Shouting *"chin min yau lok"* (stop at the front) in a minibus: Transportation assimilation among immigrants in Hong Kong

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Abstract

Transportation socialization as a rising field of study has gained much attention in traditional immigration countries, such as the United States and European countries. Treating transportation behaviors as a routine activity, previous studies mainly looked at the discrepancy in transportation choices between immigrants and natives, for example, automobile usage in the U.S. By examining immigrants' minibus ridership in Hong Kong (a unique local public transportation service) and extending the previous theoretical thread on spatial assimilation, this study expands the social and geographical scope of transportation assimilation to a non-traditional immigration region and further tests the applicability of general immigration theory on transportation socialization. Capitalizing on a large sample of pooled census data, we are the first to explore the changing pattern of immigrants' transportation socialization in Hong Kong and Asia. By looking at the transportation assimilation through individual and locational level factors, we found the pattern in Hong Kong to be generally in line with the previous studies in traditional immigration countries on the individual level but not on the locational level.

1. Introduction

Traditional studies on immigrant integration often focus on economic, social, and spatial integration. Social integration often looks at intergroup communications, which would require direct interaction between immigrants and locals. While direct interaction provides strong evidence for boundary-crossing for immigrants, some less mentioned frequent participation in locals' daily routine also provides information on immigrants' adaption. Concerning this, transportation assimilation offers a leading example in this field. Exploring transportation assimilation in Hong Kong, in other words, immigrants' likelihood of choosing minibus for work journeys, this research is the first to look at transportation assimilation in a non-western society.

The long-established mobility culture within each geographical region works smoothly with local residents who learned and grew with the culture throughout their

lives. While they may consider the culture completely as a norm, it can create dizzy feelings for outsiders who first arrived from a dramatically different geographical context with different commuting behaviors. At this moment, transportation studies intersect with immigration studies in which immigrants' adaption to natives' commuting behaviors represents the formers' transportation assimilation, a rising field in immigration studies.

Transportation assimilation is closely linked to several classical immigration theories, especially spatial assimilation theories. An established thread of scholarly works has focused on the relationship between spatial assimilation and social integration, in which most argued that an important outcome of socioeconomic advancement for minorities is residential integration within mainstream society (Bell, 1954; Benassi et al., 2023; Massey & Denton, 1985). However, since the previous literature usually focused on traditional immigrant countries, it would be interesting to see whether similar findings persist in a compact and non-traditionally immigrant region, such as Hong Kong. Similarly, the previous literature on transportation assimilation was mainly situated in countries with large immigrant populations in the Global North, such as North American and European countries, in which scholars conducted cross-sectional analysis on different ethnic groups' adaptation to the locals' modes of transportation (Beige & Axhausen, 2012; Blumenberg & Shiki, 2007; Haustein et al., 2019; Klinger & Lanzendorf, 2016; Smart, 2015; Tal & Handy, 2010; Valenzuela Jr et al., 2005; Welsch et al., 2018; Xu, 2018). Due to the nature of the data, except for some interview-based studies, few large-scale quantitative studies have looked into the long-term adaptation process of immigrants' transportation behaviors, which misses transportation adaptation as a dynamic process. In addition, similar to immigration literature, transportation assimilation research has mostly focused on countries in the Global North, which left other societies in other continents experiencing large quantities of migration inflows under-researched, such as Hong Kong.

Hong Kong is a popular destination for migrants from all over the world. In particular, Chinese who were born in mainland China constitute the majority of immigrants in Hong Kong. According to the 2016 census conducted by the Government of Hong Kong Special Administrative Region (S.A.R.), Chinese immigrants consisted of approximately 2 million or 23% of the total population, while the corresponding numbers for non-Chinese immigrants were 0.58 million or 8% of the total population (Census and Statistics Department, 2017). Given a large number of Chinese immigrants in Hong Kong and the unique historical trajectory of Hong Kong from a Crown Colony to a Special Administrative Region, it is important to acknowledge the internal heterogeneity of the Chinese immigrants arriving in Hong Kong during different time periods. At the same time, while much literature has focused on the Chinese immigration experience in Hong Kong, non-Chinese immigrants have continuously been under-researched in all aspects, including their transportation assimilation, even if they also consisted of a sizable amount. Capitalizing on the Hong Kong census data that include representative transportation data for a long period, for example, pooled Hong Kong Censuses from 2001 to 2016, our research is unique by being the first study on transportation assimilation in an Asian context. By analyzing Hong Kong immigrants' habits of minibus taking, such as the immigrant workforce's work journeys, this study contributes to the current literature by broadening the geographical and social contexts and incorporating a dynamic mode of transportation assimilation into the analysis. In the next section, we provide a brief history of minibus development in Hong Kong, which explains why we consider taking the minibus, a unique transportation mode in Hong Kong, as an important step of transportation assimilation for immigrants of all ethnic backgrounds.

1.1. The history and development of minibuses in Hong Kong

Hong Kong is weaved into a dense web of public transportation that runs twenty-four-seven. Today, there are seven major types of public transportation in Hong Kong, which are railways, franchised buses, non-franchises buses, minibuses, taxis, ferries, and trams. According to the transportation statistics provided by the Transport Department in 2019, minibuses consist of the third largest transportation choice (Transport Department, 2020). Minibuses cover both urban and suburban areas. Although small in size, as shown in Figure 1, minibuses are the more expensive options compared to franchised buses. According to the latest bus fare set by the Transportation Department, the caps for minibus fees were $5.7 for 3KM, $8.3 for 5KM, $10.9 for 9KM, and $14.3 for 15KM, while the corresponding franchised fares for the same distance were $4.1, 5.2, $8.1, and $9.4, respectively (Transport Department, 2020). The minibus fare is approximately 1.5 times the fare of the franchised bus.

To better explain the complexity and nuances of minibus taking, we briefly describe the process of getting on and off a minibus. Two types of minibuses are prevalent today, which are green minibuses and red minibuses. While green minibuses have clear bus stops, some red minibuses do not have bus stop podiums for each stop, and they stop anywhere when requested. A passenger needs to check

Figure 1. Green minibus (top) and red minibus (down) in Hong Kong

the minibus route beforehand and patiently wait along the route to wave to the minibus driver when the minibus approaches. After getting on, the passenger must be very familiar with the minibus route to shout to the driver in Cantonese loudly when the bus is close to the destination. The "shouting" of "*chin min yau lok*" (stop at the front) not only needs much courage for a non-native passenger who is often not fluent in Cantonese, but it also is not rare that the driver somehow has not heard or fully understood the "shouting" and the minibus passes the stop.

As a medium between franchised buses and taxis, minibuses have provided both flexibility and convenience for local passengers at an affordable price. However, this whole set of localized and culturally loaded procedures to take minibuses creates many difficulties for non-native passengers, who rarely master Cantonese or have enough knowledge of the local geography. Therefore, taking a minibus is an important step in marking a non-native's transportation assimilation in Hong Kong.

1.2. Theories and previous research: The homophily principle – preferences and opportunities

Literature on travel socialization has mainly focused on two sets of factors that may influence immigrants' travel behaviors, which are individual variables, such as one's demographic and economic background, and ethnic group characteristics, represented by the density of certain ethnic population within a region (Haustein *et al.*, 2019; Smart, 2015).

While the minibus is a major type of transportation in Hong Kong, compared to other major transportation types, immigrants are less likely to take a minibus. As shown in Table 1, Hong Kong locals were consistently more likely to take the minibus than immigrants throughout the census years. Except for Chinese who migrated before 1997, migrants from all other cultural backgrounds were significantly less likely to take minibus than the locals. This observation is in line with the previous research on immigrants in Hong Kong, in which immigrants arriving before 1997 were the most well-integrated due to the rather tolerant sociopolitical environment toward the mainlanders in the pre-Handover period (Fong & Guo, 2018; Sun & Fong, 2021; Sun & Fong, 2022). We postulate that one major reason for most immigrants' relatively low participation in minibus taking is the non-standardized logistics of getting on and getting off the minibus. As staying longer in Hong Kong would increase one's knowledge of this place, we hypothesized that *a longer duration in Hong Kong is positively related to one's likelihood to take minibuses (H1)*.

To better analyze both the individual and contextual variables that influence immigrants' travel socialization, we applied a social integration theory about preferences and opportunities in this study (Martinovic *et al.*, 2009). This standard theory was previously used in research on ethnic intermarriage or casual contact in leisure time (Kalmijn, 1998; Martinovic *et al.*, 2009). Here, we further extend the theory to interethnic contacts that require even less verbal communication but need much interaction, such as immigrants' minibus ridership in Hong Kong.

1.2.1. Preferences: Individual-level characteristics

McPherson *et al.* (2001) propose the homophily principle, which argues that social networks of every type are partially guided by people's preference for interaction with similar others. People prefer to interact with culturally similar individuals because the similarity promotes mutual understanding (Kalmijn, 1998). Translating the homophily principle into immigrants' transportation socialization, we would expect immigrants to avoid certain modes of transportation that are not common in their original cultures at the time of arrival.

To understand how individuals form their preferences in transportation behaviors, we look into the demographic and economic variables pointed out in the previous literature, including their age, ethnicity, cultural origin, gender, education, language ability, socioeconomic

Table 1. Proportion of minibus users by year, migration status, and ethnic group

	% of minibus users	Observations	Chi² test [χ² (1)]
Year=2001			
Local	14.83	89,586	
Migrant			
Chinese who migrated before 1997	13.70	38,738	27.98***
Chinese who migrated in/after 1997	8.44	3,034	96.04***
East Asian	7.00	357	17.28***
South Asian	6.15	715	42.43***
South-east Asian	10.81	1,730	21.81***
White	9.08	1,013	26.29***
Others	10.27	584	9.55**
Year=2006			
Local	14.18	97,441	
Migrant			
Chinese who migrated before 1997	13.71	33,039	4.64**
Chinese who migrated in/after 1997	12.73	6,550	10.64***
East Asian	10.95	283	2.42
South Asian	10.10	703	9.57***
South-east Asian	10.96	602	5.10**
White	9.65	974	16.31***
Others	11.40	351	2.23
Year=2011			
Local	16.56	101,560	
Migrant			
Chinese who migrated before 1997	14.69	28,187	56.87***
Chinese who migrated in/after 1997	14.75	12,901	27.38***
East Asian	7.75	400	21.42***
South Asian	7.40	1,068	64.51***
South-east Asian	11.57	674	12.07***
White	9.86	1,288	41.48***
Others	13.09	191	1.66
Year=2016			
Local	16.58	95,846	
Migrant			
Chinese who migrated before 1997	16.40	21,540	0.412
Chinese who migrated in/after 1997	15.50	18,392	13.13***

(Cont'd...)

Table 1. *(Continued)*

	% of minibus users	Observations	Chi² test [χ² (1)]
East Asian	8.36	347	16.93***
South Asian	8.83	1,348	59.24***
South-east Asian	12.30	854	11.27***
White	11.78	1,435	23.68***
Others	13.33	435	3.31*

Note: *$p<0.05$, **$p<0.01$, ***$p<0.001$ (two-tailed tests).

background, and life cycle stage. In European countries with a high cycling level, scholars have identified obviously different commuting behaviors between natives and immigrants, with the former tending to cycle more while the latter preferring public transportation (Haustein *et al.*, 2019; Welsch *et al.*, 2018).

One classical factor in immigration studies is one's age because the age at migration also sets a starting point for later social integration in the destination. On arrival, generally, both younger and older immigrants could be equally unfamiliar with the context (Martinovic *et al.*, 2009). However, those who arrive at a younger age are better at grasping the host city's language, which provides them with more opportunities to interact with the local society (Chiswick & Miller, 2001). In addition, we expect immigrants arriving at a younger age to be less socialized into their own cultures by cultural identity shapers and can absorb the ways of living in the destination with less of a cultural burden. Thus, we hypothesized that *arriving in Hong Kong at a younger age is positively related to one's likelihood of taking the minibus (H2)*.

Another set of transportation assimilation research focused on the heterogeneity of immigrants' transportation assimilation in the United States. For example, compared to Hmong immigrants in Minnesota, who rated privacy with higher importance, Latino immigrants were more open to "social" types of travel, including public transit and carpooling (Douma, 2004). In our research, as Hong Kong is a predominantly Chinese ethnic society, we have enough Chinese immigrants in the dataset. To retain enough observations within each non-Chinese ethnic group simultaneously, we regrouped the non-Chinese immigrants based on geographical and cultural proximity. Compared to immigrants of all other ethnicities, Chinese immigrants in Hong Kong might be the best-assimilated group due to the latter's cultural and linguistic proximity to the locals. Moreover, it is important to acknowledge the internal heterogeneity of the Chinese immigrants arriving in Hong Kong during different time periods, given the unique historical trajectory of Hong Kong from a Crown

Colony to a Special Administrative Region. It is possible that the Chinese arriving before the Handover might be more likely to take the minibus as they entered a relatively more tolerating socio-political environment nurturing better integration when first entering Hong Kong. In this way, we hypothesized that *Chinese immigrants are more likely to take the minibus than immigrants of any other ethnicity in Hong Kong, and those Chinese immigrants arriving before 1997 were even more likely to take the minibus compared to the latecomers (H3).*

Among the non-Chinese immigrants in Hong Kong, South-east Asians, who are mainly Filipino and Indonesian domestic helpers, constitute the largest population. The increasing discrimination from the locals toward the domestic helpers comes hand in hand with their large population. Numerous studies have empirically confirmed that South-east Asian domestic helpers in Hong Kong often experience physical and verbal abuse that increases their level of depression (Cheung *et al.*, 2019; Ng *et al.*, 2019). Against this backdrop, we postulate that South-east Asian immigrants might become less likely to integrate into the local society. Thus, we hypothesized that *compared to immigrants from other ethnic backgrounds, the longer length of stay in Hong Kong, the less likely for South-east Asian immigrants to take the minibus (H4).*

The language barrier also plays a role in immigrants' transportation preferences. For example, to circumvent the language barrier and to compensate for other deficiencies in regular public transit service, Camionetas (the Spanish word for privately operated minivans) have been popular among Latino communities throughout the U.S. (Valenzuela Jr *et al.*, 2005). In Hong Kong, Cantonese is the most used language. In addition, immigrants often assume that Cantonese is a must for taking a minibus. Therefore, we hypothesized that *the ability to speak Cantonese is positively related to one's likelihood of taking the minibus (H5).*

1.2.2. Opportunities: district-level characteristics

In addition to individual-level features, district-level characteristics could also be influential in the social integration process as the latter affects the opportunities for interethnic interaction. In a more specific sense, this opportunity to meet coethnic peers depends, among others, on the size of the ethnic group, the size of the major population, and the degree of segregation (Blau & Schwartz, 1984). Immigrants would have more opportunities to meet the coethnics when the coethnic group is large and intergroup segregation is evident (Leurent, 2022). Such a structural condition would slow down immigrants' interethnic social integration. In contrast, when the immigrants cannot consist of a sizeable group, they are structurally conditioned to more interethnic communications and assimilate to the host society at a faster speed. In transportation integration, the size of the coethnic group in the residential location is a crucial structural condition influencing the opportunities.

Residential location becomes influential for immigrants' transportation socialization through two channels: The social and physical characteristics of the locality itself and the distance between the locality and the important places (e.g., churches, work location). The previous literature on U.S. immigrants discovered that newly arrived immigrants tend to live closer to public transit, especially the rail. For Latin Americans, living closer to the rail is positively correlated with their likelihood of taking public transportation and lowers the probability of car ownership. This correlation might vary across different ethnic groups, as Indians also exhibit a higher propensity for rail use but do not necessarily live closer to rail stations (Chatman, 2014).

In the U.S., the clustering of immigrants in urban dwellings is a well-known phenomenon. A recent study investigating Latino immigrant groups in six metropolises in the U.S. confirmed that living in areas with higher ethnic concentrations increases the likelihood of relying on carpooling and public transit (Liu & Painter, 2012). Hong Kong displays a much different urban setting, where districts are all quite close and have a much denser population. At the same time, Hong Kong is also unique in the sense that certain non-Chinese immigrants are likely to cluster in specific regions. We would expect that immigrants living in areas with a higher percentage of ethnic concentration, in other words, more immigrants with similar ethnic origins, are more likely to build intra-ethnic relations, which negatively influences their possibility of taking the minibus. Hence, we hypothesized that *living districts with a higher percentage of non-Chinese immigrants are negatively correlated to an immigrant's transportation assimilation (H6).*

1.3. The dynamic mode of integration

With a few exceptions, one common feature of transportation assimilation or social integration literature, in general, is the static nature of the findings (Martinović, 2013). While the previous research has generally pointed out that a longer duration in the destination is positively correlated to a higher level of transportation assimilation, few have specified a possible dynamic assimilation phenomenon. The previous research has also confirmed that people with different characteristics or opportunities may integrate at a different pace (Martinović, 2013; Martinovic *et al.*, 2009). With different types of initial

endowments at the point of arriving at the destination, some groups (e.g., Haitians in the U.S.) may display better interethnic integration while others eventually shy away from the host society (e.g., Cubans in the U.S.) (Portes & Zhou, 1993). Following a previous discussion on age at arrival and length of stay in Hong Kong, we argue that younger immigrants, who are more accepting towards the local culture compared to those arriving at an older age, may extend their initial advantages to the long-term. Hence, we hypothesized that *among those who have spent the same period of time in Hong Kong, immigrants arriving at a younger age are more likely to take the minibus than those arriving at an older age (H7).*

Extending the dynamic mode of integration to Chinese immigrants arriving in different periods, the initial sociopolitical environment they initially encountered at the destination might exert long-lasting impacts on their assimilation in the long-term. For example, taking advantage of a natural experiment, scholars confirmed that immigrants who fortunately went through naturalization at the beginning were much better integrated in the long-term than other very similar immigrants who narrowly missed naturalization (Hainmueller *et al.*, 2017). We postulate that similar situations may also happen among Chinese immigrants in Hong Kong. Given the more tolerant sociopolitical environment toward Chinese immigrants before 1997, we hypothesized that *compared to Chinese immigrants arriving in or after 1997, those arriving before the Handover are increasingly more likely to take minibus in the long-term (H8).* In addition to Chinese integration, South-east Asians' lower likelihood of minibus taking in the long run, as previously explained under *H4*, is another example of the dynamic mode of integration.

Taken together, we would incorporate a dynamic mode of integration in our research. We can argue that immigrants exhibit different transportation behaviors based on their individual preferences, which is further intertwined with contextual constraints like residential locations that influence opportunities for interethnic contacts. Hong Kong, with its unique post-colonial culture, is the destination for many immigrants from developing and developed countries worldwide, providing an interesting and important context for analyzing immigrants' transportation behaviors in a non-western setting.

2. Data and variables

2.1. Data

We pooled 4 years (2001, 2006, 2011, and 2016) of 5% of Hong Kong census microdata obtained from the Census and Statistics Department of Hong Kong. With the relatively large coverage of the sample size in each census year, the Hong Kong census provides a fair representation of the overall demography of Hong Kong throughout the years.

Table 2 provides the descriptive statistics of our analytical sample, which consists of 169,766 individuals in total. Among the 169,766 immigrants in Hong Kong, 23,996, or approximately 14.13% of, respondents take the minibus as one of the major modes of daily transportation. Within our analytical sample, 91.19% are respondents of Chinese ethnicity, and 8.81% are immigrants with non-Chinese ethnic origins. Approximately 14.53% of Chinese immigrants have chosen a minibus as one of their transportation modes to work, while the corresponding number for immigrants of non-Chinese origin was 10.02%. We now move on to describe our variables of interest.

2.2. Variables of interest

We have limited our sample to those at least 15 years old and actively working/looking for jobs. We define immigrants as regular residents who were not born in Hong Kong.

2.2.1. Minibus

As shown in Table 2, the minibus is our binary dependent variable capturing whether a person takes the minibus to go to work. The census provides information on 1, the primary mode of transport to work, and 2, other modes of transport to work. Minibus users are coded as 1 for those who have included red or green minibus as one of their possible modes of transport to work; non-minibus users are coded as 0 for those who have not included minibus as a potential mode of transport to work.

2.2.2. Arriving in Hong Kong

Age at migration is a continuous variable derived from one's age and duration in Hong Kong. Based on the census year and duration in Hong Kong, we derived the arriving cohorts as follows: Pre-1997 cohort (i.e., those who arrived in Hong Kong before 1997), 1997 – 1999 cohort, 2000 – 2004 cohort, 2005 – 2009 cohort, and 2010 – 2016 cohort. For those who have stayed in Hong Kong for more than 20 years, since the census no longer provides their exact years of duration in Hong Kong, we lumped these people into the pre-1997 cohort. As shown in Table 2, the average age at migration for immigrants in Hong Kong is 27.36, with a standard deviation of 11.04. The mean age at migration for the immigrant minibus users is 26.55, which is 0.81 years younger than that of the full sample and 0.94 years younger than the non-minibus users. We also acknowledge that all the averaged ages are biased towards the left.

2.2.3. Ethnicity

We included seven ethnicity categories in our sample: Chinese immigrants arriving before 1997, Chinese

Table 2. Summary statistics of selected variables

	Full sample (n=169,766)	Non-minibus users (n=145,770)	Minibus users (n=23,996)	Difference
	Mean/% (SD)	Mean/% (SD)	Mean/% (SD)	
Minibus user	14.13			
Duration of residence in Hong Kong (years)	15.37 (6.32)	15.37 (6.39)	15.92 (5.91)	$t=-13.31$***
Age at migration	27.36 (11.04)	27.49 (11.00)	26.55 (11.21)	$t=12.02$***
Ethnic group				$\chi^2(6)=255.23$***
Chinese (migrated before 1997)	67.43	67.06	69.65	
Chinese (migrated in/after 1997)	23.76	23.70	24.10	
East Asian	0.80	0.85	0.48	
South Asian	2.18	2.34	1.25	
South-east Asian	2.25	2.32	1.79	
White	2.70	2.82	1.97	
Others	0.89	0.91	0.76	
Cantonese ability	92.18	91.76	94.72	$\chi^2(1)=250.01$***
District-level ethnic density	0.22 (0.11)	0.22 (0.11)	0.23 (0.10)	$t=-14.07$***
Arrival cohort				$\chi^2(1)=45.93$***
Before 1997	70.86	70.63	72.28	
1997–1999	8.53	8.52	8.56	
2000–2004	9.72	9.79	9.30	
2005–2009	6.19	6.25	5.84	
2010–2016	4.70	4.81	4.02	
Female	48.27	47.92	50.36	$\chi^2(1)=49.01$***
Married	72.52	72.83	70.64	$\chi^2(1)=49.44$***
Living with child (ren)	34.03	34.12	33.51	$\chi^2(1)=3.47$
Postsecondary education	17.46	17.76	15.65	$\chi^2(1)=63.95$***
Logged monthly personal income	9.18 (0.80)	9.18 (0.81)	9.15 (0.72)	$t=7.48$***
Industry				$\chi^2(8)=271.59$***
Agriculture, fishing, mining and quarrying	0.20	0.18	0.33	
Manufacturing	7.80	7.82	7.68	
Electricity, gas, and water	0.34	0.35	0.26	
Construction	9.00	9.12	8.27	
Wholesale, retail, and import/export trades, restaurants, and hotels	26.83	26.63	28.04	
Transport, storage, and communication	19.62	19.95	17.64	
Financing, insurance, real estate, and business services	14.01	14.24	12.60	
Community, social, and personal services	22.17	21.68	25.15	
Others	0.04	0.04	0.03	
Occupation				$\chi^2(9)=313.44$***
Managers and administrators	9.74	10.12	7.42	
Professionals	4.79	4.86	4.36	
Associate professionals	12.57	12.39	13.64	
Clerical support workers	11.86	11.72	12.77	
Service and sales workers	22.07	21.74	24.10	

(Cont'd...)

Table 2. *(Continued)*

	Full sample (*n*=169,766)	Non-minibus users (*n*=145,770)	Minibus users (*n*=23,996)	Difference
	Mean/% (SD)	Mean/% (SD)	Mean/% (SD)	
Skilled agricultural and fishery workers	0.11	0.10	0.22	
Craft and related workers	9.66	9.75	9.13	
Plant and machine operators and assemblers	5.56	5.65	5.00	
Elementary occupations	23.60	23.64	23.35	
Others	0.02	0.03	0.01	

Note: ***p<0.001 (two-tailed tests).

immigrants arriving in or after 1997, East Asian, South Asian, South-east Asian, white, and others. As provided in the existing literature on immigration issues in Hong Kong, 1997, the year of the Handover, marks a special watershed that differentiates a Crown Colony of the United Kingdom from a Special Administrative Region under the People's Republic of China. The different sociopolitical contexts before and after the Handover may result in different social sentiments toward Chinese immigrants, especially those from mainland China. Other ethnic groups are broader categories compared to the Chinese. East Asian includes Japanese and Korean. South Asians refer to Bangladeshi, Indian, Nepalese, Pakistani, and Sri Lankan. South-east Asian includes Filipino, Indonesian, Thai, and Vietnamese. Mixed races, blacks, other Asians, and others are all categorized under others. As shown in Table 2, in the full sample, 67.43% are Chinese immigrants who migrated before 1997, 23.76% are Chinese immigrants who migrated in or after 1997, 0.80% are East Asians, 2.18% are South Asians, 2.25% are South-east Asians, 2.70% are whites, and 0.89% are others. In the minibus users (*N* = 23,996), 69.65% are Chinese who migrated before 1997, 24.10% are Chinese who migrated in or after 1997, 0.48% are East Asians, 1.25% are South Asians, 1.79% are South-east Asians, 1.97% are whites, and 0.76% are others.

2.2.4. Cantonese ability

The ability to speak Cantonese is a binary variable, with 1 referring to yes, and 0 referring to no. In our full sample, as shown in Table 2, those who indicated the ability to speak Cantonese consisted of 92.18% of all the individuals. This percentage is 94.72% for the minibus subsample, which is slightly higher than the full sample.

2.2.5. Index of interaction

The index of interaction aims to measure the possibility of meeting other co-ethnic immigrants in one's residential area. The index of interaction depicts the dimension of exposure, a rather standard indicator to measure the level of spatial segregation by sociologists (Massey & Denton,

1988). We followed Shevky and Bell's method to obtain the index of interaction, in which *P** represents the probability of a randomly selected member of a particular ethnic group meeting (in his census tract) another member of the same ethnic group (Bell, 1954; Shevky & Bell, 1955). The equation for P^* is $P^* = \frac{1}{A}\sum_{i=1}^{k}\frac{a_i^2}{b_i}$. We obtained P^* by dividing the number of coethnic immigrants living in the same residential district by the total number of residents in that district in each census year.

In addition to the independent variables mentioned above, we also control a list of covariates, including educational attainment, gender, life stages, monthly income, industry, occupation, residential district, working district, year dummies, and several district-year dummies. To control for residential district-fixed effects, for instance, to compare the residents living in the same district, we included 24 residential district dummies in our analysis. Similarly, to control for working district-fixed effects, such as comparing the passengers working in the same district, we included 24 working district dummies throughout the models. We also included the interactions between place of residence and place of work as well as the interactions between census year and residential/working district.

2.3. Methodology

We applied linear probability models (LPM) with the binary variable, such as the likelihood of taking the minibus as the dependent variable. We started with a base model (Model 1), in which we only included our key independent variables by themselves. In this way, the base model captures the static effects of individual-level and district-level variables on the probability of taking a minibus. From Model 2 to Model 5, we added interaction terms between certain key independent variables and the years of duration in Hong Kong one by one. In Model 4 and Model 5, we included three-way interaction terms to explore inter-ethnic differences in taking minibuses along with different lengths of stay in Hong Kong. Model

5 is our final model, which dissects the total effects into initial effects and long-term effects of our key independent variables.

Equations I – V below correspond to Models 1 – 5 in the Results section. We started with Equation I, in which we only included immigrant, i's arrival, years of duration in Hong Kong, ethnic background, Cantonese ability, i's index of interaction (represented by P^*), and a series of control variables. $Minibus_i$ is the dependent variable capturing immigrant i's probability of choosing minibus over other modes of transportation in journeys to work, and ε_i is the individual-level robust standard error.

$$Minibus_i = MigAge_i + Duration_i + Ethicity_i + Cantonese_i + P^* + Controls_i + \varepsilon_i \quad \text{(I)}$$

In Equation II, we further included two interactions, which are individual i's years of staying in Hong Kong and age at arrival and individual i's years of staying in Hong Kong and ethnic group. In Equation III, we included more interactions (including one three-way interaction) to depict the potential interethnic differences in minibus ridership, which are individual i's age at arrival and ethnicity as well as individual i's years of staying in Hong Kong, age at arrival, and ethnicity. In Equation IV, we again expanded our interactions terms by including some important control variables into the interactions, including the interaction between individual i's years of staying in Hong Kong and logged personal income, individual i's years of staying in Hong Kong and Cantonese ability, and individual i's years of staying in Hong Kong and gender.

$$Minibus_i = MigAge_i + Duration_i + Ethnicity_i + Cantonese_i + P^* + Duration_i \times MigAge_i + Duration_i \times Ethnicity_i + Controls_i + \varepsilon_i \quad \text{(II)}$$

$$Minibus_i = MigAge_i + Duration_i + Ethnicity_i + Cantonese_i + P^* + Duration_i \times MigAge_i + Duration_i \times Ethnicity_i + MigAge_i \times Ethnicity_i + Duration_i \times MigAge_i \times Ethnicity_i + Controls_i + \varepsilon_i \quad \text{(III)}$$

$$Minibus_i = MigAge_i + Duration_i + Ethnicity_i + Cantonese_i + P^* + Income_i + Gender_i + Duration_i \times MigAge_i + Duration_i \times Ethnicity_i + MigAge_i \times Ethnicity_i + Duration_i \times MigAge_i \times Ethnicity_i + Duration_i \times Cantonese_i + Duration_i \times EthDen_i + Duration_i \times Income_i + Duration_i \times Gender_i + Controls_i + \varepsilon_i \quad \text{(IV)}$$

Equation V is our final model, in which we streamlined previous models by keeping only those more important items for i's likelihood to take a minibus. Throughout the analysis, we applied linear regressions and robust standard errors clustered in residential districts. Below we further explain our reasons for including arrival cohorts and a series of locational- and temporal-fixed effects and applying linear approximation in our analysis.

$$Minibus_i = MigAge_i + Duration_i + Ethnicity_i + Cantonese_i + P^* + Income_i + Duration_i \times MigAge_i + Duration_i \times Ethnicity_i + MigAge_i \times Ethnicity_i + Duraiton_i \times MigAge_i \times Ethnicity_i + Duration_i \times Income_i + Controls_i + \varepsilon_i \quad \text{(V)}$$

Following classical immigration research on immigrants' integration, we controlled for one's arrival cohort in our analysis (Martinović, 2013). The major advantage of controlling for arrival cohorts is that we can trace the groups of immigrants in cross-sectional data, in our case, the immigrants arriving in Hong Kong in the same cohort, similarly to tracing individuals in longitudinal data. In this way, we can control for potential cohort effects.

We have also included a series of locational- and temporal-fixed effects, including residential district-fixed effects, working district-fixed effects, residential-working-district fixed effects, census year-fixed effects, year-residential-district fixed effects, and year-working-district fixed effects. By incorporating a series of residential district dummies, we are only comparing the transportation behaviors of immigrants living in the same district, which therefore wipes out the possibility of not taking minibuses as a result of having few minibus routes in certain residential districts. Similarly, by including working district dummies, we are only comparing the passengers working in the same district, which accounts for the possibility of not taking minibuses to work as a result of not having minibus routes in certain working districts. To also control the distance between one's residential location and working location, we included the interactions between residential location dummies and working location dummies. To account for the effects of potential district development throughout the years (e.g., any development of the subway system throughout the years that may affect minibus ridership), we have controlled for census year dummies. In the end, by incorporating the year-fixed effects and the district-year-fixed effects (i.e., the interaction between year dummies and district dummies), we can control potential time-specific regional factors (e.g., any suspension of the

minibus routes) that may affect minibus ridership (Xu, 2018).

We employed LPM with robust standard errors correcting heteroskedasticity to test our hypotheses. We acknowledge that our dependent variable is of binary nature, which generally should rate logistic regression with higher preference. However, since we will incorporate several interaction terms in our full model, the statistical interaction in models with categorical outcomes may result in inaccurate *P*-values (Mustillo *et al.*, 2018). In addition, logistic regressions would eliminate the observations in which no minibus takers were present, which might unnecessarily reduce our sample size. Therefore, to avoid any inaccurate interpretation and maintain the high statistical power of our analysis, we simply relied on linear probability models. Nevertheless, for robustness check, please refer to Table S1 in the Online Supplementary Materials for the results from logic regressions, in which all major conclusions stand.

To ensure that our results are robust, we also carried out a series of analyses, including only immigrants whose main mode of transportation is a minibus. We reran Model 1, Model 2, Model 4, and Model 5, and all the major conclusions also stand. Please find the results in Table S2 in the Online Supplementary Materials as well.

3. Results

Tables 3 and 4 present the results of our five regression models, each of which has controlled for a collection of sociodemographic characteristics, year-specific fixed effects, and location-specific fixed effects. Model 1 is the base model that does not include any interaction terms. Model 1 suggests that the duration of residence in Hong Kong is positively associated with the likelihood of taking the minibus. By contrast, a negative relationship exists between age at migration and the probability of taking the minibus. In regard to the role of ethnic groups, we found ethnic differences in the likelihood of taking the minibus to be statistically significant. Specifically, South Asians are significantly less likely to take the minibus than Chinese immigrating in or after the year of the Handover (i.e., 1997). The latter has a slightly but insignificantly lower chance of taking minibus than other ethnic groups except for South Asians. In addition, Cantonese ability is another powerful determinant of immigrants' minibus taking. Inconsistent with the findings of prior research that reveal a negative link between ethnic density and transportation assimilation (Liu & Painter, 2012), our analysis indicates no substantial effect of district-level ethnic density. There are two possible explanations for such a result. First, since residential district dummies are included in all the

models, we only performed within-district comparisons. Our analysis suggests that within each residential district, the population proportion of one's ethnic group has no association with the likelihood of taking the minibus. Second, this study depends on a context different from prior research. Unlike relatively sparsely populated areas, such as cities in Europe and North America, in the previous research, Hong Kong is a highly compact city with a high population density.

Model 2 incorporates the interactions between certain individual characteristics and the duration of residence in Hong Kong to capture the "dynamic mode" of transportation assimilation. Throughout the models, continuous variables are centered around their means, such as duration of residence in Hong Kong, age at migration, logged personal income, and others. Since the interaction between years of staying in Hong Kong and age at migration is statistically insignificant, we cannot suggest that age at migration moderates the effect of residence duration among all immigrants. The main effect of the ethnic group indicates the probability of taking the minibus by the ethnic group when the duration of residence in Hong Kong is equal to its mean (i.e., 15 years) and holding other factors constant. The interactions between the duration of residence in Hong Kong and ethnic group show that compared to Chinese immigrating in or after 1997, South-east Asians are significantly less likely to take minibus with longer years of staying in Hong Kong.

Model 3 adds three-way interactions among duration of residence in Hong Kong, age at migration, and ethnic group, as well as interactions between age at migration and ethnic group. The main effect of duration of residence in Hong Kong reveals that those staying in Hong Kong for more years are more likely to take the minibus. The main effect of age at migration shows that those arriving in Hong Kong at a younger age are more likely to take the minibus. Since we used Chinese immigrating in or after 1997 as the reference group for ethnicity, the statistically significant interaction between years of living in Hong Kong and age at arrival suggests that, for recent Chinese immigrants, the effect of duration of residence in Hong Kong on minibus taking is more pronounced for those immigrating at a younger age. Figure 2 summarizes the association between years of living in Hong Kong and the predicted probability of taking the minibus by age group at migration among Chinese immigrating in or after 1997. Recent Chinese immigrants arriving at a younger age have a higher initial probability of taking the minibus than those arriving at an older age, and such a difference grows with more years of staying in Hong Kong. Similar to Model 2, Model 3 also confirms South-east Asians' steeper decline

Table 3. Linear probability models predicting minibus usage (Models 1, 2, and 3)

	Model 1	Model 2	Model 3
Independent variables			
Duration of residence in Hong Kong (D)	0.0008380**	0.0014111*	0.0014904*
	(0.0002915)	(0.0005781)	(0.0005837)
Age at migration	−0.000783***	−0.000763***	−0.001011***
	(0.0000949)	(0.0000956)	(0.0002215)
Ethnic group (Chinese [in/after 1997]=ref.)			
Chinese [before 1997]	0.0070596	−0.0062835	−0.0046948
	(0.0071382)	(0.0095889)	(0.0095941)
East Asian	0.0065193	−0.0067763	−0.0027870
	(0.0087641)	(0.0150991)	(0.0168933)
South Asian	−0.0161889**	−0.0273267**	−0.0257558**
	(0.0061179)	(0.0090054)	(0.0090158)
South-east Asian	0.0089186	−0.0106081	−0.0095421
	(0.0063719)	(0.0091648)	(0.0092006)
White	0.0069552	−0.0090005	−0.0050199
	(0.0062437)	(0.0099641)	(0.0107389)
Others	0.0146943	−0.0007639	0.0035438
	(0.0092873)	(0.0127758)	(0.0130051)
Cantonese ability	0.0146034***	0.0151558***	0.0154833***
	(0.0039161)	(0.0039335)	(0.0039317)
District-level ethnic density	0.0373921	0.0263577	0.0267702
	(0.0262907)	(0.0344524)	(0.0344692)
Interactions			
D×Age at migration		−0.0000049	−0.0000587*
		(0.0000128)	(0.0000263)
D×Ethnic group (Chinese [in/after 1997]=ref.)			
D×Chinese (before 1997)		−0.0004988	−0.0006306
		(0.0006439)	(0.0006527)
D×East Asian		−0.0011811	−0.0014381
		(0.0012627)	(0.0015434)
D×South Asian		−0.0010096	−0.0007562
		(0.0007988)	(0.0008095)
D×South-east Asian		−0.0024034**	−0.0023418**
		(0.0008703)	(0.0008921)
D×White		−0.0016206+	−0.0021740*
		(0.0008318)	(0.0009613)
D×Others		−0.0016336	−0.0019054
		(0.0012010)	(0.0013231)
Age at migration×Ethnic group (Chinese [in/after 1997]=ref.)			
Age at migration×Chinese (before 1997)			−0.0000454
			(0.0002521)
Age at migration×East Asian			−0.0003968
			(0.0015593)

(Cont'd...)

Table 3. *(Continued)*

	Model 1	Model 2	Model 3
Age at migration×South Asian			0.0005523
			(0.0006528)
Age at migration×South-east Asian			0.0005283
			(0.0007670)
Age at migration×White			−0.0002177
			(0.0008974)
Age at migration×Others			0.0016403+
D×Age at migration×Ethnic group (Chinese [in/after 1997]=ref.)			
D×Age at migration×Chinese (before 1997)			0.0001296***
			(0.0000392)
D×Age at migration×East Asian			0.0000430
			(0.0001343)
D×Age at migration×South Asian			−0.0000565
			(0.0000756)
D×Age at migration×South-east Asian			0.0000134
			(0.0000893)
D×Age at migration×White			0.0001056
			(0.0000841)
D×Age at migration×Others			0.0002493*
			(0.0001065)
Controls			
Arrival cohort (before 1997=ref.)			
1997–1999	0.0066226	−0.0059316	−0.0059412
	(0.0060425)	(0.0075843)	(0.0075801)
2000–2004	0.0041830	−0.0073039	−0.0063267
	(0.0063138)	(0.0081296)	(0.0081216)
2005–2009	0.0062574	−0.0035357	−0.0026838
	(0.0072692)	(0.0095166)	(0.0095110)
2010–2016	0.0086150	−0.0005012	−0.0006189
	(0.0083830)	(0.0115073)	(0.0115054)
Female	0.0053457**	0.0054121**	0.0059645**
	(0.0019259)	(0.0019328)	(0.0019490)
Married	−0.0028037	−0.0027136	−0.0024588
	(0.0022543)	(0.0022586)	(0.0022667)
Living with child (ren)	−0.0001933	−0.0001354	−0.0000190
	(0.0018880)	(0.0018919)	(0.0018929)
Postsecondary education	−0.0034206	−0.0034021	−0.0031982
	(0.0029009)	(0.0029030)	(0.0029058)
Logged personal income	0.0056519***	0.0056139***	0.0057795***
	(0.0014931)	(0.0014979)	(0.0014999)
Constant	0.1292658***	0.1418663***	0.1391784***
	(0.0299786)	(0.0303448)	(0.0303549)

(Cont'd...)

Table 3. *(Continued)*

	Model 1	Model 2	Model 3
Year FE	Yes	Yes	Yes
Place of residence FE	Yes	Yes	Yes
Place of work FE	Yes	Yes	Yes
Place of residence FE×Place of work FE	Yes	Yes	Yes
Place of residence FE×Year FE	Yes	Yes	Yes
Place of work FE×Year FE	Yes	Yes	Yes
R-squared	0.077	0.077	0.077
Observations	169,766	169,766	169,766

Note: FE: Fixed effect; $+p<0.1$, $*p<0.05$, $**p<0.01$, $***p<0.001$ (two-tailed tests); The results for occupation and industry are not displayed.

in the likelihood of minibus usage. Figure 3 presents the link between the duration of residence in Hong Kong and the predicted probability of taking the minibus by ethnic group. As shown in Figure 3, South Asians have the lowest initial probability of minibus taking, while South-east Asians have the highest. As the duration of living in Hong Kong increased, South-east Asians became even less likely to take the minibus, which shows an opposite trend in minibus usage compared to any other ethnic group. In addition, we found no substantial inter-ethnic difference in arrival age on minibus taking. The three-way interactions show that while age at migration reduces the effect of duration of residence in Hong Kong among Chinese who immigrated in or after 1997, the moderating effect of age at migration is significantly less pronounced among Chinese who immigrated before 1997. We also employed a logit model to replicate Model 3 (Table S1), which reveals similar results to those of the LPM.

Model 4 tests how Cantonese ability, district-level ethnic density, logged personal income, and gender moderate the effect of duration of residence in Hong Kong on minibus usage. We found that only logged personal income is an effective moderator. The association between the duration of residence in Hong Kong and the likelihood of taking the minibus is significantly less pronounced in people with higher incomes, which may result from the fact that rich immigrants tended to swap public transportation for private cars. According to the 2016 census, among the immigrants who have stayed in Hong Kong for 20 years or more, 19.3% of the 10% richest people (i.e., the people with the top 10% income) chose private cars as their major transportation mode, while this proportion was only 2.9% for the rest of people. Figure 4 presents the association between the duration of residence in Hong Kong and the predicted probability of taking the minibus by income percentile. Model 5 is a simplified model excluding statistically insignificant interactions.

In sum, our findings support Hypotheses 1, 2, 4, and 5 and partly support Hypothesis 7. Hypotheses 3, 6, and 8 are not confirmed. Table 5 summarizes the results of our eight hypotheses.

4. Discussion

In general, we confirmed our expectation that immigrants in Hong Kong had been increasingly picking up the locals' transportation behaviors during the years spent at the destination; in other words, they were more likely to ride minibuses as one of the top three modes of transportation to work. However, the exact pace of this assimilation may vary strongly on individual-level factors, which in general can be grouped into two major categories: (1) The characteristics that result in entry differences which then continue with the length of stay in Hong Kong, and (2) those that we can only determine the average effects along with the length of stay.

Age at migration and ethnicity belong to the first category, whose effects were influential for immigrants' minibus taking both at the beginning and in the long run. Younger immigrants already had initial advantages in minibus taking over older immigrants. In addition, for certain ethnic groups, for example, recent Chinese immigrants in our case, the advantage of arriving in Hong Kong at a younger age further strengthened as time passed since younger immigrants demonstrated a faster speed of transportation adaptation. This also explains why we often observe immigrants arriving at a younger age are often more absorbable of local knowledge, even if they had the same length of stay in the destination as those who arrived at an older age.

Similarly, the seven ethnic groups began at different levels when they first arrived in Hong Kong, with Chinese arriving before 1997 at a more advantaged starting point than the Chinese arriving later and South Asians being the most disadvantaged group. However, throughout the years,

Table 4. Linear probability models predicting minibus usage (Models 4 and 5)

	Model 4	Model 5
Independent variables		
Duration of residence in Hong Kong (D)	0.0006615	0.0014437*
	(0.0008938)	(0.0005840)
Ethnic group (Chinese [in/after 1997]=ref.)		
Chinese (before 1997)	−0.0045155	−0.0039954
	(0.0096029)	(0.0096001)
East Asian	−0.0018566	−0.0025499
	(0.0169862)	(0.0168902)
South Asian	−0.0247590**	−0.0253147**
	(0.0091346)	(0.0090198)
South-east Asian	−0.0086768	−0.0091106
	(0.0092362)	(0.0092040)
White	−0.0027827	−0.0039780
	(0.0109656)	(0.0107540)
Others	0.0034494	0.0033468
	(0.0130295)	(0.0130023)
Age at migration	−0.0010161***	−0.0010099***
	(0.0002219)	(0.0002215)
Cantonese ability	0.0182503***	0.0167433***
	(0.0050770)	(0.0039773)
District-level ethnic density	0.0223478	0.0234693
	(0.0346453)	(0.0345013)
Logged personal income	0.0057689***	0.0058124***
	(0.0014993)	(0.0014994)
Female	0.0059081**	0.0059894**
	(0.0019468)	(0.0019490)
Interactions		
D×Ethnic group (Chinese [in/after 1997]=ref.)		
D×Chinese [before 1997]	0.0002024	−0.0006082
	(0.0010370)	(0.0006528)
D×East Asian	−0.0012567	−0.0011182
	(0.0016082)	(0.0015490)
D×South Asian	−0.0007201	−0.0006285
	(0.0009013)	(0.0008106)
D×South-east Asian	−0.0025297**	−0.0024571**
	(0.0009189)	(0.0008929)
D×White	−0.0017552+	−0.0017425+
	(0.0010605)	(0.0009789)
D×Others	−0.0018360	−0.0016327
	(0.0013795)	(0.0013300)
D×Age at migration	−0.0000607*	−0.0000591*
	(0.0000264)	(0.0000263)

(Cont'd...)

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Table 4. *(Continued)*

|	Model 4	Model 5
Age at migration×Ethnic group (Chinese [in/after 1997]=ref.)		
Age at migration×Chinese [before 1997]	−0.0000420	−0.0000446
	(0.0002522)	(0.0002521)
Age at migration×East Asian	−0.0004080	−0.0004135
	(0.0015599)	(0.0015589)
Age at migration×South Asian	0.0005724	0.0005558
	(0.0006529)	(0.0006529)
Age at migration×South-east Asian	0.0005205	0.0005151
	(0.0007669)	(0.0007670)
Age at migration×White	−0.0001992	−0.0002217
	(0.0008985)	(0.0008979)
Age at migration×Others	0.0016247+	0.0016124+
	(0.0009185)	(0.0009187)
D×Age at migration×Ethnic group (Chinese [in/after 1997]=ref.)		
D×Age at migration×Chinese [before 1997]	0.0001298**	0.0001267**
	(0.0000395)	(0.0000393)
D×Age at migration×East Asian	0.0000532	0.0000494
	(0.0001345)	(0.0001344)
D×Age at migration×South Asian	−0.0000441	−0.0000472
	(0.0000758)	(0.0000758)
D×Age at migration×South-east Asian	0.0000238	0.0000187
	(0.0000896)	(0.0000895)
D×Age at migration×White	0.0001196	0.0001163
	(0.0000843)	(0.0000842)
D×Age at migration×Others	0.0002663*	0.0002607*
	(0.0001066)	(0.0001066)
D×Cantonese ability	0.0003051	
	(0.0005417)	
D×District-level ethnic density	−0.0039186	
	(0.0040039)	
D×Logged personal income	−0.0003245*	−0.0003419*
	(0.0001613)	(0.0001534)
D×Female	0.0001317	
	(0.0002784)	
Constant	0.1362044***	0.1320566***
	(0.0305408)	(0.0307300)
Controls	Yes	Yes
Year FE	Yes	Yes
Place of residence FE	Yes	Yes
Place of work FE	Yes	Yes
Place of residence FE×Place of work FE	Yes	Yes
Place of residence FE×Year FE	Yes	Yes

(Cont'd...)

Table 4. *(Continued)*

	Model 4	Model 5
Place of work FE×Year FE	Yes	Yes
R-squared	0.0774	0.0774
Observations	169,766	169,766

Note: Fe: Fixed effect; +*p*<0.1, **p*<0.05, ***p*<0.01, ****p*<0.001 (two-tailed tests).
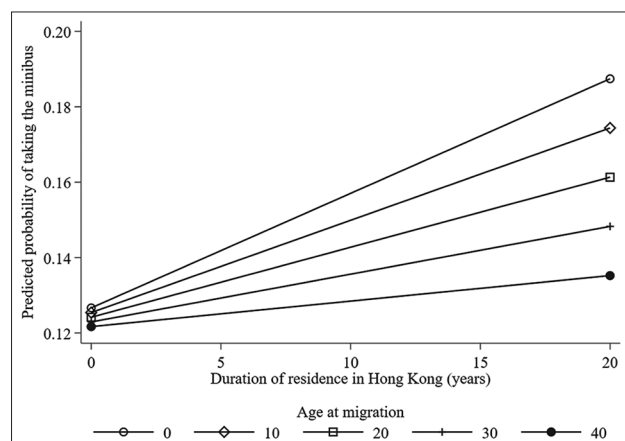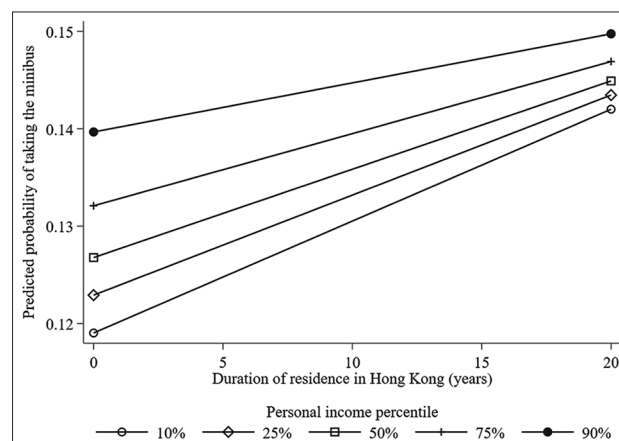

Figure 2. The association between duration of residence in Hong Kong and minibus usage by age at migration among Chinese who immigrated to Hong Kong in or after 1997

Figure 4. The association between duration of residence in Hong Kong and minibus usage by personal income percentile

Figure 3. The association between duration of residence in Hong Kong and minibus usage by age at migration by ethnic group

South-east Asian and white immigrants quickly lost their initial advantages and were significantly slower than other groups to pick up minibus. We postulate that South-east Asian immigrants might have experienced discrimination in Hong Kong in the long run, which lowered their pace for integration (Loper, 2001; Sim, 2003; Tang *et al.*, 2004). Similar discrimination toward South Asians may also explain their significantly lower likelihood of taking the minibus. South Asians had long been viewed by the

locals as competitors for low-skilled jobs since the colonial period. In addition, South Asians, on average, maybe more economically disadvantaged than other ethnic groups, which may decrease the probability of choosing the more expensive transportation option, that is, the minibus (Law & Lee, 2013; Tonsing, 2013). Moreover, research has also revealed South Asian immigrants' lower language acquirement in Hong Kong, which might deter them from choosing the more culturally-loaded transportation mode (Shum *et al.*, 2011). Differently, Chinese arriving before 1997 were significantly faster in picking up minibus than the newly arrived Chinese, which might be explained by the different sociopolitical contexts in Hong Kong before and after the Handover. The social sentiments toward mainland immigrants were more empathized and tolerated before the Handover, during which massive numbers of mainlanders arrived as refugees and received help from their relatives in Hong Kong. However, as daily resources became more scarce with the presence of mainlanders after the Handover, increasing negative sentiments toward the recently arrived mainlander might have negatively affected their social integration (Fong & Guo, 2018).

The second category would include one's Cantonese ability. We are in line with previous findings that being able to speak the local language is all positively associated with one's higher likelihood of adopting the locals' transportation mode.

Table 5. Summary of hypotheses and results

	Hypotheses	Results (✓=Supported, ✗=Not supported)	Notes
1	Longer duration in Hong Kong is positively related to one's likelihood to take minibuses.	✓	$Duration_i$ is positive and significant throughout the models
2	Arriving in Hong Kong at a younger age is positively related to one's likelihood of taking the minibus.	✓	$MigAge_i$ is negative and significant throughout the models
3	Chinese immigrants are more likely to take the minibus than immigrants of any other ethnicity in Hong Kong, and those Chinese immigrants arriving before 1997 were even more likely to take the minibus compared to the latecomers.	✗	$Ethicity_i$ is not statistically significant in Model 1, meaning we did not observe significant inter-ethnic differences in terms of the total effects
4	Compared to immigrants from other ethnic backgrounds, the longer length of stay in Hong Kong, the less likely for Southeast Asian immigrants to take the minibus.	✓	$Duration_i \times Ethicity_i$ (D×South-east Asian) in Model 2 to Model 5 is negative and significant
5	The ability to speak Cantonese is positively related to one's likelihood of taking the minibus.	✓	$Cantonese_i$ is positive and significant throughout the models
6	Living in districts with a higher percentage of non-Chinese immigrants is negatively correlated to an immigrant's transportation assimilation.	✗	$EthDen_i$ is insignificant throughout the models
7	Among those who have spent the same period of time in Hong Kong, immigrants arriving at a younger age are more likely to take the minibus than those arriving at an older age.	Partially supported	$Duration_i \times MigAge_i \times Ethicity_i$ is only significant between Chinese arriving before 1997 versus Chinese arriving in or after 1997
8	Compared to Chinese immigrants arriving in or after 1997, those arriving before the Handover are increasingly more likely to take minibus in the long-term.	✗	Results in Figure 3 support the opposite

While the district-level characteristics are insignificant throughout the models, this result offers interesting implications for assimilation theories, especially the literature on residential segregation and inequality (Tessema *et al.*, 2021). The previous literature on assimilation theories has often argued for a bidirectional causal relationship between social and spatial integration (Patel & Pradhan, 2020). For example, in the Netherlands, the government attributes ethnic segregation to a lack of socioeconomic assimilation, which leads to the view that segregation, either ethnic or socioeconomic, can be combated by altering the uneven spatial distribution of affordable housing (Bolt *et al.*, 2008). Another example would be the scholars' examination of Turkish neighborhoods in Germany, in which ethnic concentration was viewed as immigrants' refusal to assimilate into the mainstream German sphere (Gruner, 2010). However, as Bolt *et al.* (2010) argued, the relationship between integration and residential segregation might not be as straightforward as previous scholars have claimed. Immigrants' "self-segregation" argument may be overstated, and we need to pay more attention to the roles played by both individuals and institutions of the host society in creating a segregated society (Bolt *et al.*, 2010). In our case, the rather compacted topography of Hong Kong has created a much less spatially segregated society. Nevertheless, we witnessed immigrants' different patterns of social assimilation across ethnic

groups. It is possible that the ethnic concentration is not directly related to immigrants' assimilation *per se*. Instead, it may well be that "the street, community center, work, park, and other public spaces" consist of more meaningful sites of ethnic segregation in people's daily lives (Phillips, 2007). Then, the minibus itself becomes a type of public space that either encourages or impedes social integration. Unsurprisingly, immigrants of Chinese ethnicity, who are more culturally similar to the local people, are more likely to pick up minibus in the long-term.

Our research is also with several limitations. First, similar to most migration studies in general, our data also suffer from selection bias, in which the individuals we can observe are those choosing to stay in Hong Kong. Since those who find it challenging to adapt to Hong Kong society may have already left and are no longer in our dataset, we may thus overestimate the importance of the positive effects on transportation assimilation brought by the length of stay in the destination. In addition, for the same reason, our dependent variable also tends to include the more integrated immigrants as it does not comprehensively capture the difficulty of taking a minibus. Since the question asks for respondents' major mode of transportation to work, immigrants who need to work already represent a selected group. In addition, compared to hopping onto a minibus casually, taking a minibus bus to

work is a more routine process in which the random shifting routes or waving to the minibus between stations are less involved. The relatively lower difficulty in this process might explain the models' significant but small effect size. Second, to explore the dynamic mode of integration, we could not include the locals in our model. We acknowledge that comparing immigrants to the locals is a more common practice in integration studies. Some research on immigrants' integration into the destination also used a similar approach to ours (Martinović, 2013; Martinovic *et al.*, 2009). Third, we could not obtain information on the initial ethnic concentration when immigrants first arrived in Hong Kong, which becomes impossible to infer whether the initial district-level ethnic diversity was important for one's social integration. Fourth, as a large-scale quantitative study, we lack depth in interpreting inter-ethnic differences in transportation adaptation. The future research might want to conduct interviews with immigrants from different ethnic groups regarding their minibus ridership.

5. Conclusion

Our paper provides another avenue for studying immigrant adaptation by exploring the transportation mode of immigrants. By looking at immigrants' minibus ridership throughout the years, our research zooms in on a routine activity to delineate immigrants' integration process in Hong Kong. This research creatively examines immigration and mobility in a non-traditional immigrant region, which extends the scope of the application of immigration theories. In addition, our research further expands transportation socialization studies by adding the dynamic mode of integration of immigrants. Capitalizing on a pooled set of census data and relying on linear probability models, we confirmed several expectations on immigrants' minibus taking in Hong Kong. By dissecting the main effects from the total effects of transportation assimilation, we applied general theories on interethnic contacts to a specific type of interethnic contact, for example, transportation assimilation as a typical type of non-leisure contact.

One innovation in this study is differentiating the effects between entry and long-term differences in the process. Compared to other immigration research on Hong Kong, one major contribution of our study is using a regionally representative dataset to explore immigrants' social integration into the local society. Due to data limitations, the previous Hong Kong studies had either only focused on economic integration (Tong *et al.*, 2018; Zhang & Wu, 2011) or social integration with a much smaller sample size (Chen *et al.*, 2019).

From a more local level, our research efficiently captures a fleeting scene in Hong Kong. According to the Transport Department of Hong Kong, which started in August 2017, all newly registered minibuses must be equipped with a stop button. This requirement would free passengers from shouting "*chin min yau lok*" (stop at the front), thus easing immigrants' procedures to take the minibus. Nevertheless, the minibus deserves more scholarly attention as a unique and culturally loaded transportation mode in Hong Kong.

Conflict of interest

The authors declare no conflicts of interest.

Author contributions

Conceptualization: Skylar Biyang Sun, Xiaohang Zhao

Data curation: Skylar Biyang Sun, Xiaohang Zhao

Formal analysis: Skylar Biyang Sun

Methodology: Skylar Biyang Sun, Xiaohang Zhao

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Writing – review & editing: Skylar Biyang Sun, Xiaohang Zhao, Guixiang Zhang

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data

Interested scholars may apply to the Census and Statistics Department of Hong Kong to obtain the microdata used in this research.

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