Differences in Daily Trips between Immigrants and US-born Individuals: Implications for Social Integration

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Abstract

A key expectation regarding immigrants is that they need to integrate into mainstream society. Some countries have social programs to meet this ideal, while the US Government has largely left immigrants to integrate through their own means or receive help though non-profit organizations. One measure of integration is comparable trips for socialization and recreation. In this paper, we asked how divergent was daily trip frequency by immigrants versus US-born individuals across various trip purposes. We used the 2017 National Household Travel Survey data at the person level and estimated a series of trip frequency models where our outcome variables were daily trips by purposes. We controlled for socio-economic and demographic factors at the person and household levels, as well as for characteristics of the home location. We found that immigrants made fewer social, recreational, or errand trips than US-born individuals, which could slow their integration. However, immigrants made more exercise and education trips than US-born individuals. There was no statistical difference between the two populations for daily frequency of work trips. The need for policies encouraging social and recreation trips for immigrants, and exercise and education trips for US-born individuals, is indicated from this research.

Keywords: discretionary travel; immigrants; integration; negative binomial; NHTS; trip purpose

Highlights

- Immigrants below 36 years, though more likely to integrate, make fewer social and recreation trips.
- Immigrant women make the fewest recreation trips, holding all else constant.
- Driving ability linked with higher chance of social and recreation trips.
- More household vehicles correlated with more social and recreation trips.
- Household income has a bigger impact on increasing recreation trips than number of vehicles.

1. Introduction: Everyday travel as a means for social integration

According to American Community Survey estimates, there are 45 million foreign-born individuals in the United States, comprising 14% of the total US population (US Census Bureau 2019). Based on Pew Research Center's figures, until recently, the US had about 1 million immigrants arriving annually. The largest populations currently originate from Mexico, China, or India (Budiman 2020). This growing population of foreign-born individuals results in increased demand in travel across all modes, particularly public transit (Blumenberg 2009). An overall lack of access to social, economic, and educational resources leads to worse outcomes for immigrant populations including fewer jobs, poor health, and missed opportunities to improve skills and language (Bose 2014).

Bloemraad and de Graauw (2012) document how, historically speaking, US immigrant integration policy has taken a laissez-faire approach with limited coordinated federal programs. Despite this, researchers claim that social, economic, and educational integration is occurring successfully in the US. In a model where community members help each other, integration is often led through social networks (Barajas 2018; Shin 2016) or through numerous non-profit and advocacy groups (Allen and Slotterback 2017; de Graauw and Bloemraad 2017). Yet, integration could be more effective if there were centralized federal policies to coordinate and fund efforts at the national and sub-national levels (de Graauw and Bloemraad 2017). Transportation policies have the capacity to help with integration. For example, learning the public transit system is one of the local resettlement services offered to recently settled immigrants and refugees in some locations (Blumenberg 2008). Experts maintain that access to affordable transportation can improve job security, education access, and social inclusion; all key aspects of successful integration (Bloemraad and de Graauw 2012; de Graauw and Bloemraad 2017; Lucas 2012).

There are vast differences in immigrants to the US, based on origin country, culture, socioeconomics, and demographics. Researchers (Bose 2014; Yu 2016) discuss the limitations that being an immigrant can impose on an individual with respect to everyday mobility. They show how being immobile is not just about transportation accessibility, but can often be related to personal factors such as individual capacity, and outside forces such as labor market equality. This internal and external heterogeneity speaks to the need for diverse transportation planning approaches for ensuring effective access to resources and opportunities for immigrants. There is an evolving body of research that addresses immigrants' travel mode choices (Blumenberg 2009; Blumenberg et al. 2007; Blumenberg and Smart 2010; Hu 2017; Matsuo 2019). Specifically, there is a well-developed understanding of the impact of vehicle ownership and shared modes on travel behavior (Chatman and Klein 2013; Klein and Smart 2015; Tal and Handy 2010). However, researchers have not yet investigated *why* immigrants make daily trips, and if their daily travel by trip purpose is similar or different than those born in the US. Such an analysis can reveal gaps in trip making frequency to various destination types. Understanding inequities, especially in relation to daily travel for discretionary (social or recreation) and non-discretionary (work or education) needs, can provide insights for designing policies to help successfully integrate immigrants into society.

In this paper, we focus on trip destination purpose i.e., the purpose at the end of the trip. We define any individual who is not born in the US as an immigrant for this analysis. We run our analysis at the person level, focusing on daily trip frequency which also includes those who make zero trips across various purposes. Consequently, while we recognize that many immigrants may

choose not to travel or have constrained travel options (Bose 2014; Yu 2016), we also acknowledge that on any regular day in the US, many immigrants are making trips. The largely induced nature of travel implies that the same needs that incentivize their US-born counterparts to get on the road, nudge immigrants to undertake trips. We suspect, however, that there may be differences in discretionary and non-discretionary trip making frequency. Trip destination purposes are reported in the 2017 National Household Travel Survey. We identify various trip destination purposes across six categories, namely, social, recreation, exercise, errand, education, and work (**Figure 1**). We ask: how divergent is daily trip frequency by US-born individuals versus immigrants across various trip purposes? We expect to find some differences for discretionary trips (social, recreation, exercise, or errand) but not many differences for non-discretionary trips (education or work).

2. Socio-demographics, travel behavior, and geography: A literature review

In this review, we focus on recent advances in immigrant travel behavior research categorized into three segments: socioeconomics and demographics, travel behavior, and geography. Although immigrant status is categorized in the socioeconomics and demographics segment, it is embedded within the other sub-sections given the overall emphasis on immigrants in this paper.

2.1 Socioeconomics and demographics

Several researchers have studied the impacts of immigrant status on travel behavior. Newbold et al. (2015) determine that immigrants, in general, have shorter commutes to work than do native-born residents. This may be explained by the tendency for immigrant populations to live in central cities, closer to employment (Blumenberg et al. 2007), but this may change with longer time spent in the US (Lo et al. 2011; Singer 2013).

Vehicle ownership is lower in immigrant populations than native born populations (Blumenberg et al. 2007; Bose 2013; Tal and Handy 2010). Immigrant families are also more likely to transition into and out of car ownership frequently, signaling that vehicle ownership may be an impermanent condition in this population (Klein and Smart 2015). Blumenberg's research of Southeast Asian immigrants in California underscores the importance of private vehicles in immigrant populations. She finds that a lack of public transit infrastructure causes reliance on private vehicles for access to employment and other resources, even though income is constrained in the immigrant group (Blumenberg 2008).

Demographic variables have different correlations with car ownership for some immigrant groups. Household size, lack of children, and retirement all have negative effects on vehicle ownership for a subset of the immigrant population (Tal and Handy 2010). Income level, access to flexible work schedules, residential density, and distance to transit influence whether residents will utilize private vehicles, or alternative and active modes for transportation in both immigrant and native-born populations (Chakrabarti and Shin 2017; Chatman 2014). Chatman and Klein (2013) find that lower auto ownership in recent immigrants may be due to difficult driving conditions in the US and limited capital due to remittances. Matsuo (2016) demonstrates that driving patterns are substantially different for female Hispanic immigrants than other ethnic female immigrant populations in the US, and these patterns tend to stay that way for decades after immigration.

Constrained transportation accessibility has been shown to limit access to education, services, social activities, and employment opportunities (Bloemraad and de Graauw 2012; de Graauw and Bloemraad 2017; Farber et al. 2018; Lucas 2012; Sanchez and Brenman 2007). Researchers have tied the concept of transportation accessibility directly to social inclusion in North American immigrant populations (Farber et al. 2018; Parks 2004). Research underscores that social inclusion, and participation in discretionary activities, is crucial in supporting the process of integration and societal participation among the immigrant population (Farber et al. 2018; Liang 1994; Priya and Uteng 2009).

The customs and institutions of origin cultures are important and very likely influence immigrants' early travel behavior beyond what is explained by socio-economic and demographic variables (Chatman 2014; Tal and Handy 2010). Barajas (2018) and Yu (2016) use rich qualitative evidence to highlight the importance of socio-cultural factors. However, no researchers have included these latent factors in quantitatively predicting travel outcomes.

2.2 Travel behavior

Researchers have investigated the relationship between immigrant status and mode choice. Smart (2010) finds that recent US immigrants travel by bicycle more than native-born residents, and the association remains even after controlling for traditional mode choice variables such as income, age, and automobile access. Barajas (2018) adds more nuance by documenting how immigrants in the San Francisco Bay Area approach bicycling through cultural lenses, which often limits their self-identification as bicyclists. Immigrants are also more likely to use transit and less likely to use private vehicles than the rest of the population (Blumenberg 2009; Blumenberg et al. 2007; Blumenberg and Evans 2010; Chakrabarti and Painter 2019). This increased use of transit by immigrants over the native-born population holds even when the immigrant population lives farther from the central city (Lo et al. 2011). However, over time, immigrant travel behavior tends to mirror that of the native-born population with transit use decreasing and vehicle miles traveled increasing (Blumenberg and Evans 2010; Blumenberg and Smart 2010; Tal and Handy 2010).

Although immigrants have a higher rate of transit mode share (Blumenberg 2009), private vehicle use and carpooling comprise an appreciable mode split for immigrant populations (Barajas 2021; Blumenberg and Smart 2010; Matsuo 2019). Immigrants make significantly more trips by carpool than their native born counterparts and are significantly more likely to form carpools within their households and social networks (Blumenberg and Smart 2010; Matsuo 2019). Immigrants utilize carpooling for work trips at higher rates than US-born individuals (Chatman and Klein 2009; Liu and painter 2012). Shopping and social trips are positively associated with carpooling, relative to single-occupancy vehicles (Blumenberg and Smart 2010; Shin 2016).

Trip generation based on trip mode, trip purpose, socioeconomics, and demographic factors has been studied widely for the overall population (e.g., Duvarci and Mizokami 2009; Mokhtarian et al. 2006; Rodriguez and Joo 2004; Schmöcker et al. 2005). However, there is limited literature in this area on immigrants. A handful of researchers have utilized the National Household Travel Survey from 2001 to point to differences in trip frequency among the US-born and immigrant populations (Chatman and Klein 2009; Tal and Handy 2010).

2.3 Geography

Home location and residency within ethnic enclaves both have impacts on travel behavior of the immigrant population. Residents of ethnic enclaves are more likely to use alternatives modes of transportation and carpool more than others (Blumenberg 2009). Specifically, living or working in ethnic enclaves increases the likelihood of carpooling versus driving alone (Liu and Painter 2012). Living in immigrant neighborhoods has a stronger influence on mode choice for immigrants than for US-born residents of the same neighborhood (Smart 2014). This may be explained by the strong social networks that occur in ethnic enclaves and immigrant neighborhoods (Shin 2016).

Immigrants tend to reside in central cities when first establishing in the country, and then move to the suburbs over time (Blumenberg et al. 2007). However, this trend has changed over the decades; immigrants are moving to different metro areas than they have in the past, and are frequently choosing suburbs as initial home locations, over larger cities (Singer 2013). These trends may explain the increase in commuting time for established immigrant populations (Blumenberg et al. 2007).

In summary, much of the research on immigrant trip behavior has focused on trip mode choice, vehicle ownership, and vehicle miles traveled. Some researchers have discussed the influence of trip purpose on mode choice for the immigrant population (e.g., Shin 2016). Bose (2013) shows that for immigrants in Vermont, the most important use of transportation is for commuting to school and work, but there are concerns regarding children's education and health outcomes due to the lack of transportation options. Overall, there remains a gap in understanding how trip frequency by purpose compares between immigrants and the US-born population. We hypothesize that there are systematic differences in trip frequency across various purposes for immigrant versus US-born populations and examine the reasons through this research.

3. Data and model choice

Our objective was to understand person level trip making by purpose; i.e., how often did a person make trips for various purposes in a day. We relied on the 2017 National Household Travel Survey (NHTS) (US Department of Transportation 2018). This non-panel survey, collected every few years, provides a robust dataset to examine questions at the national level. The 2017 NHTS had data reported at household, person, vehicle, and trip levels, and provided weights at household, person, and trip levels. These weights enabled generalizing from the sample to the US population (**Table 1**). For this analysis, we joined totaled daily trip frequencies computed from the trip table to the person level table since our unit of analysis for this work was the person or individual. We also joined household level information to this person level table.

The NHTS has often been used to study travel behaviors including the most recent 2017 dataset (Deka and Fei 2019). Importantly, immigrants' travel behaviors have been studied using NHTS data by various researchers (Barajas 2021; Blumenberg and Smart 2010; Chatman and Klein 2009; Hu 2017; Matsuo 2016; Tal and Handy 2010). Our research followed in this tradition. We used the 2017 NHTS data to estimate negative binomial trip purpose models.

Given that our outcome variables are counts, we first specified a simpler Poisson-form regression. However, failed goodness of fit tests indicated overdispersion in the outcome variables. When the outcome is an overdispersed count variable, a negative binomial is the

preferred model form rather than a Poisson model (Milton and Mannering 1998). The negative binomial treats the dependent variable (here daily trip frequency) as linear without the need to log-transform, and the explanatory variables are exponentiated. The equation is as below:

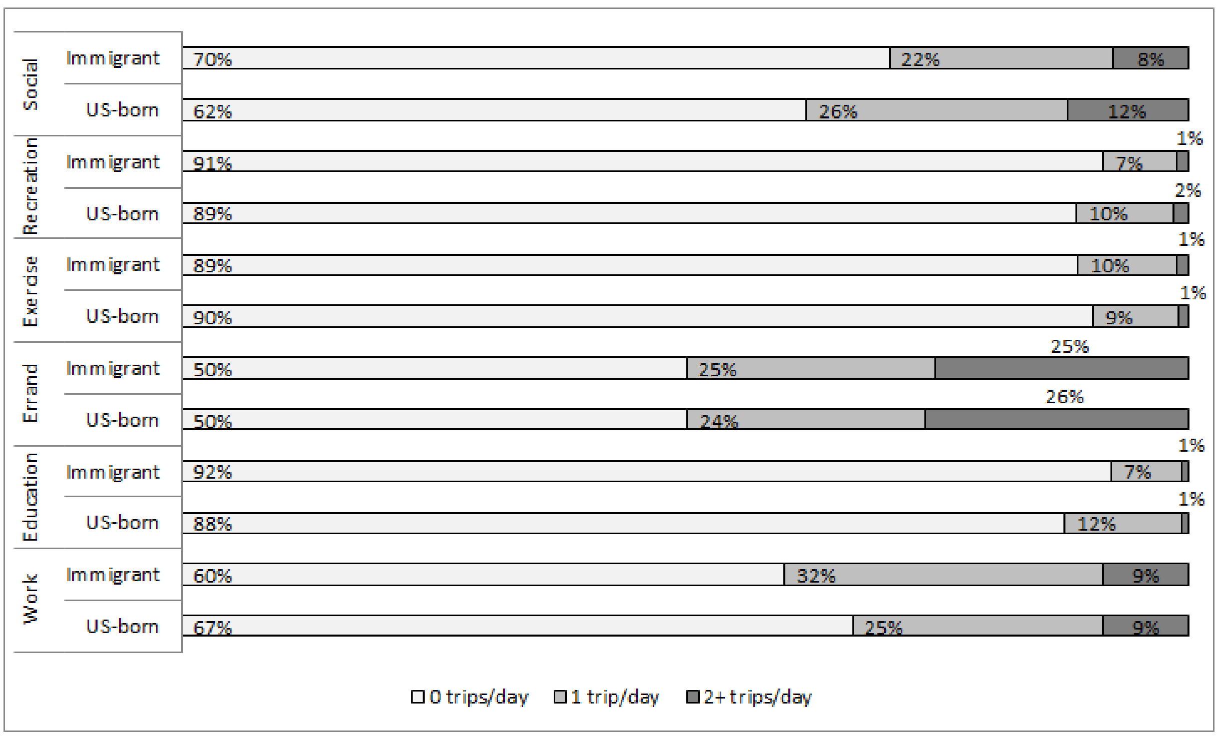
$$\lambda_i = exp(\beta X_i + \varepsilon_i) \quad \text{...} \quad (1)$$

where, λ_i = Expected number of daily trips and X_i = the vector of explanatory variables (Milton and Mannering 1998). For each specified daily trip frequency model across the full sample, we also computed average marginal effects (Williams, 2012, sections 6.2 and 7).

4. Variables used in the estimation

Social, recreation, exercise, and errand trips are generally considered to be discretionary, while education and work trips are typically non-discretionary. In the main paper, we focus on discretionary outcomes, but present non-discretionary trip models in the **Appendix**. **Figure 1** shows the weighted distribution for the outcome variables, daily trip frequency by purpose, across the immigrant and US-born groups. Immigrants make fewer social and recreation trips, but slightly more exercise trips, than their US-born counterparts. Daily frequency of errand trips is comparable across both cohorts. The weighted distribution suggests that immigrants make fewer education trips but more daily work trips than their US-born counterparts. However, further analysis using a regression framework is required to test if this difference holds after controlling for socio-demographic and location factors.

Figure 1 Daily trip frequency across various purposes (weighted)



Note: Trip destination purpose link to NHTS 2017 codes for WHYTO: Social = 5/13/17/19; Recreation = 15; Exercise = 16; Errand = 6/7/9/10/11/12/14/18; Education = 8; Work = 2/3/4.

Table 1 shows the weighted summary statistics for all the variables we use in this analysis. Since our unit of analysis is the individual, we present attributes split by those who immigrated to the US and those born in the US. Our outcome variables, trip frequency by purpose, are shown here with summary statistics; a similar pattern is seen in the weighted distribution (**Figure 1**).

Table 1 Summary statistics (weighted)

	Immigrated to the US (14%)					**Was born in the US (86%)**					**(A) minus (B)**
	Mean / Prop. (A)	Std. Dev.	Med -ian	Min.	Max.	Mean / Prop. (B)	Std. Dev.	Med -ian	Min.	Max.	
Outcome variables											
Social trips	0.40	0.73	0	0	7	0.55	0.87	0	0	19	-0.15
Recreation trips	0.10	0.38	0	0	6	0.13	0.42	0	0	13	-0.03
Exercise trips	0.13	0.40	0	0	5	0.11	0.36	0	0	12	0.02
Errand trips	1.00	1.42	0	0	16	1.01	1.42	0	0	38	-0.01
Education trips	0.09	0.32	0	0	6	0.13	0.37	0	0	7	-0.05
Work trips	0.52	0.80	0	0	33	0.48	0.95	0	0	46	0.04
Explanatory variables											
Personal attributes											
Age cohort											
<16 years – Children	7%					18%					-11.4%
16-35 years – Early adulthood	27%					29%					-1.6%
36-64 years – Middle-aged	51%					38%					12.9%
>64 years – Older adults	15%					15%					0.1%
Female (dummy)	53%					51%					2.1%
Non-White Race (dummy)	56%					24%					32.3%
Years of education	14.4	2.8	14	10	18	14.1	2.5	14	10	18	0.28
Driver (dummy)	77%					85%					-8.1%
Household characteristics											
Household size[1]	3.3	1.5	3	1	11	3.2	1.6	3	1	13	0.14
Life-cycle: Household with at least one child under 16 years of age (dummy)	44%					43%					0.8%
Annual household income ($1,000)[1]	74.7	57.4	62.5	10	200	78.4	55.8	62.5	10	200	-3.65
Count of household vehicles[1]	1.9	1.2	2	0	12	2.2	1.3	2	0	12	-0.3
Home location factors											
Household in urban area (dummy)	95%					81%					14.5%
Population density at home census tract (10,000 persons/sqmi)	0.81	0.85	0.70	0.005	3	0.44	0.62	0.30	0.005	3	0.37

Note: (1) Variable transformed in model but reported here in original form.

The split between immigrants and US-born individuals is comparable to the population, i.e., 14% immigrants and 86% US-born. We divided the sample by age into four cohorts, namely, children (<16 years), early adulthood (16-35 years), middle-aged (36-64 years), and older adults (>64 years). The first age cohort (children <16 years) is comprised of those who generally cannot drive legally in the US, and rely on others for transportation, which can impact their daily trip making. The second cohort (early adulthood 16-35 years) largely mirrors the

millennial generation, and research suggests that this group has reduced transportation consumption and trip generation (Blumenberg et al. 2016; Deka 2018; McDonald 2015; Wang et al. 2018). The third cohort (36-64 years) is comprised of individuals who are likely to have families and are in mid- to late-stage careers. The fourth cohort (older adults >64 years) is made up of individuals who are likely to have retired, rely on others for transportation due to health concerns, and have distinctly different travel patterns than other age groups (Agrawal et al. 2020; Haustein and Siren 2015; Shirgaokar 2018; Shirgaokar et al. 2020).

Between immigrants and US-born, there are fewer immigrant children. There are slightly more women in the immigrant group compared to the native born group. Thirty-two percent more immigrants identify as racially non-White. Years of education are comparable between the two groups. Eight percent fewer immigrants are drivers than the US-born group. Immigrants have slightly larger households than their US-born counterparts, and slightly more immigrants are from a household with a child under 16 years. Average annual household income is $3,650 lower in the immigrant group, and there are fewer vehicles in immigrant households on average, compared to US-born households. More immigrants (14.5%) live in an urban area, or in census tracts with an average 3,700 more persons/sqmi, compared to US-born individuals.

5. Discussion of findings

We present findings for the four discretionary trip purposes in this section, namely, social (**Table 2**), recreation (**Table 3**), exercise (**Table 4**), and errand (**Table 5**). We do not report daily trip frequency models for non-discretionary purposes, i.e., education and work here (see **Appendix**). For all the models, we estimate full-sample models as well as separate models for immigrant and US-born populations.

5.1 Impact of personal attributes on discretionary travel

Full-sample estimation showed that immigrants, relative to US-born individuals, and holding all else constant, had lower daily social, recreation, or errand trip frequency but higher exercise trip rates. Within both cohorts, compared to older adults (> 64 years), those between 16 and 64 years of age had lower daily social trip frequency. Children (< 16 years) had higher daily recreation trip frequency compared to older adults within both the immigrant and US-born groups. Further, 16-35 year old immigrants, compared to immigrants over 64 years, had higher daily recreation trip frequency. However, middle-age (36-64 years) individuals in both groups made fewer recreation daily trips compared to older adults in the respective populations. Daily errand trips were lower for all the under-64 year groups, relative to older adults in both immigrant as well as US-born groups, holding all else equal. This suggests that older adults, whether immigrant or US-born, undertake more errand-based trips for multiple reasons including the need for socializing and seeking recreation. Compared to older adults, middle-aged individuals in both groups made fewer exercise trips, ceteris paribus. This indicates that during middle-age years, people budget time for other needs more so than exercise.

Studying gender-based differences revealed that women's daily trip making was systematically different than men's in the US-born population, but such differences by gender were only significant for errand trips within immigrants where women made more trips than men. This indicates that, on average, immigrant women and men likely made comparable daily trips for social, recreation, or exercise purposes. In comparison, US-born women had higher

daily trip rates for social, exercise, or errand purposes, and lower frequency for recreation trips than US-born men.

Race mattered for daily trip making, not just in the US-born group as expected, but also within the immigrant population. Immigrants who identified as non-White, compared to those who identified as White, ceteris paribus, had lower daily trip frequencies for all four discretionary travel purposes. In comparison, those who identified as non-White within the US-born group, relative to being White, made more daily errand trips. Social trip frequencies were not statistically different by race among US-born individuals, but similar to immigrants, non-White Americans made fewer daily recreation and exercise trips compared to White Americans.

More education and the ability to drive an automobile were correlated with higher discretionary trip making across the board. Highly educated immigrants and US-born individuals had higher daily trip rates for recreation, exercise, or errand purposes. However, more education did not statistically matter for higher daily social trips among immigrants, but did for US-born individuals. A possible explanation is that wider cultural factors encourage immigrants towards more social behaviors relative to the US-born population. Compared to those who could not drive an automobile, those who were drivers (Barajas 2021), and holding all else equal, had higher daily trip frequencies across all four discretionary trip purposes in both groups.

5.2 Impact of household characteristics on discretionary travel

Larger households were correlated with fewer discretionary trips for both groups. Specifically, more members in the household reduced the daily trip frequency for social, recreation, exercise, and errand trips, holding all else equal, for both immigrants and US-born individuals. A factor connected to the size of the household is the presence of young children because their presence might result in more trips for some purposes (e.g., errands) but fewer trips to other destinations (e.g., recreation). However, the NHTS 2017 data showed that among both groups (immigrants and US-born), households with at least one child under 16 years of age, compared to those without such young children, had higher daily trip frequencies for social, recreation, or errand trips. For US-born individuals, coming from a household with a young child, relative to a household without a young child, was correlated with fewer daily exercise trips.

Having higher income has been widely shown to be correlated with more travel (e.g., Matsuo 2016; Shirgaokar et al. 2020). Our analysis showed that at higher household income levels, both immigrants and US-born individuals, ceteris paribus, had greater daily frequency for trips for social, recreation, or exercise purposes, but lower rates of errand trips. This suggests that at higher income levels, individuals could be paying other people to complete daily errands or are managing errands virtually.

Access to vehicles in a household has also been shown to be positively correlated to daily travel (e.g., Blumenberg 2008; Hu 2017). Among immigrants, the impact of access to vehicles in the household is not statistically linked to an increase or decrease in social, recreation or exercise trips, but more vehicles are correlated with a lower daily frequency of errand trips in this population (as well as for US-born individuals). Further, among US-born individuals, higher number of vehicles in the household is correlated with more daily social and recreation trips.

Table 2 Daily frequency of social trips

	Full sample			Immigrants			US-Born		
	Coef.	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**
Immigrant (dummy)	**-0.27**	0.01	-20.92						
>64 years – Older adults (reference)									
<16 years – Children	0.05	0.04	1.28	0.26	0.17	1.57	0.04	0.04	0.96
16-35 years – Early adulthood	**-0.18**	0.01	-17.56	**-0.12**	0.04	-3.18	**-0.18**	0.01	-17.33
36-64 years – Middle-aged	**-0.17**	0.01	-22.46	**-0.14**	0.03	-4.74	**-0.18**	0.01	-21.95
Female (dummy)	**0.07**	0.01	10.29	-0.01	0.02	-0.53	**0.07**	0.01	10.86
Non-White Race (dummy)	**-0.03**	0.01	-3.35	**-0.08**	0.02	-3.46	-0.02	0.01	-1.68
Years of education	**0.02**	0.00	15.63	0.00	0.01	0.59	**0.03**	0.00	16.21
Driver (dummy)	**0.51**	0.02	30.50	**0.53**	0.05	11.26	**0.50**	0.02	28.21
Household size (LN)	**-0.25**	0.01	-23.65	**-0.38**	0.04	-10.14	**-0.24**	0.01	-21.67
Life-cycle: Household with at least one child under 16 years of age (dummy)	**0.04**	0.01	3.20	**0.09**	0.04	2.54	**0.03**	0.01	2.68
Annual household income ($1,000) (LN)	**0.05**	0.01	9.73	**0.04**	0.02	2.65	**0.05**	0.01	9.44
Count of household vehicles (LN(x+1))	**0.09**	0.01	7.57	0.08	0.04	1.93	**0.09**	0.01	7.29
Household in urban area (dummy)	0.00	0.01	0.19	**-0.10**	0.04	-2.34	0.01	0.01	0.73
Population density at home census tract (10,000 persons/sqmi)	**0.04**	0.01	5.48	**0.06**	0.02	3.40	**0.04**	0.01	4.30
Constant	-1.36	0.03	-50.15	-1.08	0.10	-11.05	-1.41	0.03	-49.29
lnalpha	-0.91	0.02		-0.60	0.06		-0.93	0.02	
alpha	0.40	0.01		0.55	0.03		0.39	0.01	
Model Diagnostics									
	Obs.	203,890		Obs.	21,043		Obs.	182,847	
	Wald ChiSq (14)	4,986		Wald ChiSq (13)	459		Wald ChiSq (13)	3,824	
	Prob. > ChiSq	0.000		Prob. > ChiSq	0.000		Prob. > ChiSq	0.000	
	Log-Lik Intercept Only	-215,064		Log-Lik Intercept Only	-18,649		Log-Lik Intercept Only	-195,955	
	Log-Lik Full Model	-212,067		Log-Lik Full Model	-18,394		Log-Lik Full Model	-193,623	
	Deviance (df=203,867)	424,135		Deviance (df=21,022)	36,789		Deviance (df=182,826)	387,246	
	Lik Ratio (14)	5,994		Lik Ratio (13)	509		Lik Ratio (13)	4,665	
	Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000	
	McFadden (adj R^2)	0.014		McFadden (adj R^2)	0.013		McFadden (adj R^2)	0.012	
	AIC	2.08		AIC	1.75		AIC	2.12	

Notes: (1) Trip destination purpose link to NHTS 2017 codes for WHYTO: Social = 5/13/17/19. This is the outcome variable for these models. (2) Robust negative binomial regressions. (3) Bolded values have significance at 95% (i.e., -1.96 ≤ z-value ≥ 1.96).

Table 3 Daily frequency of recreation trips

	Full sample			Immigrants			US-Born		
	Coef.	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**
Immigrant (dummy)	**-0.18**	0.03	-6.50						
>64 years – Older adults (reference)									
<16 years – Children	**0.59**	0.06	9.20	**1.06**	0.25	4.23	**0.56**	0.07	8.41
16-35 years – Early adulthood	0.02	0.02	0.93	**0.23**	0.08	2.96	0.00	0.02	-0.18
36-64 years – Middle-aged	**-0.16**	0.02	-8.99	**-0.14**	0.07	-2.09	**-0.17**	0.02	-8.68
Female (dummy)	**-0.08**	0.01	-5.65	0.03	0.05	0.67	**-0.09**	0.02	-6.07
Non-White Race (dummy)	**-0.22**	0.02	-9.67	**-0.24**	0.05	-4.77	**-0.21**	0.03	-8.31
Years of education	**0.05**	0.00	12.70	**0.05**	0.01	4.60	**0.04**	0.00	11.66
Driver (dummy)	**0.40**	0.03	11.48	**0.33**	0.09	3.65	**0.42**	0.04	11.09
Household size (LN)	**-0.22**	0.02	-9.32	**-0.35**	0.08	-4.53	**-0.21**	0.03	-8.26
Life-cycle: Household with at least one child under 16 years of age (dummy)	**0.37**	0.02	15.58	**0.43**	0.07	5.85	**0.37**	0.03	14.58
Annual household income ($1,000) (LN)	**0.25**	0.01	21.10	**0.24**	0.04	6.69	**0.25**	0.01	19.83
Count of household vehicles (LN(x+1))	**0.08**	0.03	3.11	-0.04	0.09	-0.48	**0.10**	0.03	3.42
Household in urban area (dummy)	**0.05**	0.02	2.62	-0.13	0.09	-1.49	**0.06**	0.02	3.17
Population density at home census tract (10,000 persons/sqmi)	**0.16**	0.01	10.74	**0.17**	0.04	4.81	**0.16**	0.02	9.49
Constant	-4.13	0.06	-67.29	-4.03	0.21	-19.34	-4.15	0.07	-63.75
lnalpha	0.73	0.03		0.73	0.10		0.73	0.03	
alpha	2.08	0.06		2.08	0.21		2.07	0.06	
Model Diagnostics									
Obs.	203,890			Obs.	21,043		Obs.	182,847	
Wald ChiSq (14)	2,467			Wald ChiSq (13)	278		Wald ChiSq (13)	2,166	
Prob. > ChiSq	0.000			Prob. > ChiSq	0.000		Prob. > ChiSq	0.000	
Log-Lik Intercept Only	-80,124			Log-Lik Intercept Only	-7,190		Log-Lik Intercept Only	-72,895	
Log-Lik Full Model	-78,849			Log-Lik Full Model	-7,042		Log-Lik Full Model	-71,784	
Deviance (df=203,867)	157,697			Deviance (df=21,022)	14,084		Deviance (df=182,826)	143,568	
Lik Ratio (14)	2,551			Lik Ratio (13)	295		Lik Ratio (13)	2,221	
Prob. > Lik Ratio	0.000			Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000	
McFadden (adj R^2)	0.016			McFadden (adj R^2)	0.018		McFadden (adj R^2)	0.015	
AIC	0.77			AIC	0.67		AIC	0.79	

Notes: (1) Trip destination purpose link to NHTS 2017 codes for WHYTO: Recreation activities = 15. This is the outcome variable for these models. (2) Robust negative binomial regressions. (3) Bolded values have significance at 95% (i.e., -1.96 ≤ z-value ≥ 1.96).

Table 4 Daily frequency of exercise trips

	Full sample			Immigrants			US-Born		
	Coef.	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**
Immigrant (dummy)	**0.13**	0.02	6.12						
>64 years – Older adults (reference)									
<16 years – Children	**0.79**	0.08	9.77	0.31	0.30	1.04	**0.88**	0.08	10.41
16-35 years – Early adulthood	**-0.05**	0.02	-2.63	**-0.16**	0.06	-2.61	-0.04	0.02	-1.82
36-64 years – Middle-aged	**-0.07**	0.02	-4.23	**-0.23**	0.05	-4.50	**-0.05**	0.02	-2.90
Female (dummy)	**0.04**	0.01	3.32	0.00	0.04	-0.08	**0.05**	0.01	3.27
Non-White Race (dummy)	**-0.15**	0.02	-7.70	**-0.09**	0.04	-2.33	**-0.16**	0.02	-6.83
Years of education	**0.12**	0.00	35.90	**0.08**	0.01	8.86	**0.13**	0.00	34.85
Driver (dummy)	**0.58**	0.04	15.56	**0.39**	0.08	4.95	**0.64**	0.04	15.15
Household size (LN)	**-0.31**	0.02	-14.54	**-0.32**	0.06	-5.52	**-0.31**	0.02	-13.62
Life-cycle: Household with at least one child under 16 years of age (dummy)	**-0.16**	0.02	-6.86	-0.10	0.06	-1.72	**-0.16**	0.02	-6.56
Annual household income ($1,000) (LN)	**0.23**	0.01	20.71	**0.16**	0.03	5.94	**0.24**	0.01	19.80
Count of household vehicles (LN(x+1))	-0.02	0.02	-0.70	0.00	0.07	-0.02	-0.03	0.03	-1.03
Household in urban area (dummy)	**0.28**	0.02	14.90	**0.22**	0.07	2.94	**0.28**	0.02	14.09
Population density at home census tract (10,000 persons/sqmi)	**0.11**	0.01	8.39	0.00	0.03	0.13	**0.13**	0.01	8.83
Constant	-5.29	0.06	-86.67	-3.81	0.17	-22.60	-5.49	0.07	-81.74
lnalpha	0.00	0.04		-0.35	0.13		0.03	0.04	
alpha	1.00	0.04		0.70	0.09		1.03	0.04	
Model Diagnostics									
	Obs.	203,890		Obs.	21,043		Obs.	182,847	
	Wald ChiSq (14)	5,348		Wald ChiSq (13)	426		Wald ChiSq (13)	4,952	
	Prob. > ChiSq	0.000		Prob. > ChiSq	0.000		Prob. > ChiSq	0.000	
	Log-Lik Intercept Only	-86,154		Log-Lik Intercept Only	-9,432		Log-Lik Intercept Only	-76,701	
	Log-Lik Full Model	-83,164		Log-Lik Full Model	-9,205		Log-Lik Full Model	-73,899	
	Deviance (df=203,867)	166,327		Deviance (df=21,022)	18,410		Deviance (df=182,826)	147,798	
	Lik Ratio (14)	5,982		Lik Ratio (13)	455		Lik Ratio (13)	5,604	
	Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000	
	McFadden (adj R^2)	0.034		McFadden (adj R^2)	0.022		McFadden (adj R^2)	0.036	
	AIC	0.82		AIC	0.88		AIC	0.81	

Notes: (1) Trip destination purpose link to NHTS 2017 codes for WHYTO: Exercise = 16. This is the outcome variable for these models. (2) Robust negative binomial regressions. (3) Bolded values have significance at 95% (i.e., -1.96 ≤ z-value ≥ 1.96).

Table 5 Daily frequency of errand trips

	Full sample			Immigrants			US-Born		
	Coef.	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**
Immigrant (dummy)	**-0.10**	0.01	-9.69						
>64 years – Older adults (reference)									
<16 years – Children	**-0.63**	0.04	-14.43	**-0.43**	0.16	-2.62	**-0.63**	0.05	-14.01
16-35 years – Early adulthood	**-0.55**	0.01	-60.15	**-0.48**	0.03	-16.15	**-0.56**	0.01	-57.68
36-64 years – Middle-aged	**-0.19**	0.01	-28.64	**-0.21**	0.02	-8.96	**-0.18**	0.01	-27.11
Female (dummy)	**0.18**	0.01	31.99	**0.18**	0.02	9.98	**0.18**	0.01	30.32
Non-White Race (dummy)	**0.03**	0.01	3.66	**-0.07**	0.02	-3.85	**0.05**	0.01	5.88
Years of education	**0.03**	0.00	20.35	**0.02**	0.00	5.29	**0.03**	0.00	19.76
Driver (dummy)	**0.69**	0.01	47.48	**0.70**	0.04	19.52	**0.69**	0.02	43.31
Household size (LN)	**-0.14**	0.01	-15.35	**-0.13**	0.03	-4.51	**-0.14**	0.01	-14.39
Life-cycle: Household with at least one child under 16 years of age (dummy)	**0.37**	0.01	39.57	**0.46**	0.03	17.00	**0.36**	0.01	35.66
Annual household income ($1,000) (LN)	**-0.08**	0.00	-19.72	**-0.06**	0.01	-4.61	**-0.09**	0.00	-19.01
Count of household vehicles (LN(x+1))	**-0.08**	0.01	-8.04	**-0.18**	0.03	-5.46	**-0.07**	0.01	-6.57
Household in urban area (dummy)	**-0.03**	0.01	-4.04	**-0.07**	0.03	-2.06	**-0.03**	0.01	-3.55
Population density at home census tract (10,000 persons/sqmi)	-0.01	0.01	-1.30	-0.01	0.01	-0.78	-0.01	0.01	-1.09
Constant	-0.27	0.02	-11.70	-0.25	0.07	-3.41	-0.29	0.02	-11.74
lnalpha	-0.41	0.01		-0.37	0.03		-0.42	0.01	
alpha	0.66	0.01		0.69	0.02		0.66	0.01	
Model Diagnostics									
	Obs.	203,890		Obs.	21,043		Obs.	182,847	
	Wald ChiSq (14)	10,756		Wald ChiSq (13)	1,161		Wald ChiSq (13)	9,559	
	Prob. > ChiSq	0.000		Prob. > ChiSq	0.000		Prob. > ChiSq	0.000	
	Log-Lik Intercept Only	-309,471		Log-Lik Intercept Only	-30,463		Log-Lik Intercept Only	-278,938	
	Log-Lik Full Model	-303,026		Log-Lik Full Model	-29,798		Log-Lik Full Model	-273,176	
	Deviance (df=203,867)	606,052		Deviance (df=21,022)	59,596		Deviance (df=182,826)	546,353	
	Lik Ratio (14)	12,890		Lik Ratio (13)	1,331		Lik Ratio (13)	11,523	
	Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000	
	McFadden (adj R^2)	0.021		McFadden (adj R^2)	0.021		McFadden (adj R^2)	0.021	
	AIC	2.97		AIC	2.83		AIC	2.99	

Notes: (1) Trip destination purpose link to NHTS 2017 codes for WHYTO: Errand = 6/7/9/10/11/12/14/18. This is the outcome variable for these models. (2) Robust negative binomial regressions. (3) Bolded values have significance at 95% (i.e., -1.96 ≤ z-value ≥ 1.96).

5.3 Impact of home location factors on discretionary travel

Living in an urban setting or in a higher density location is thought to encourage more trips due to higher accessibility to a greater number of diverse opportunities. Our discretionary trip frequency models showed that, all else equal, compared to immigrants with home locations in non-urban settings, those who lived in urban areas made lower daily trips for social and errand purposes, but had higher rates of exercise trips. Similarly, US-born individuals who lived in urban settings, relative to those in non-urban settings, had higher daily trip rates for recreation and exercise, but made fewer errand trips. Importantly, home location in urban settings does not seem to encourage more social trips for immigrants, suggesting that other cultural constraints might limit socialization among immigrants (Bose 2014; Farber et al. 2018; Yu 2016). In contrast, living in locations with higher population density was clearly connected to higher daily trip rates for social and recreation purposes among both immigrants and US-born populations.

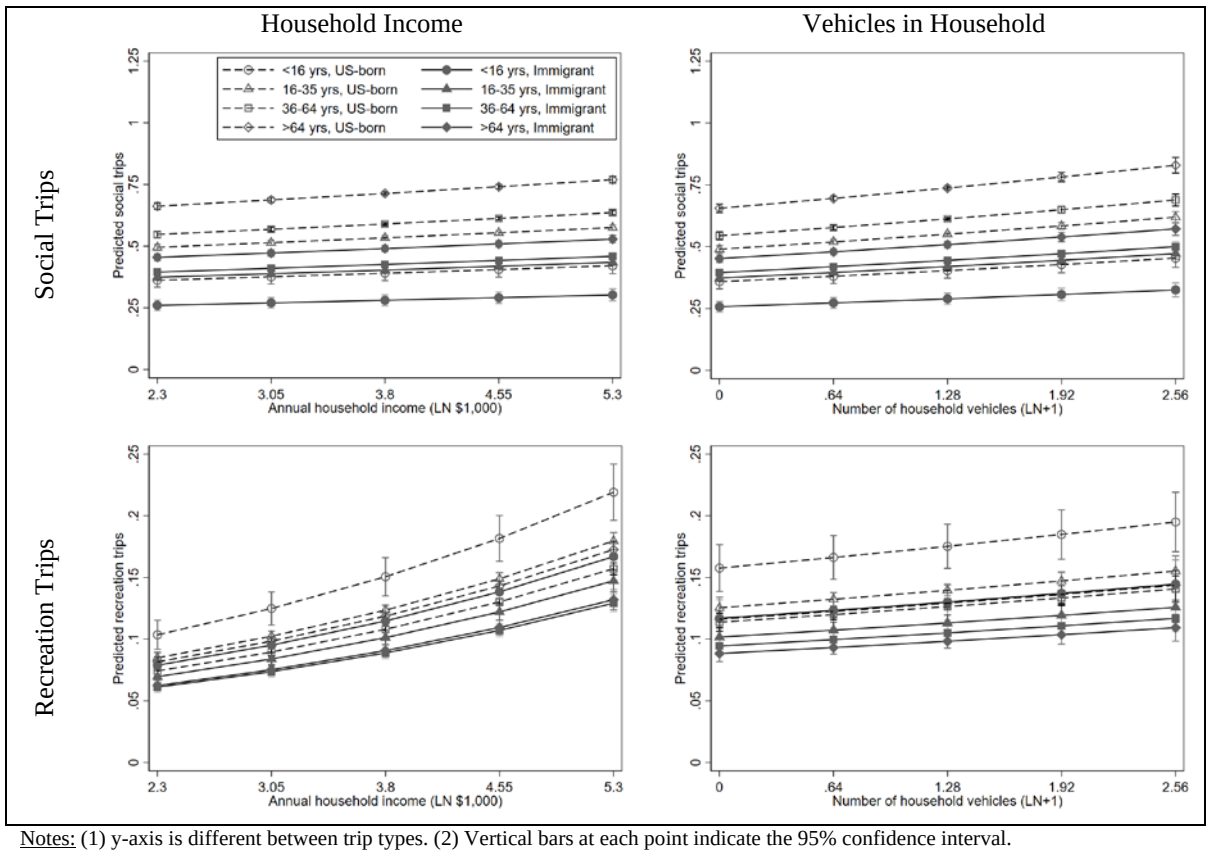
6. Implications for policy

Based on the full-sample models presented in **Section 5**, we estimated average marginal effects across age cohorts (**Figure 2**), ability to drive an automobile (**Figure 3**), and gender (**Figure 4**). We rely on these marginal effect curves to discuss policy implications from this research. We focus on social and recreation trips in this section since such discretionary trips may most encourage integration (Farber et al. 2018; Liang 1994; Priya and Uteng 2009).

One reason for focusing on younger age cohorts is that the immigration policies in most developed countries favor young people. Arguably, younger individuals have an easier time adapting to new environments and integrating into a new milieu, which suggests that young immigrants need to be the focus of policies for social integration. Our models consistently show (**Figure 2**) that for social and recreation trip purposes, immigrants had lower daily trip rates than US-born individuals across different income and home vehicle ownership levels. Immigrant children (< 16 years) made the fewest social trips among all groups, but they did make more recreation trips than other older immigrants ($\geq$16 years).

Many immigrants come to the US for higher education or seeking work opportunities during their youth. Our models show that immigrants in early adulthood (i.e., 16-35 years which maps the millennial generation) lagged behind US-born individuals in social and recreation trip making. These cohorts under 36 years could benefit from community- or school/university-based programs that encourage activities for socializing and recreation. Overall, income had a stronger effect on trip making than access to vehicles. More research is needed to investigate if financial policies that benefit immigrants during early years in the US could spur more social and recreation trips, consequently encouraging integration.

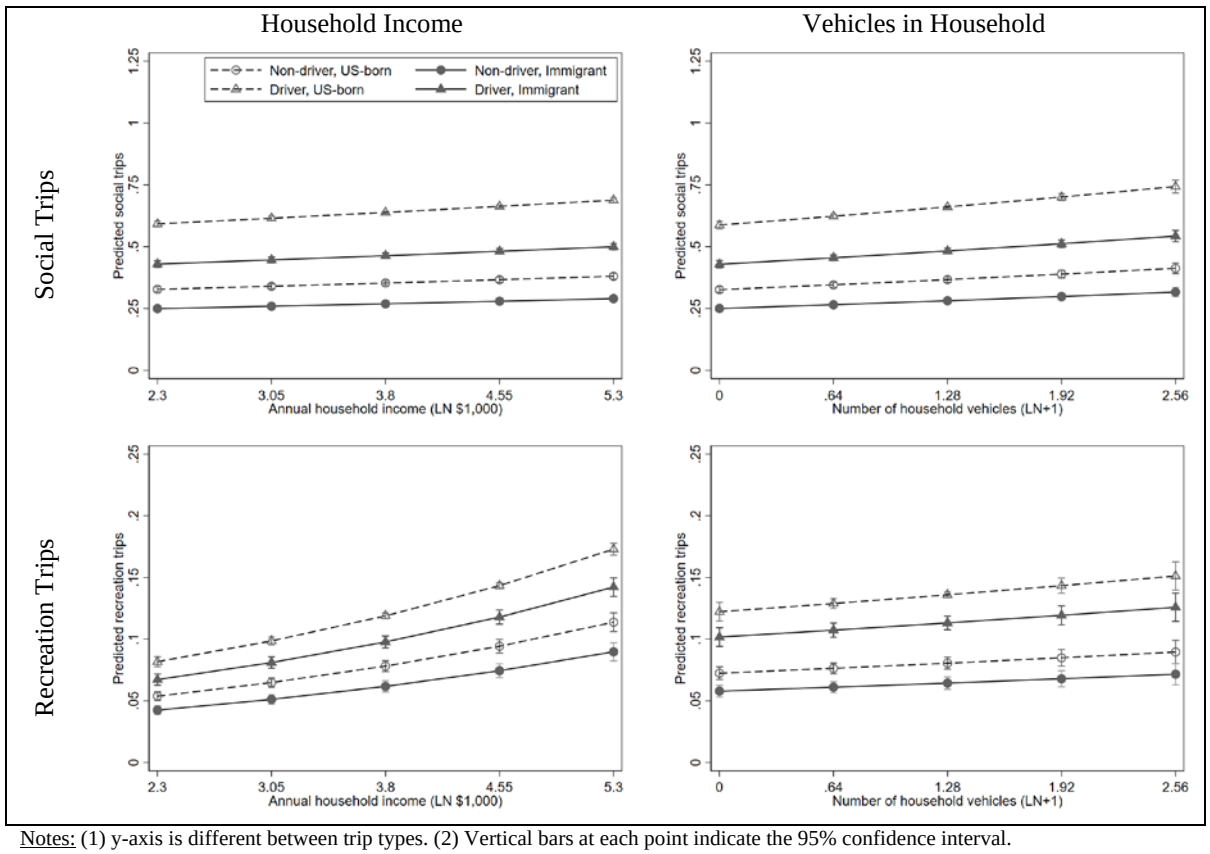
Figure 2 Average marginal effects across age cohorts



Notes: (1) y-axis is different between trip types. (2) Vertical bars at each point indicate the 95% confidence interval.

The ability to drive an automobile has been shown to result in better outcomes across many sub-groups in the North American population (e.g., Matsuo 2019; Priya and Uteng 2009; Shirgaokar et al. 2020). Average marginal effects for everyday discretionary trip purposes across income and home vehicle ownership levels for drivers versus non-drivers are shown in **Figure 3**. Non-drivers had lower predicted daily trip rates than drivers. Immigrants without the ability to drive had the lowest daily trip-making frequencies. The capacity to drive can be improved through social programs that encourage immigrants to get their driving permit, especially in early years after arrival to the US. Notably, many immigrants might drive in their home countries but may not be able to continue in the US due to different laws.

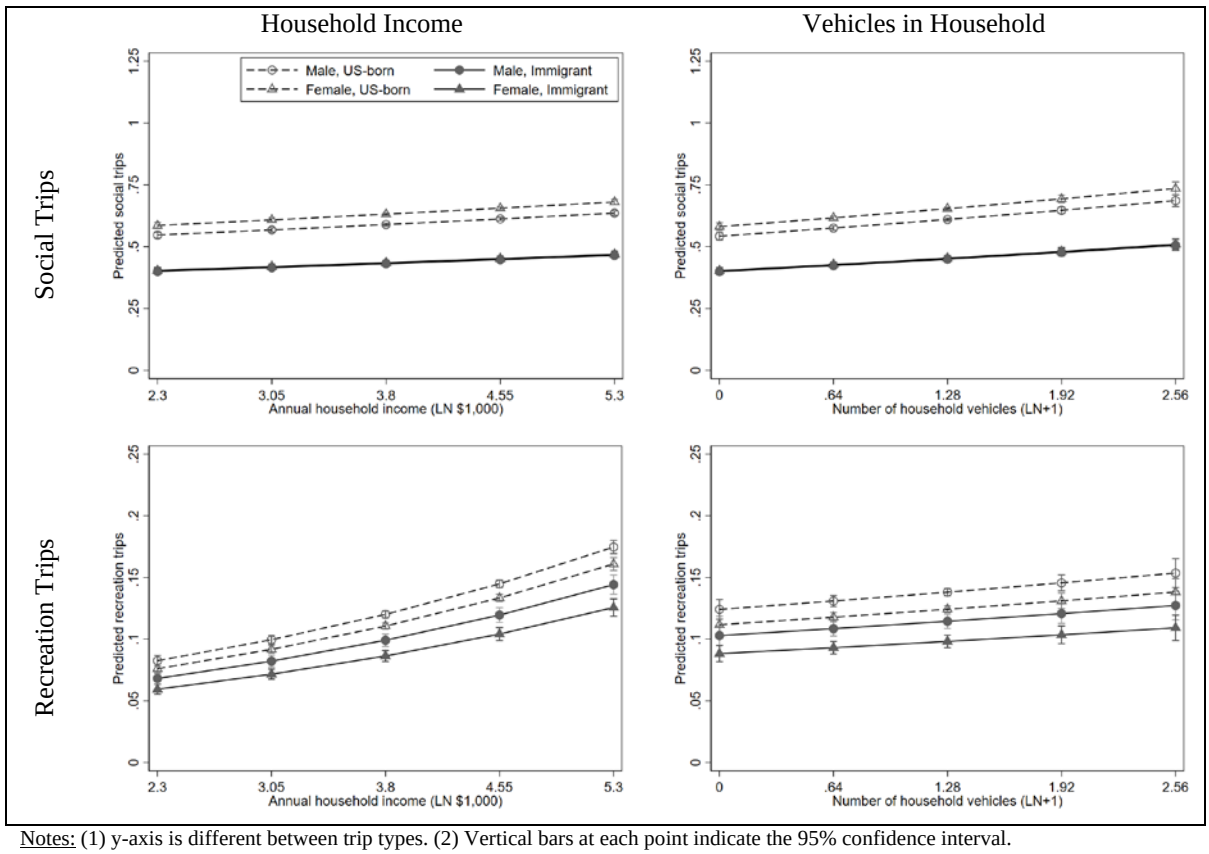
Figure 3 Average marginal effects across the ability to drive an automobile



Notes: (1) y-axis is different between trip types. (2) Vertical bars at each point indicate the 95% confidence interval.

Gender has been discussed in the literature as a factor that impacts travel behavior (e.g., Matsuo 2016; Parks 2004). Average marginal effects from our models confirmed this (**Figure 4**), where immigrant women had lower comparable trip rates for social and recreation purposes. The socialization impact from social and recreation trips may benefit immigrant women and should be encouraged further, especially in young adulthood and middle-age years. Non-profit organizations and advocacy groups for immigrants could factor in these gender and age effects in the design of outreach programs.

Figure 4 Average marginal effects across gender



Notes: (1) y-axis is different between trip types. (2) Vertical bars at each point indicate the 95% confidence interval.

Positive impacts on discretionary trip rates were also seen from more education or living in a denser place (**Table 2**, **Table 3**, **Table 4**, **Table 5**). These impacts could be extended through policies encouraging education in immigrant groups and creating programs to incentivize immigrants to locate in places with higher population density, especially in their early years in the US.

6.1 Strengths, limitations, and ways forward

A key strength of our research was that we relied on a nationally representative dataset (US Department of Transportation 2018) to understand the differences in daily trip frequencies by purpose across immigrants and US-born populations. We also specified relatively simple models for this research and discussed what the findings suggest for integration policies for immigrants. However, there were some key factors like cultural bias, especially for new immigrants, which needed to be factored into such analyses. To the best of our knowledge, this is an unexplored area and a limitation of research in this domain. Concepts to measure "culture" could emerge from qualitatively focused research in immigrant communities (e.g., Barajas 2018; Bose 2014; Chatman and Klein 2013; Yu 2016). The development of Likert-scale tools to collect data for such fundamental research can lead to the conceptualization of latent factors, and such factors are one way forward to include cultural effects into estimation. A second improvement may come from using activity- and time-based data to investigate how household-level decisions impact everyday trip generation differently between these groups.

7. Conclusions

In this paper, we developed a deeper understanding of how daily trip frequencies across purposes varied between immigrants and US-born persons. We relied on the 2017 National Household Travel Survey and estimated negative binomial models for daily frequencies of discretionary trips. We aggregated trips reported in the Survey into social, recreation, exercise, errand, education, or work trips (**Figure 1**). After controlling for a number of socio-demographic and location attributes, we found that daily trip frequencies across purposes were indeed systematically different between the immigrant versus US-born population. Specifically, we discovered that immigrants made fewer social, recreation, or errand trips, but more exercise trips, than their US-born counterparts. Though weighted frequency distributions (**Figure 1**) showed that immigrants made fewer education and more work trips than US-born individuals, our analysis (**Appendix**) showed that this was not the case once we factored in socio-demographic and location attributes. Immigrants made more education trips per day than US-born individuals, all else equal, but there was no statistical difference in daily work trip rates between the two groups.

Our analysis showed that immigrants in the US were on less social, recreation, or errand trips per day compared to the US-born population, but they went on more exercise trips. Immigrants in the US engage in self-improvement at comparable levels to their US-born counterparts through work travel and even make more education trips. Yet, keeping up with non-discretionary activities seems to have an impact on time allocation for discretionary activities. Notably, less socialization and recreational activities are indicated in the immigrant population. Such activities may help immigrants integrate faster into mainstream society through engaging with other individuals in faith- and community-based settings, or through volunteer opportunities. In the US-born population, the unexpected finding of fewer daily exercise and education trips compared to the immigrant group needs to be explored in greater detail.

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Appendices: Models for non-discretionary trips

Table A1 Daily frequency of education trips

	Full sample			Immigrants			US-Born		
	Coef.	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**
Immigrant (dummy)	**0.17**	0.04	4.35						
>64 years – Older adults (reference)									
<16 years – Children	**4.35**	0.10	44.22	**3.77**	0.26	14.74	**4.43**	0.11	41.32
16-35 years – Early adulthood	**3.87**	0.09	41.81	**3.24**	0.23	14.26	**3.96**	0.10	39.10
36-64 years – Middle-aged	**1.13**	0.10	11.38	**1.02**	0.24	4.33	**1.14**	0.11	10.36
Female (dummy)	**0.09**	0.02	4.37	-0.02	0.07	-0.21	**0.11**	0.02	4.84
Non-White Race (dummy)	**0.10**	0.03	3.76	0.06	0.08	0.73	**0.09**	0.03	3.48
Driver (dummy)	**-0.16**	0.03	-5.68	**-0.31**	0.10	-3.02	**-0.14**	0.03	-4.67
Household size (LN)	**0.15**	0.04	4.05	**0.25**	0.12	2.17	**0.12**	0.04	3.20
Life-cycle: Household with at least one child under 16 years of age (dummy)	**-0.22**	0.03	-6.94	**-0.29**	0.11	-2.76	**-0.20**	0.03	-6.20
Annual household income ($1,000) (LN)	**0.09**	0.02	5.30	-0.02	0.05	-0.39	**0.09**	0.02	5.17
Count of household vehicles (LN(x+1))	**0.35**	0.04	9.52	-0.06	0.15	-0.38	**0.41**	0.04	10.88
Household in urban area (dummy)	**0.17**	0.03	5.77	0.07	0.14	0.50	**0.18**	0.03	5.76
Population density at home census tract (10,000 persons/sqmi)	**0.09**	0.02	3.72	-0.06	0.06	-1.03	**0.11**	0.03	4.17
Constant	-5.85	0.11	-53.06	-4.17	0.34	-12.27	-6.00	0.12	-50.41
Years of education	**0.49**	0.01	56.70	**0.29**	0.03	10.69	**0.53**	0.01	56.10
Constant	-6.44	0.12	-54.28	-3.99	0.47	-8.48	-6.88	0.13	-54.01
Model Diagnostics									
	Obs.	203,890		Obs.	21,043		Obs.	182,847	
	Non-zero obs.	7,738		Non-zero obs.	786		Non-zero obs.	6,952	
	Zero obs.	196,152		Zero obs.	20,257		Zero obs.	175,895	
	Wald ChiSq (13)	7,272		Wald ChiSq (12)	887		Wald ChiSq (12)	6,104	
	Prob. > ChiSq	0.000		Prob. > ChiSq	0.000		Prob. > ChiSq	0.000	
	Log-Lik Intercept Only	-36,151		Log-Lik Intercept Only	-3,729		Log-Lik Intercept Only	-32,420	
	Log-Lik Full Model	-25,402		Log-Lik Full Model	-3,034		Log-Lik Full Model	-22,272	
	Deviance (df=203,867)	50,804		Deviance (df=21,022)	6,069		Deviance (df=182,826)	44,544	
	Lik Ratio (21)	21,499		Lik Ratio (19)	1,390		Lik Ratio (19)	20,296	
	Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000	
	McFadden (adj R^2)	0.297		McFadden (adj R^2)	0.181		McFadden (adj R^2)	0.312	
	AIC	0.25		AIC	0.29		AIC	0.24	

Notes: (1) Trip destination purpose link to NHTS 2017 codes for WHYTO: Education = 8. This is the outcome variable for these models. (2) Robust zero-inflated poisson regressions. (3) Bolded values have significance at 95% (i.e., -1.96 ≤ z-value ≥ 1.96).

Table A2 Daily frequency of work trips

	Full sample			Immigrants			US-Born		
	Coef.	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**	**Coef.**	**Std. Err.**	**z-value**
Immigrant (dummy)	0.00	0.01	-0.15						
>64 years – Older adults (reference)									
<16 years – Children	**-0.62**	0.15	-4.24	**-2.59**	1.00	-2.59	**-0.42**	0.15	-2.83
16-35 years – Early adulthood	**1.30**	0.02	80.09	**1.26**	0.05	24.72	**1.31**	0.02	76.55
36-64 years – Middle-aged	**1.27**	0.02	82.61	**1.28**	0.05	25.69	**1.27**	0.02	78.75
Female (dummy)	**-0.29**	0.01	-40.89	**-0.41**	0.02	-20.12	**-0.28**	0.01	-36.77
Non-White Race (dummy)	**-0.04**	0.01	-4.15	**-0.05**	0.02	-2.67	**-0.03**	0.01	-2.74
Driver (dummy)	**0.93**	0.02	40.17	**0.72**	0.05	15.41	**0.98**	0.03	37.03
Household size (LN)	**-0.34**	0.01	-28.74	**-0.31**	0.03	-9.21	**-0.35**	0.01	-27.55
Life-cycle: Household with at least one child under 16 years of age (dummy)	**0.19**	0.01	17.60	**0.11**	0.03	3.39	**0.21**	0.01	17.73
Annual household income ($1,000) (LN)	**0.15**	0.01	24.64	**0.10**	0.01	7.88	**0.16**	0.01	23.76
Count of household vehicles (LN(x+1))	**0.25**	0.01	18.08	**0.20**	0.03	5.75	**0.25**	0.01	16.77
Household in urban area (dummy)	**0.04**	0.01	3.59	**0.08**	0.04	2.11	**0.03**	0.01	3.07
Population density at home census tract (10,000 persons/sqmi)	**0.06**	0.01	7.50	**0.04**	0.02	2.57	**0.05**	0.01	6.29
Constant	-3.04	0.04	-86.00	-2.57	0.09	-30.04	-3.14	0.04	-80.71
Years of education	**-0.92**	0.06	-14.35	**-1.20**	0.52	-2.31	**-1.04**	0.07	-14.58
Constant	9.04	0.67	13.57	9.52	5.19	1.84	10.50	0.74	14.14
Model Diagnostics									
Obs.	203,890			Obs.	21,043		Obs.	182,847	
Non-zero obs.	78,595			Non-zero obs.	8,915		Non-zero obs.	69,680	
Zero obs.	125,295			Zero obs.	12,128		Zero obs.	113,167	
Wald ChiSq (13)	16,131			Wald ChiSq (12)	2,083		Wald ChiSq (12)	14,290	
Prob. > ChiSq	0.000			Prob. > ChiSq	0.000		Prob. > ChiSq	0.000	
Log-Lik Intercept Only	-211,227			Log-Lik Intercept Only	-21,534		Log-Lik Intercept Only	-189,509	
Log-Lik Full Model	-192,716			Log-Lik Full Model	-19,705		Log-Lik Full Model	-172,807	
Deviance (df=203,867)	385,433			Deviance (df=21,022)	39,410		Deviance (df=182,826)	345,613	
Lik Ratio (21)	37,021			Lik Ratio (19)	3,658		Lik Ratio (19)	33,404	
Prob. > Lik Ratio	0.000			Prob. > Lik Ratio	0.000		Prob. > Lik Ratio	0.000	
McFadden (adj R^2)	0.088			McFadden (adj R^2)	0.084		McFadden (adj R^2)	0.088	
AIC	1.89			AIC	1.88		AIC	1.89	

Notes: (1) Trip destination purpose link to NHTS 2017 codes for WHYTO: Work = 2/3/4. This is the outcome variable for these models. (2) Robust zero-inflated poisson regressions. (3) Bolded values have significance at 95% (i.e., -1.96 ≤ z-value ≥ 1.96).