0.52	2.44
Train-subway transfer	0.63		0.31	1.26
Constant	3.94	**	0.98	15.81
AIC	1445.84			
BIC	1544.68			
Log likelihood	-703.92			
Observations	1,342			

†*** Significant at 99% ** Significant at 95% * Significant at 90%, blank cell indicates no statistical significance

Model results:

- A transfer between 2 bus routes decreases the odds of satisfaction by 37%, compared to a non-transferring trip
- Transferring subway lines has no statistically significant impact on trip satisfaction
- Commuters who transferred from a subway to a bus or vice versa have 27% lower odds of satisfaction compared to their non-transferring counterparts

CONCLUSIONS

Transferring is strongly associated with **trip satisfaction** however the model results indicate that the relationship varies according to the **number of transfers** and the **mode(s) being used** in a trip.

Number of transfers:

No statistically significant difference between those who **transferred once compared to those who did not transfer** was observed.

The odds of satisfaction decline by 32% for those who require **two or more transfers.**

Mode-specific transfers:

Transferring between bus routes, and between a bus and subway negatively impact trip satisfaction.

Interestingly, transferring between subway lines did not show an impact on trip satisfaction.

Policy implications:

Agencies should aim to **minimize trips involving 2 or more transfers.**

Transferring between high frequency routes does not impact trip satisfaction in the same way as transfers involving low frequency services.

Areas for future research:

Explore satisfaction with transferring buses according to **service frequency.**

Study how **bus stop design,** including features such as heated shelters, impact customer satisfaction levels in other cold cities.

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