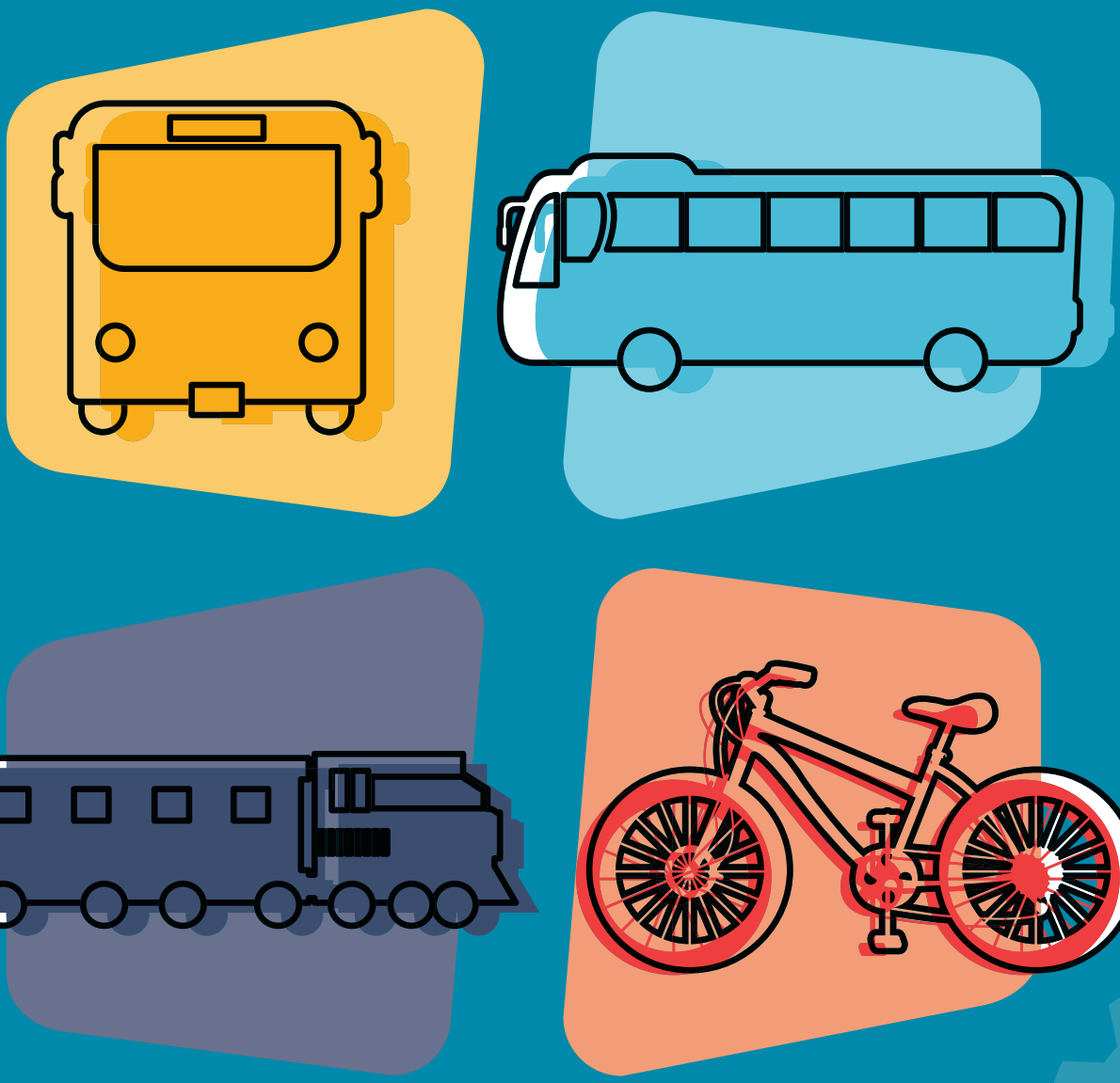

Research Report

Fresh Start Effect in New Movers

A Pilot to Reduce SOV Trips

February 2023

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Duke | CENTER FOR ADVANCED HINDSIGHT

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Executive Summary

In 2020, the Center for Advanced Hindsight (CAH) at Duke University was awarded a grant from the Triangle J Council of Governments (TJCOG) to research an innovative way to reduce single-occupancy vehicle (SOV) trips among individuals that had recently moved (or new movers) to three areas within North Carolina. We aimed to understand the behavioral principle of the "fresh start effect", which posits that humans are more likely to change behavior at moments that stand out in time, and if this could be applied to transportation habits.

Transportation behavior is difficult to change because it is a continuous behavior that we enact every day, and as a result have strong and engrained habits. Habit discontinuity moments (breaks in our day-to-day habits) can raise a good opportunity to change transportation behavior. One ideal opportunity to capitalize on this effect is when people move house.

The city of Raleigh, the town of Carrboro, and Orange County partnered with CAH. These communities have existing programs aimed at reducing SOV trips but have not evaluated the specific impact of targeting a population with a high potential to change travel habits: new movers.

During an initial exploration phase, we conducted ten interviews with experts in transportation and outreach communities to gain insights into transportation barriers and resources. Their suggestions focused on addressing infrastructural barriers, availability of resources, and accessibility. Based on these interviews, we created a Welcome Box containing transportation-related materials to reduce SOV trips. The final Welcome Box included several transportation-related materials designed to address common public transportation barriers, and personalized content for each geographic region within the study.

To test the "fresh start effect", we conducted a field experiment by mailing a Welcome Box to 650 new movers – our treatment group – in three cities and counties (the City of Raleigh, the Town of Carrboro, and Orange County). Another 660 new movers – those in the control group – received a welcome postcard. In total, 1,310 people took part in this pilot study.

All new movers were invited to complete one survey immediately after receiving the Welcome Box or the postcard, and a series of five bi-weekly follow-up surveys thereafter. Data collection took place between July 13, 2022, and December 26, 2022.

We compared transportation habits between treatment and control households for three months after sending them the Box or postcard. Over the three-month data collection period, our analysis revealed

an overall increase in SOV mileage over time; however, there was a greater increase in the control group than in the Welcome Box group. More specifically, we observed an increase in drive-alone mileage of 6 miles in the Welcome Box group compared to 25 miles in the control group. We find that the Welcome Box is particularly effective for those who moved from a different county within North Carolina. Furthermore, the nudge towards sustainable modes of transportation seemed to work better in areas that are more walkable and transit-friendly. Overall, the results do point to Welcome Boxes as a promising strategy to reduce SOV trips among new movers.

Background

The concept of the fresh start effect is drawn from research on the psychological process of creating "temporal landmarks", or specific moments or events humans use to mark a change in chronology.[1] Temporal landmarks provide context to memories and can have personal or shared cultural significance. A temporal landmark may be either a calendar-based event (such as holidays or the start of a new year), a major cultural event (such as a natural disaster), or a life milestone (such as a significant birthday or moving to a new house). The fresh start effect, demonstrated by such research, states that people tend to adopt beneficial behavioral changes or habits at temporal landmarks, marking a fresh start after the landmark.[2]

The Fresh Start Effect

As people approach temporal landmarks, they are open to making beneficial changes to their habits. Anticipating future landmarks can lead to more motivation.[3] Similarly, a "fresh start mindset'' is defined as the belief in a fresh start which can be cultivated through message framing, or how information is presented.[4] It is notable that fresh starts are only effective if people can use them to envision turning points from their current self to a positive future self.[5]

In 2014, a series of three studies examined the changes in undergraduate gym attendance, usage of a commitment contract app, and Google searches for "diet", and found that each outcome significantly correlated with temporal landmarks like the start of a new week, month, year, semester, or participants' birthdays.[6]

Applications to Transportation

To date, a limited number of studies have examined the fresh start effect as applied to transportation behavior. In 2007, participants at a small English university were surveyed. The survey revealed that those who had recently moved and were environmentally concerned used the car less frequently to commute to work. This effect was found not only when compared to those who were low on

[1] Shum, M.S. (1998) The role of temporal landmarks in autobiographical memory processes. Psychological Bulletin, 124(3), 423.
[2] Alter, A. L., Hershfield, H. E. (2013) People search for meaning when they approach a new decade in chronological age. Proceedings of the National Academy of Sciences, 111(48), 17066-17070
[3] Ibid
[4] Price, L. L., Coulter, R. A., Strizhakova, Y., & Schultz, A. E. (2018). The fresh start mindset: transforming consumers' lives. Journal of Consumer Research 45(1), 21-48.
[5] Peetz, J., Wilson, A. (2013) The post-birthday world: Consequences of temporal landmarks for temporal self-appraisal and motivation. Journal of Personality and Social Psychology 104(2)
[6] Dai, H. Li, C. (2019) How experiencing and anticipating temporal landmarks influence motivation. Current Opinion in Psychology

environmental concern, but also to those who were environmentally concerned but had not recently moved.[7]

In a 2012 study, car drivers in Copenhagen were randomly assigned to either receive a free travel card for public transportation (valid for a month) or serve as a control group. The free card led to a doubling of the use of public transportation in the treatment group and a significant effect remained four months after the intervention. However, the behavioral effects of the promotion appeared only among individuals who had recently relocated residence or workplace before the intervention.[8]

In 2006, researchers sent welcome packets that were filled with information, maps, and free transit passes to residents shortly after moving to Stuttgart, Germany. Later, they observed a 17.6% higher public transportation usage among those who received the package over a control group, and an increase in the perceived attractiveness of public transit use.[9]

In a study in Portland, Oregon, two groups - those who recently moved near a bikeshare dock and those living near a newly constructed bikeshare dock - randomly received one of two postcards, framing rides as free or discounted. Those who recently moved were four times as likely to use any offer.[10] As part of the SmartTrips Welcome program in Portland, Oregon, new movers received newsletters about transportation options and an invitation to receive phone calls, personalized emails, and market-segmented messaging as well as monthly newsletters and continued engagement pledge forms. Researchers observed a 10.4% reduction in drive-alone trips among all new resident populations (not just those who ordered information and materials) and a relative increase of 13.6% in environmentally-friendly mode use among new residents. One year after the intervention, there was a 10% and 5% increase in environmentally-friendly commute and non-commute trip modes, respectively, and a decrease in drive-alone trips by 9% and 13%.[11]

Prototyping

Based on initial findings from a review of the existing literature and conversations with experts in the transportation and outreach communities, we designed a Welcome Box and its content. Below is a table (Table 1) of the final Welcome Box content. All materials were available in English and Spanish.

[7] Verplanken, B., Walker, I., Davis, A., & Jurasek, M. (2008). Context change and travel mode choice: Combining the habit discontinuity and self-activation hypotheses. Journal of Environmental Psychology
[8] Thøgersen, J. (2012), The Importance of Timing for Breaking Commuters' Car Driving Habits.
[9] Bamberg, S., (2006), Is a Residential Relocation a Good Opportunity to Change People's Travel Behavior? Results From a Theory-Driven Intervention Study
[10] Kirkman, Elspeth. (2019). "Free Riding or Discounted Riding? How the Framing of a Bike Share Offer Impacts Offer-Redemption." Journal of Behavioral Public Administration 2, no. 2, https://doi.org/10.30636/jbpa.22.83.
[11] https://toolsofchange.com/en/case-studies/detail/658

Table 1. Welcome Box Content

Materials		Town of Carrboro	Orange County	City of Raleigh
Welcome Packet	Welcome Letter from…	…Mayor of Carrboro	… County Manager of Orange County	… Raleigh's Commute Smart Consultant
	Information about the local library	Orange County Public Library		Wake County Libraries
	Coupons from local transportation-related businesses (e.g., bike shops)	$10 off a purchase of $50 or more + a sticker from a local bike store	$5 off $15 water bottle + information on bicycle repair workshops from a local bike store	$10 first pair of shoes from a running apparel store + free 2-hour ride with code
	Mock Transit Pass[12]	Visual of Blue Chapel Hill Buses		Visual of Red GoRaleigh Buses
	Information on social commuting	Information on carpool, vanpool and community bike rides. Weblinks and details differed slightly per geographic region.		
	Personalized route to get to the closest local library using sustainable modes of transportation (a reward was waiting for participants at the library)	Personalized route for each household showing carpooling, walking, public transit, or biking paths to the local library with time estimates for the quickest and most feasible sustainable option. A collapsible coffee mug was available at local libraries for participants.		
User flip cards on carpooling, biking, walking, bus riding and remote working tips for reach geographic region		Content differed slightly per geographic region.		
Bike Shops Magnets		Details on local bike shops. This differed based on geographic region.		
Set of bike lights		Set of bike lights.		

Pictures of the Welcome Box and its contents can be found in Appendix B.

[12] Mock passes were provided since transit within the area would be fare-free through June 2023.

Key Project Timeline

- **2020:** Grant was awarded
- **2021-2022:** Formed partnerships with local businesses, libraries, transportation experts, and community advocates
- **September - December 2021**: Conducted ten interviews with experts in the transportation and outreach community
- **January - May 2022**: Successfully created an interactive, robust new mover's transportation box that included over 14 handheld items to incentivize more sustainable travel within the Triangle Region
- **July 2022:** Successful project launch and distribution of Welcome Boxes and postcards
- **November 2022:** Presentation of this project to academic scholars at the Society for Judgment and Decision-Making Annual Conference in San Diego
- **December 2022:** Completed data collection
- **February 2023:** Delivered final report

Challenges Faced and How These Were Addressed

Survey participation: Participation in the first survey (delivered via the Welcome Box or the postcard) was very low. A first round of reminders (additional postcards for those in the control group and letters for those in the treatment group) was sent out at the end of July 2022. A second round of reminders (letters) was sent out at the end of August 2022. Finally, we increased the Amazon gift certificate drawing for the last survey from $39 to $100. We learned the importance of incentivizing voluntary survey participation and supplementing self-report data with objectively measured data. In addition, due to the low response rate and the need for reminders, the first survey is no longer considered a baseline measure, but instead, the first post-intervention survey.

How Was Equity Integrated into Project Planning and Implementation?

During the project planning phase – between September and December 2021 – we conducted ten interviews with experts in the transportation and outreach community to better understand the context of transportation access and behavior in the City of Raleigh, the Town of Carrboro, and Orange County. The interviewed experts were academics, faith leaders, small business owners, employees at transportation authorities, members that serve on bike commissions for their local governments or work with historically marginalized populations such as immigrants, disabled individuals, and those who live with fewer financial resources.

Their suggestions focused on infrastructural barriers, availability of resources, and accessibility across varying populations. Based on these interviews, we developed the Welcome Box filled with transportation-related materials. The final Welcome Box items included interactive materials on common public transportation barriers as well as personalized content for each geographic region within the study.

To succeed during the implementation phase, all materials included in the Welcome Box and all surveys and communication were provided in English and Spanish.

Experimental Design

Design

Our primary question was whether receiving a Welcome Box filled with transportation-related materials reduces SOV trips among new movers. We hypothesized that new movers would report a lower percentage of miles driven alone and a lower absolute number of miles driven alone when assigned to the Welcome Box condition compared to the control condition.

We relied on an external company – Data Axle – to provide us with data about recent new movers (within the previous three months) to the City of Raleigh, the Town of Carrboro, and Orange County. In total, we identified 1,310 new movers. We randomly selected 650 new movers to receive a Welcome Box, and 660 new movers to receive a welcome postcard. Boxes and postcards were sent to new movers on July 11/12, 2022.

Condition	Town of Carrboro	Orange County	City of Raleigh
Welcome Box (Treatment)	66	185	399
Welcome Postcard (Control)	64	196	400
Total	130	381	799

Measurement

We relied on self-reported (survey) data to measure transportation behavior. New movers received their first survey invitation via the welcome postcard (those in the control group) or the Welcome Box (those in the treatment group). Both the postcard and Welcome Box contained a QR code for participants to scan that brought them to a Qualtrics survey. This first, post-intervention survey measured the following:

- Transportation behavior at their previous address
- Current transportation behavior (transportation mode, distance, purpose)
- Perceptions of walking, biking, carpooling, and bus safety
- Number of miles driven in the previous seven days & the percentage of those miles driven alone with no passengers
- Demographics (e.g., where participants moved from, age, gender, etc.)

By collecting participants' email addresses in the first, post-intervention survey, we were able to send them a series of five bi-weekly follow-up surveys thereafter. The follow-up surveys only included questions on current transportation behavior (transportation mode, distance, purpose), safety, the number of miles driven in the previous seven days, and the percentage of those miles that were driven alone with no passengers. The final survey also asked participants about barriers to walking, biking, carpooling, and using the bus, while also eliciting feedback on the Welcome Box.

Participants received a $10 Amazon gift certificate for completing the post-intervention survey and were entered into a drawing for a $39 Amazon gift certificate for completing each of the follow-up surveys 2-5. For the final survey, we held a drawing for a $100 Amazon gift certificate. Data collection took place between July 13, 2022, and December 26, 2022.[13]

[13] The timeline was due to low survey response rates initially for the first, post-intervention survey. See "Challenges Faced and How These Were Addressed" for more details.

Results

Sample

Out of the 1,310 new movers targeted in our pilot study, 258 (19.7%) new movers responded to the first, post-intervention survey. This group of new movers was 53.9% female, with an average age of 37.6 years (min = 20, max = 92). The group was 67% White, 9% Black, 6% Asian, 4% Hispanic / Latino, and 4% Multiracial, with the remaining group not reporting their ethnicity. The largest subset of respondents possesses a bachelor's or graduate / professional degree (64%) and report an annual household income of $100,000 or more (36.8%), followed by earnings between $50,000 - $69,999 (19.7%) per year. The average household size is 2.3 people.

While 258 (19.7%) new movers responded to the first, post-intervention survey, only 104 (8%) responded to at least two surveys; that is to survey 1 and one additional survey. The survey response rate across time is as follows:

Condition	Survey 1	Survey 2	Survey 3	Survey 4	Survey 5	Survey 6
Town of Carrboro	35	16	11	11	12	12
Orange County	86	25	22	16	12	24
City of Raleigh	137	30	21	24	22	31
	258	**71**	**54**	**51**	**46**	**67**

Outcome Measures

The primary and secondary outcomes that we report on are as follows:

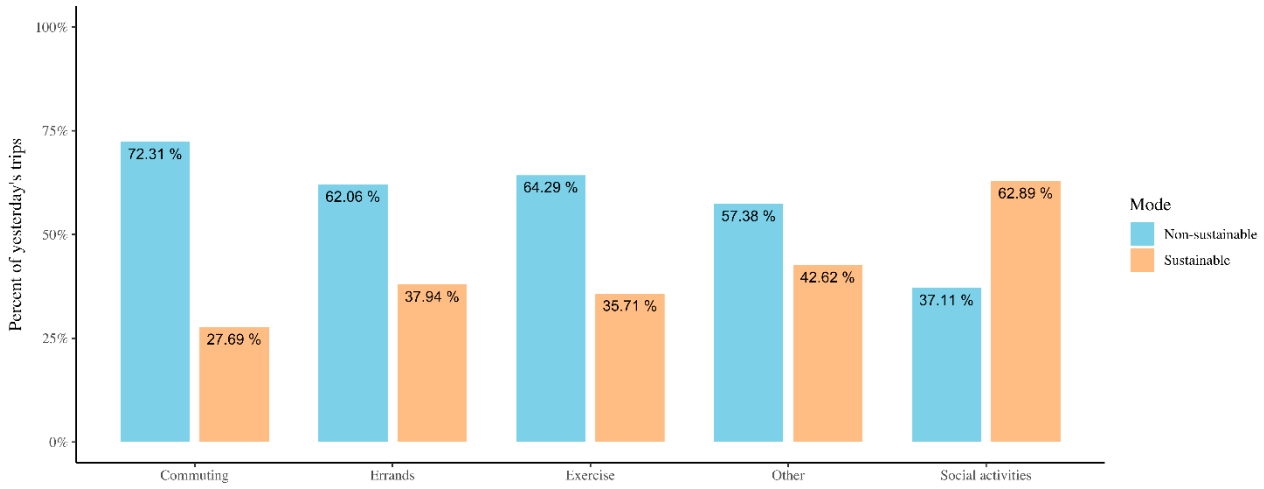
1. **Primary outcome measure:** Drive-Alone Mileage / Miles Driven Alone – Number of miles driven without any passengers. A decrease in drive-alone mileage compared to the control group was interpreted as a reduction in non-sustainable mode use.
2. Vehicle Miles Traveled (VMT) – Number of miles driven in total, regardless of the number of passengers.
3. Drive-Alone Rate – The percentage of VMT without any passengers.
4. Sustainable Trips – Trips not taken by driving alone (e.g., carpooling, walking, taking transit, etc.).

See Appendix A for a more technical description of our analytical strategy.

Descriptive Statistics

Post-Intervention Survey (Survey 1): Looking at current transportation behavior (see Figure 1), we find that for commuting, running errands, or exercising, most trips (62.1% - 72.3%) were done non-sustainably (driving alone). For social activities, however, most trips (62.9%) were done via a sustainable mode of transportation – carpooling (43% of trips), followed by walking (12% of trips).

Figure 1. *Yesterday's Transportation Behavior*



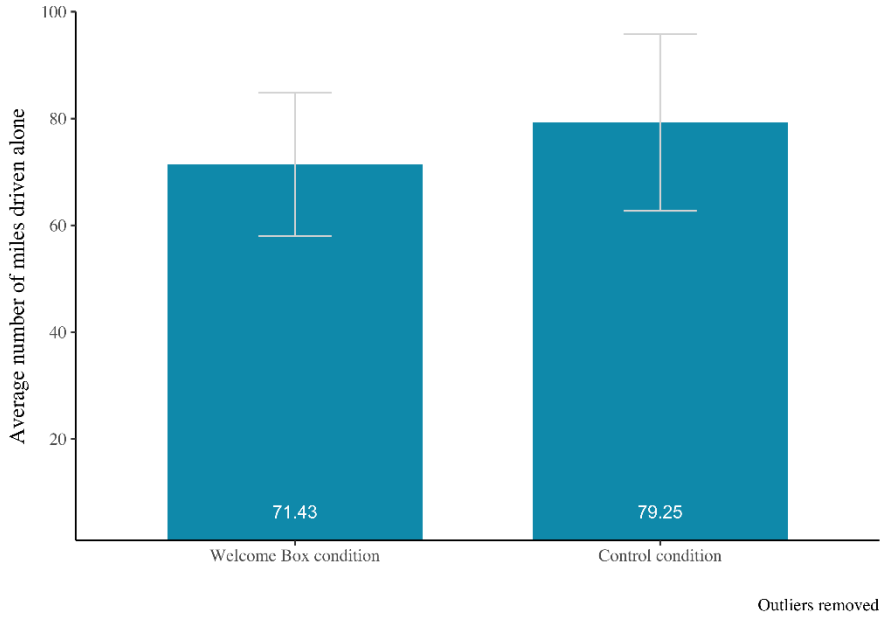
When asked which mode of transportation they never plan on using, 60% of respondents said an e-scooter, 40% said taking the bus, and 23% said biking.

Differences in Driving Behavior

Post-Intervention Survey (Survey 1): For the first survey after receiving the intervention, respondents in the Welcome Box condition reported an average of 71.4 miles driven alone in the previous seven days, while respondents in the control condition reported an average of 79.2 miles driven alone (see Figure 2). This difference of 7.8 miles translates to only about 1 mile per day and was not statistically significant (p = 0.47[14]). There was also no difference when looking at the drive-alone rate in the previous seven days: 60.7% in the Welcome Box condition vs. 64% in the control condition (p = 0.47).

[14] All p-values less than 0.05 are considered statistically significant.

Figure 2. *Number of Miles Driven Alone at Survey 1*



Over Time[15]: When comparing driving behavior for the post-intervention survey (S1) to the follow-up period (S2-6), we find an overall increase in drive-alone mileage in both groups. Even though respondents in the control group increased their drive-alone mileage by 25.2 miles (p = 0.08), whereas those in the Welcome Box condition only increased their drive-alone mileage by 6 miles (p = 0.66), none of these differences were statistically significant. The result is merely suggestive in that receiving a Welcome Box prevents an increase in drive-alone mileage over time.

Where Did New Residents Move From?

When asked where new residents had moved from, we observe that most participants had moved within North Carolina (74.6%).

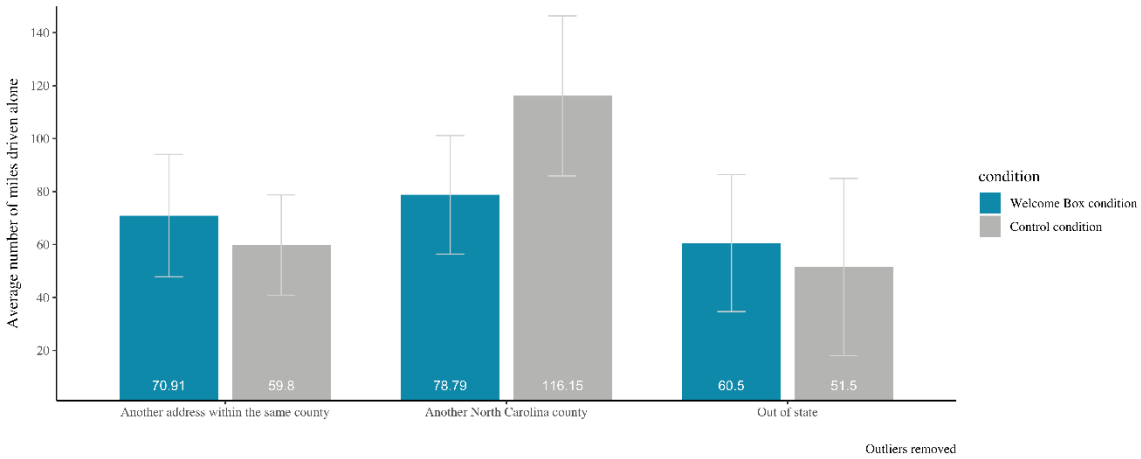
Moved from another address within the same county	Moved from another NC county	Moved from outside of state
35.6%	39.0%	25.4%

[15] There was also no difference over time between respondents in the control group and the treatment group when looking at the drive-alone rate.

Post-Intervention Survey (S1): We further analyzed how drive-alone mileage varied based on where each participant had moved from to better understand how this impacted VMT in survey 1.

We find that those who received a Welcome Box and moved from another county within North Carolina drove alone on average 37.4 miles less per week than those that received the postcard (p = 0.02; see Figure 3). We also find that the total vehicle miles traveled are significantly higher for those who received the postcard than those who received the Welcome Box (difference = 43 miles; p = 0.03). Meanwhile, the percentage of miles driven alone in the previous seven days doesn't differ in those who moved from another NC county (p = 0.41).

Figure 3. *Number of Miles Driven Alone at Survey 1 by Move-Origin*



Furthermore, even though their drive-alone mileage in the previous seven days didn't differ statistically significantly, we do find that those who moved from another address within the same county and received the Welcome Box show a higher proportion of sustainable trips (46% vs. 30%; p = 0.02) than those who received the postcard.

What makes movers from another NC county different? Perhaps we could imagine that movers within the same county experience the least number of changes to their jobs and social activities, while those who moved from out of state experience the greatest number of changes, and with this the strongest habit discontinuity. Thus, their driving habits are either not altered (same county movers) or require more reinvention (out-of-state movers). Yet, those that moved from another NC county might still have friends they visit regularly or social activities that require greater driving distances. Thus, one could imagine the intervention to be the most effective for that particular group of movers.

Over Time: Again, when comparing driving behavior at the post-intervention survey (S1) to the follow-up period (S2-6), we find an overall increase in drive-alone mileage, regardless of move-from area. However, respondents in the control group that moved from another NC county increased their drive-alone mileage by 50.5 miles (p = 0.05), while those in the Welcome Box condition only increased their drive-alone mileage by 9.5 miles (p = 0.59). That means that respondents in the control condition increased their drive-alone mileage by 41 *more* miles than those in the Welcome Box condition, resulting in a difference of 80.6 drive-alone miles between those who received a Welcome Box and those who received a postcard in the follow-up period (p = 0.01).

Walk Score, Bike Score, and Transit Score

In addition to where participants had moved from, we aimed to understand how the effects of our Welcome Box might depend on the participants' neighborhoods. We expected that people living in areas where it is difficult to walk, bike, or take public transit would be less impacted by our nudge.

Walk Score is a company that provides walkability analyses for any address in the United States. Their flagship product is the walkability index which assigns a numerical walkability score to any address. Other products include the transit and bike index.

Walk Score: Walk Score measures the walkability of any address based on pedestrian friendliness and the distance to nearby places. Overall, most respondents (82.2%) live in a (very) car-dependent area meaning that most errands require a car.

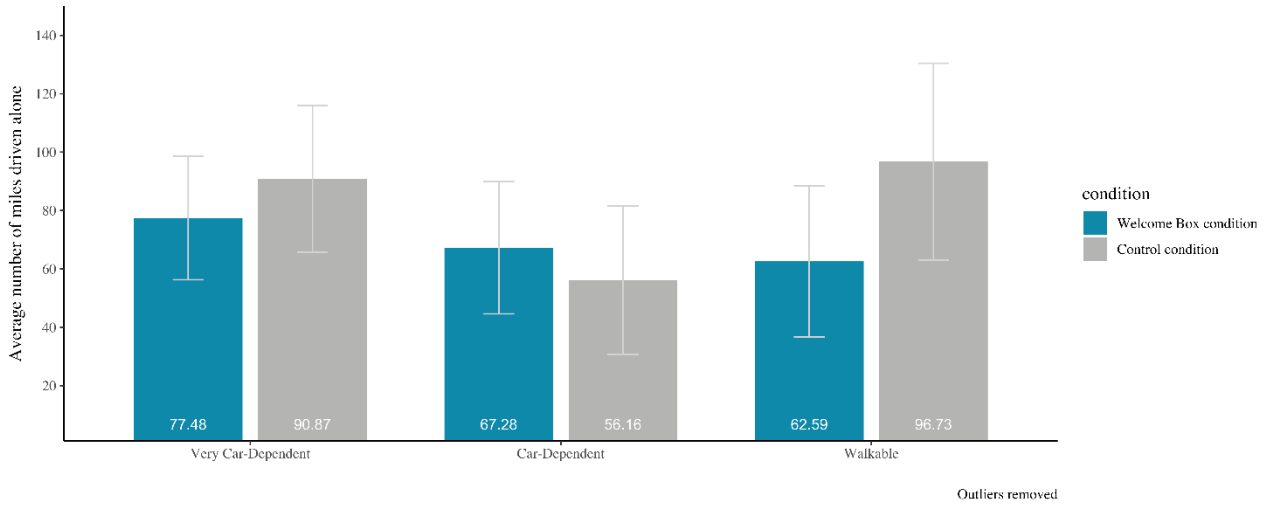
	Very Car-Dependent	Car Dependent	Somewhat Walkable	Very Walkable	Walker's Paradise
Town of Carrboro	7	11	7	8	0
Orange County	63	10	2	1	0
City of Raleigh	53	50	17	6	1
	123	**71**	**26**	**15**	**1**

Among walkable neighborhoods (either somewhat, very walkable, or walker's paradise), those who received a Welcome Box drove on average 34.1 miles alone less per week than those that received the postcard (p = 0.22; see Figure 4). When looking at the percentage of miles driven alone, we

observe an even starker picture: the percentage of miles driven alone was significantly lower among recipients of the Welcome Box than among control participants (58.35% vs. 90%; *p* = 0.007).

Thus, the trend goes in the expected direction: receiving a Welcome Box results in lower drive-alone mileage for walkable neighborhoods (62.6 drive-alone mileage) when compared to very car-dependent neighborhoods (77.5 drive-alone mileage; see Figure 4).

Figure 4. *Number of Miles Driven Alone at Survey 1 by Walkability*



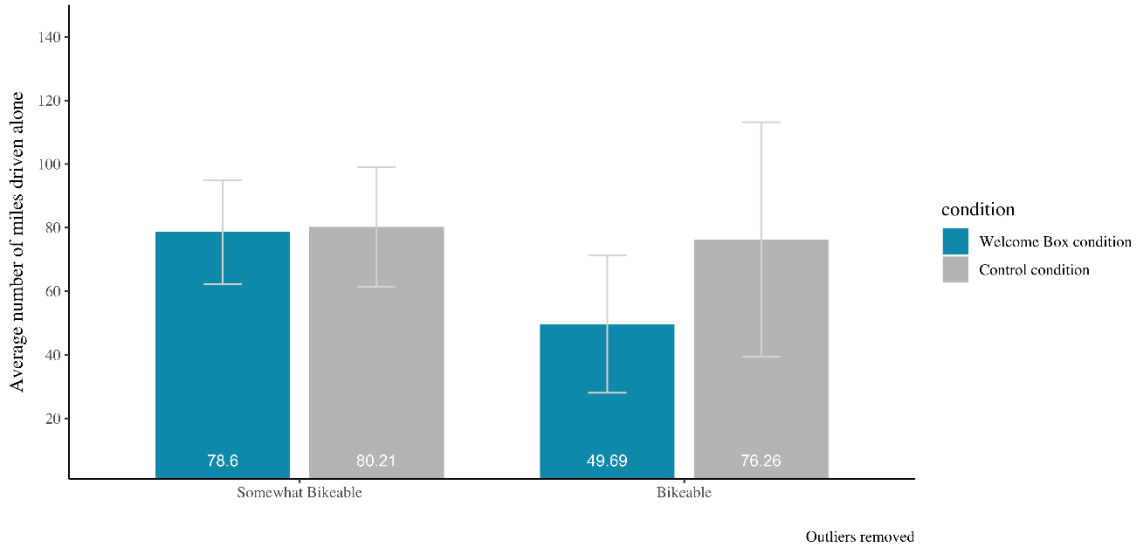
This trend continues when comparing driving behavior within the post-intervention survey (S1) to the follow-up periods (S2-6). We find respondents in the control condition (in walkable neighborhoods) increased their drive-alone mileage by 100.6 miles (p = 0.01), while those in the Welcome Box condition only increased their drive-alone mileage by 33.3 miles (p = 0.16). That means that respondents in the control condition (in walkable neighborhoods) increased their drive-alone mileage by 67.3 *more* miles than those in the Welcome Box condition (in walkable neighborhoods).

Bike Score: Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations. Overall, most respondents (75.4%) live in a somewhat bikeable area meaning that their neighborhood has minimal bike infrastructure (lanes, trails, etc.).

	Somewhat Bikeable	Bikeable	Very Bikeable	Biker's Paradise
Town of Carrboro	7	4	17	6
Orange County	72	4	/	/
City of Raleigh	100	20	7	/
	178	**28**	**24**	**6**

We observe the following trend: Receiving a Welcome Box reduces drive-alone mileage in bikeable neighborhoods with some bike infrastructure (49.69 miles per week) compared to neighborhoods with minimal infrastructure (78.6 miles per week; see Figure 5).

Figure 5. *Number of Miles Driven Alone at Survey 1 by Bikeability*



Transit Score: Transit Score measures how well a location is served by public transit based on the distance and type of nearby transit lines. Overall, many of the respondents (42.4%) live in a neighborhood with few nearby public transportation options. Yet, for another 41.5% of respondents, the program couldn't calculate a transit score (primarily for those that live in Orange County[16]). Despite that, we observe a similar trend with transit as we did for walking and biking: Receiving a Welcome Box reduced drive-alone mileage at post-intervention survey (S1), more so in transit-friendly neighborhoods (60.4 miles per week) than in neighborhoods with minimal transit (89.1 miles per week).

Program Impact

The weekly VMT for program participants averaged approximately 198.8 miles per week[17], which is 24.3 miles, or 10.9% lower than the standard weekly VMT in North Carolina[18]. This translates to 4,903 fewer grams of CO_2 per week or $15,688.62 saved in emissions costs over 12 weeks for those involved in the program.

	Weekly VMT per person	Weekly CO_2 Emissions per person (grams)[19]	Weekly Emissions Cost per person[20]	Total Emissions Cost (12 weeks)
Welcome Box Program	198.80	40,157.60	$8.19	$128,766.99
NC Standard	223.08	45,061.54	$9.19	$144,455.61
Difference (Program – NC Standard)	**-24.28**	**-4,903.94**	**-$1.00**	**-$15,688.62**
% Difference	**-10.88%**	**-10.88%**	**-10.88%**	**-10.86%**

[16] Many neighborhoods in Orange County are very rural and/or newly built. We suspect this to be the reason for the missing data.
[17] This was calculated using the first, post-intervention survey (S1), and the question asking participants to recall their VMT on the previous day.
[18] Data for 2017: https://www.ncdot.gov/initiatives-policies/environmental/climate-change/Documents/vehicle-miles-traveled-reduction-study.pdf
[19] https://cleanenergy.org/blog/electric-vehicles-emissions-and-fuel-economy/#:~:text=The%20average%20gasoline%20passenger%20vehicle,(assuming%2011%2C500%20miles%20driven)
[20] https://www.rff.org/news/press-releases/social-cost-of-carbon-more-than-triple-the-current-federal-estimate-new-study-finds/#:~:text=The%20study%2C%20published%20today%20in,estimate%20of%20%2451%20per%20ton

Discussion

Conclusions

This study tested the “fresh start effect” in a large field experiment with 1,310 new movers to three cities in North Carolina. New movers either received a Welcome Box or a welcome postcard, and surveys to track their transportation habits over a period of three months.

Overall, we found small differences in SOV mileage between Welcome Box and control respondents in the post-intervention survey (S1). However, despite SOV mileage increasing with time, there was a greater increase in the control group than in the Welcome Box group. More specifically, we observed an increase in drive-alone mileage of 6 miles in the Welcome Box group compared to 25 miles in the control group.

Next, those who moved from another NC county present a unique set of movers that seem to respond particularly well to the Welcome Box. In the future, we suggest looking at the distance of the move and the reason for moving to gain further insights into this group.

Furthermore, the majority of our new movers do not live in transportation-friendly regions. Instead, most (82.2%) live in a (very) car-dependent area. Yet, we observe the following trend: the intervention works naturally better in more walkable areas; that is, the intervention works better in areas where people have the ability to make the required changes.

Lastly, the incentives provided in the Welcome Box had low utilization rates. Only a limited number of participants picked up free coffee cups from the participating libraries, very few to none of the coupons from local transportation-related businesses were used, and only two people signed up for the NC-wide carpooling website (STRNC).

Limitations

This study contains notable limitations. Firstly, the measurement of transportation behavior relied on self-report data. As we saw above, relying on self-report data often goes hand-in-hand with a decline in survey response over time. Thus, it is not only more difficult to parse out differences between the Welcome Box and postcard recipients across time, but survey respondents and survey non-respondents may also fundamentally differ in their driving and transportation habits.

Finally, we relied on an external company to provide us with data about recent new movers. This data inherently contained a lag between the actual move-in date and when the company was able

to record the household as having recently moved. Thus, some new movers in our data set hadn't moved quite as recently as we had hoped or were no longer living at the address provided by the company.

Recommendations for Practitioners

Qualitative feedback suggests that an infrastructure improvement would tremendously increase sustainable commuting options uptake. Particularly, improving the quality (and existence) of sidewalks and biking infrastructure was mentioned most frequently.

As most new movers do not live in transportation-friendly regions, nudging residents to use sustainable modes of transportation may not produce the desired large-scale effects. Instead, finding other ways to encourage less driving may be worthwhile, such as doing groceries once a week instead of multiple times per week, or pooling errands.

We suggest finding ways to automatically collect data to assess the effectiveness of one's study or intervention over time. Where relying on self-report data is the only possibility for future interventions, we recommend creating a large buy-in from the respondents by having a trusted messenger deliver the Welcome Box and/or ask for measurements.

Lastly, a Welcome Box with a large number of materials may overwhelm new movers. Instead, focusing on a smaller set of materials that are tailored to the recipient's circumstances or available transportation options may be more useful and result in a higher impact.

Appendix

Appendix A: Analysis Notes

Some figures mention that outliers were moved. Respondents reporting a large number of vehicle miles traveled (VMT) in the previous 7 days were excluded for those analyses. These 22 outliers were classified as those whose VMT lie outside the interquartile range.

For analyses that compare driving behavior across time, we consider those new movers that completed the post-intervention survey (S1) as well as at least one other survey in the follow-up period (S2, S3, S4, S5, and/or S6; N = 104). Doing so ensures that by comparing the post-intervention period to the follow-up period, we compare the same people. Due to low survey response, answers across the five surveys in the follow-up period were averaged.

All analyses focusing on the post-intervention period, are based on linear regression. All analyses focusing on driving behavior across time, are based on linear mixed-effect model, and post-hoc tests to parse out interactions. Our threshold for statistical significance across all analyses was set at $p = 0.05$.

Appendix B: Photographs

Sample Welcome Box Content

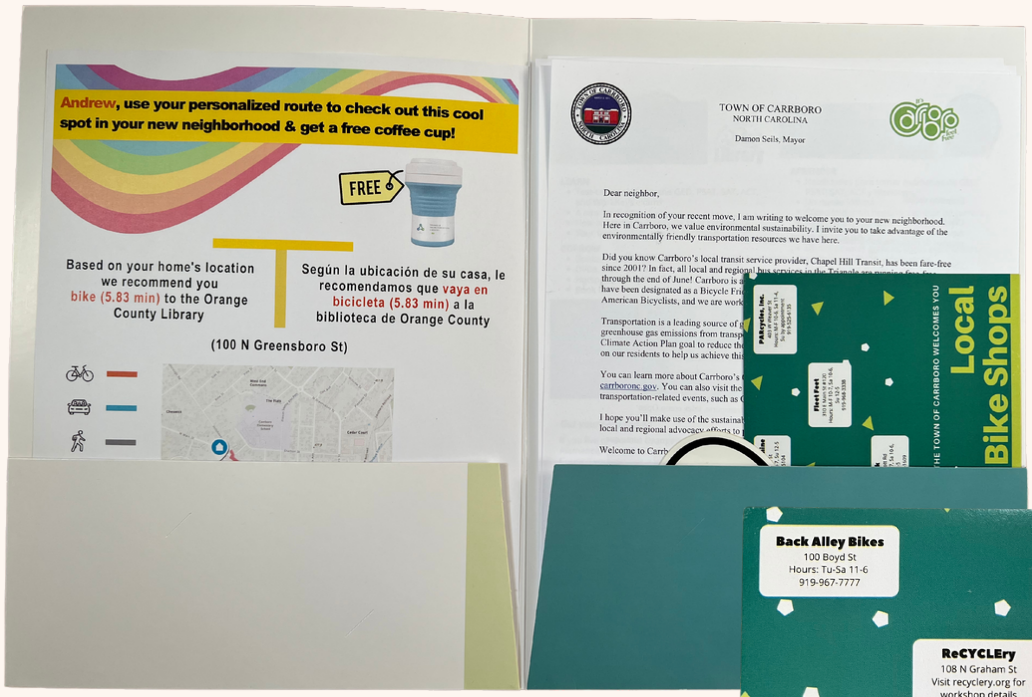
Outside of Box

Inside of Box

Town of Carrboro

Welcome Packet with survey inviation

User flip cards on carpooling, biking, bud riding and remote working tips



Bike Shop Magnet

OPCIONES DE TRANSPORTE SOCIAL

EMPEZAR A COMPARTIR COCHE

- ***¡Encuentra un compañero para compartir coche!***
- ***Share the Ride NC*** *(https://FreshStartsSP.sharetheridenc.org/) sirve a los pasajeros de Raleigh, Chapel Hill y Orange County y ofrece servicios de emparejamiento de vehículos compartidos.*
- ***Ridesharing.com*** *ofrece viajes compartidos para viajes diarios o viajes de larga distancia.*
- ***Carpoolworld Chapel Hill*** *también tiene más de 700.000 usuarios registrados.*

EMPEZAR A COMPARTIR LA FURGONETA

- ***GoTriangle*** *(gotriangle.org/find-vanpool/rtp) tiene vanpools en su sitio web*
- ***Autoridad de Transporte del Condado de Orange*** *a https://www.octa.net/Vanpool/Overview/*
- *Estos también están disponibles para* ***estudiantes y empleados*** *de la* ***UNC*** *que utilizan el sistema de asociaciones de la UNC (move.unc.edu/rideshare/vanpool)*

PROGRAMAR REUNIONES PARA CAMINAR

- ***¡Caminar y hablar!***
- *Las reuniones a pie son una excelente manera de disfrutar del clima cálido en Carolina del Norte y pasar tiempo de calidad con los compañeros de trabajo, todo mientras se realiza el trabajo.*
- *También son una forma fantástica de explorar más el área y aprender más sobre la comunidad*

ÚNETE A UNA COMUNIDAD

- *Hay amplias oportunidades para unirse a una comunidad de personas de ideas afines interesadas en el transporte sostenible en el Triángulo.*
- ***Bicycle Alliance of Chapel Hill*** *(bikechapelhill.org) y* ***Carolina Tarwheels*** *(tarwheels.net) son excelentes comunidades ciclistas.*

Social Transit Guide

Coupon to Local Business

TOWN OF CARRBORO
NORTH CAROLINA

Damon Seils, Mayor

Dear neighbor,

In recognition of your recent move, I am writing to welcome you to your new neighborhood. Here in Carrboro, we value environmental sustainability. I invite you to take advantage of the environmentally friendly transportation resources we have here.

Did you know Carrboro's local transit service provider, Chapel Hill Transit, has been fare-free since 2001? In fact, all local and regional bus services in the Triangle are running free-free through the end of June! Carrboro is also home to an amazing biking and walking culture. We have been designated as a Bicycle Friendly Community for several years by the League of American Bicyclists, and we are working to do even better.

Transportation is a leading source of greenhouse gas emissions in North Carolina. Reducing greenhouse gas emissions from transportation is an important part of Carrboro's Community Climate Action Plan goal to reduce the community's emissions by 80% by 2030. We're counting on our residents to help us achieve this ambitious goal.

You can learn more about Carrboro's Community Climate Action Plan on our website at carrboronc.gov. You can also visit the website to sign up for notifications about local transportation-related events, such as Open Streets and Bike Month activities.

I hope you'll make use of the sustainable transportation options Carrboro has to offer, and join local and regional advocacy efforts to promote more of these options for more of our neighbors.

Welcome to Carrboro!

Sincerely,

Damon Seils

Damon Seils
Mayor, Town of Carrboro

301 W MAIN ST, CARRBORO, NC 27510 • TEL 919-942-8541 • FAX 919-918-4456 • VOICE/TTY/TDD/ASCII 711
AN EQUAL OPPORTUNITY PROVIDER

Letter from Elected Official

Bicycle Lights