GOETHE UNIVERSITÄT FRANKFURT AM MAIN

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Residential (re)location & travel behavior – A comparison between residents of a car-reduced neigbourhood and a control group

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Car-free/-reduced housing developments

- Reduction of access and/or parking spaces for private cars
- Focus on multimodality with alternative means of transportation (cycling, walking, public transport & sharing schemes)
- 1990s: *Vauban* development in Freiburg with no parking spaces (Coates 2013)

- Objectives:
  - Increased quality of stay for residents
  - Promotion of multimodality
  - Enabling a car-free life
  - Reduced use of the private car

Car-free housing development *Stellwerk 60* in Cologne-Nippes

Literature

- **Residential (re)location has influence on travel behavior**
  - ~80% of all journeys either start or end at home (Nobis and Kuhnimhof 2018)

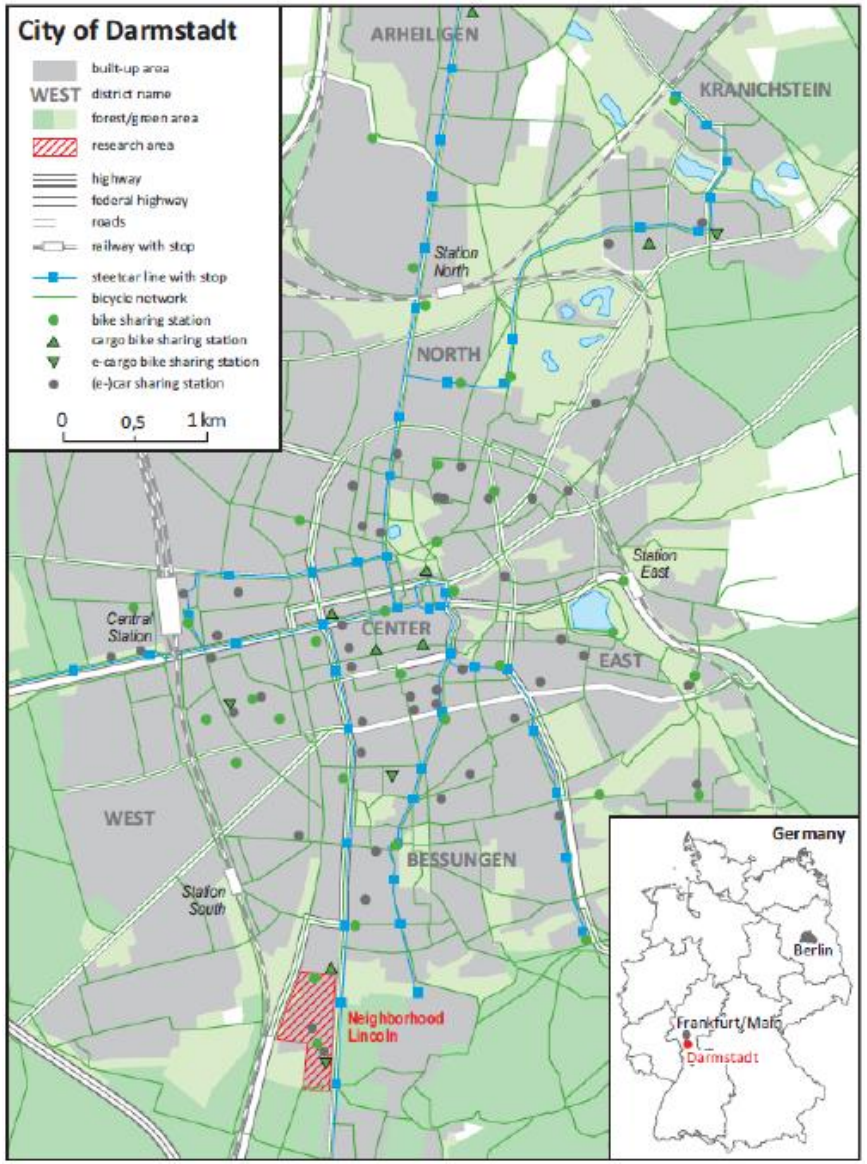
- **Limited research on car-free/-reduced neighborhoods**
  - Scheurer (2001) shows effect from (almost) car-free neighborhoods on travel behavior
  - Baehler & Rerat (2022): Residents use cycling and public transport as well as other mobility and transport services & favor proximity and transit accessibility in their everyday life
  - Sprei et al. (2021): Mobility patterns of residents in the car-reduced settlements are less car-dominated than in the surrounding areas
  - Vauban (Nobis, 2003 & Coates 2013), Stellwerk 60 (Friedrich, 2009) & Lincoln-Siedlung (Selzer, 2021; 2022, Schröder 2024)

Lincoln-Siedlung in Darmstadt, Germany

- Newly built housing development with a car-reduced mobility concept
- 2014: US-Army left the area
- 2018: First residents moved in
- 2023: **~2,900** residents
- 2025: Up to 5,000 residents (in 2,000 residential units)

Context on Darmstadt:

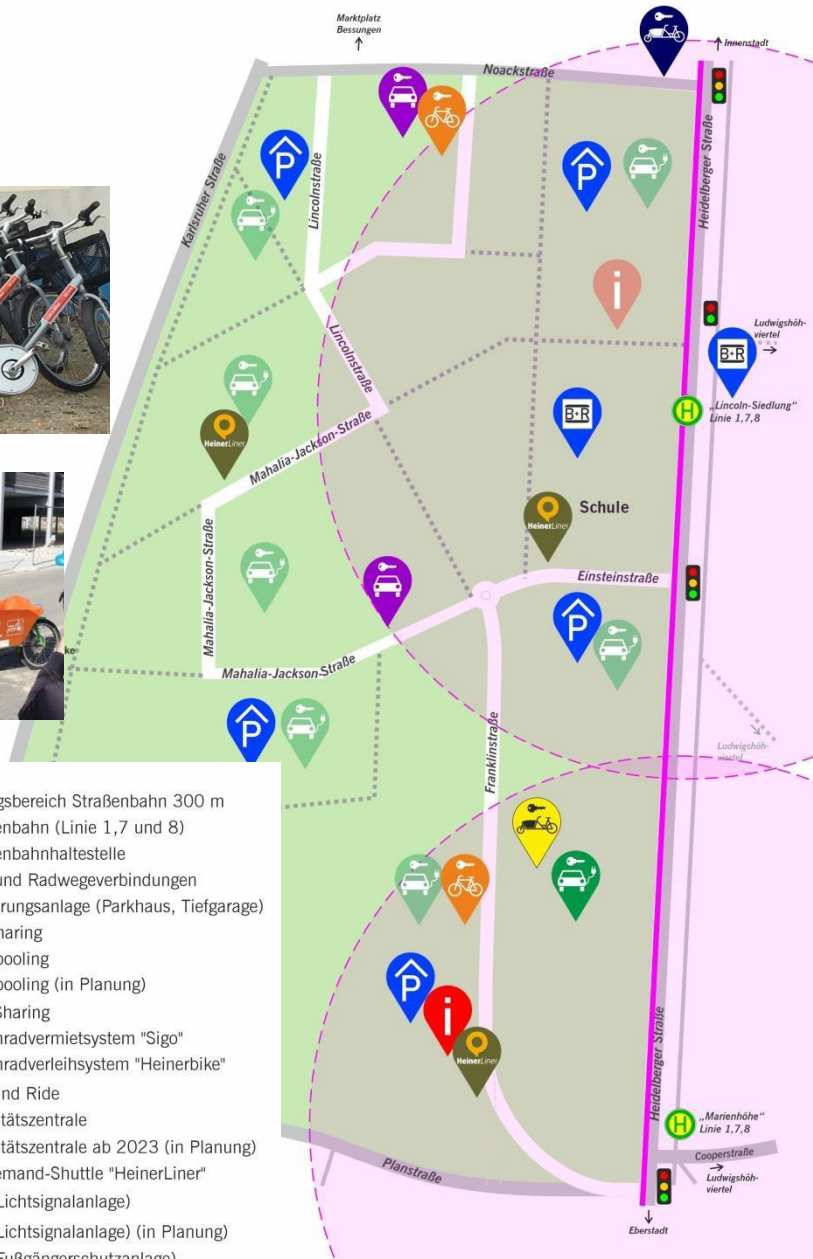
- 160.000 inhabitants (and growing)
- Metropolitan area Frankfurt/Rhein-Main
- One of highest share of academics



Lincoln-Siedlung: Mobility concept

- **Push measure**: Restrictive parking space management
  - **0.65 parking spaces** per residential unit
    - 0.15 close to houses
    - 0.5 in garages
- **Pull measures**:
  - Two tram stations
  - Good cycling & walking infrastructure
  - Different sharing schemes (bike & car)
- Basic approach: offer transportation options that suit every purpose

Lincoln-Siedlung: Mobility concept

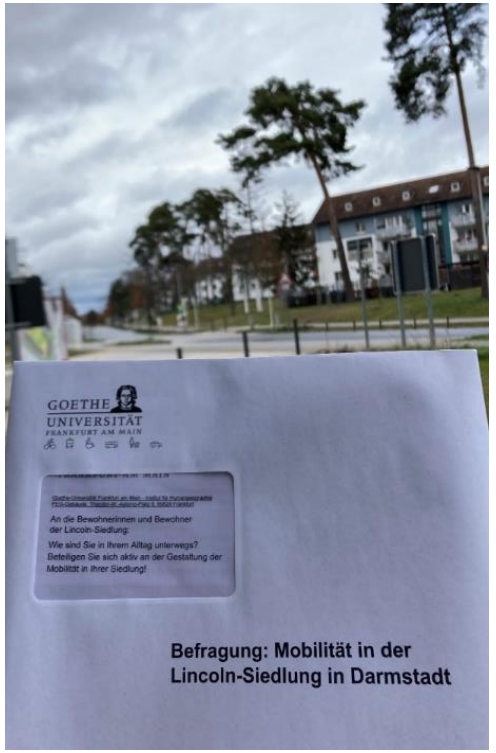


Research Questions

- Existing research on the *Lincoln-Siedlung* describes clash of planners' narratives and residents' lived practices (Selzer, 2021 & 2022)
- **Three research questions:**
  1. Does living in the car-reduced *Lincoln-Siedlung* reduce the average number of private cars, compared to before the relocation and to other recent movers?
  2. Do Lincoln residents use their cars less and other modes more than other recent movers?
  3. With regard to residential self-selection, the question arises as to whether the residents choose the *Lincoln-Siedlung* as their place of residence because of a) travel-related relocation factors and b) higher attitudes towards sustainable modes of transport?

Method: Quantitative survey

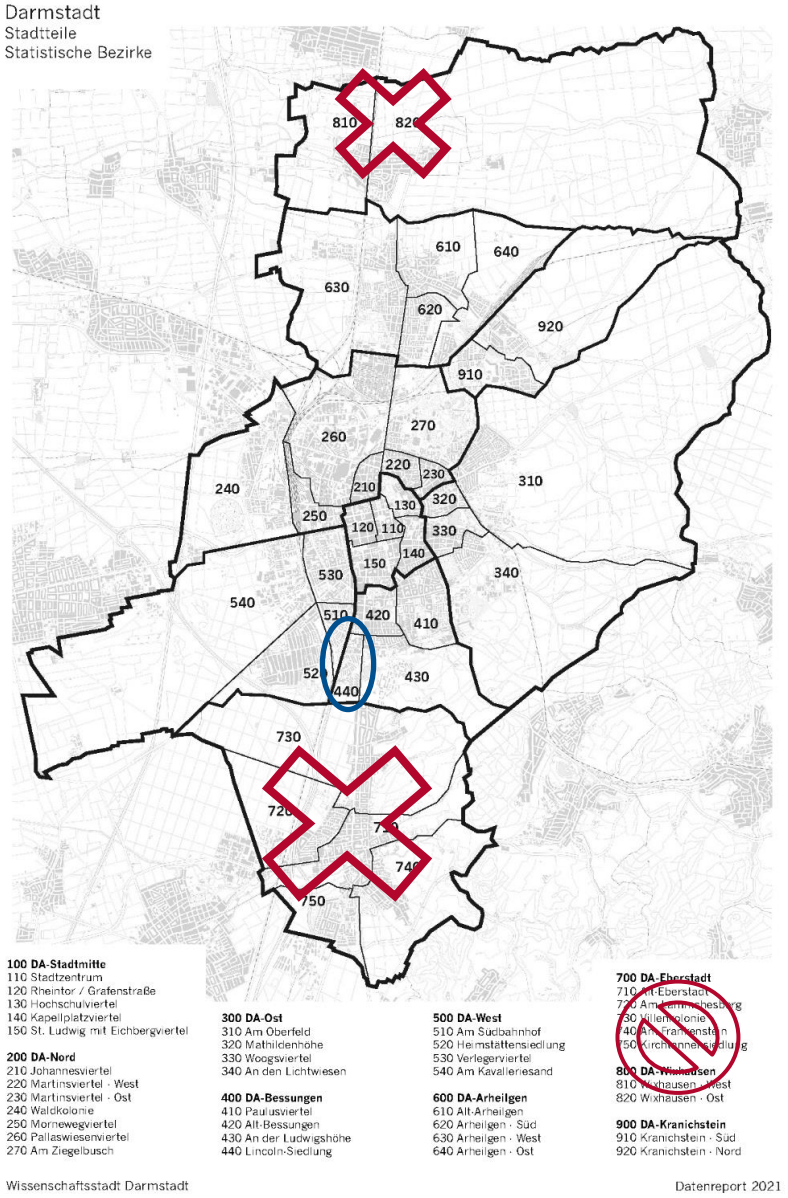
- Research is embedded in project „**Sustainable mobility in Lincoln**“ (Nachhaltige Mobilität in Lincoln), running since 2019
- Written surveys to every adult in the *Lincoln-Siedlung*
- Three survey waves in four years
  - Status as of 31.03.2023: 2,864 residents [2,065 adults]



	1st wave	2nd wave	3rd wave
Time	March 2020	March 2021	March 2023
Persons inquired	1,140	1,614	2,114
Returns (response rate)	166 (14.6%)	231 (14.3%)	**293** (13.9%)
Control group: N= return (response)			**2.649** **659** (25%)

Method: Control group

- **Objective**: Survey a group with similar characteristics to Lincoln's residents
- **Random sample** of ~3,000 Darmstadt residents from the city's municipality
- **Criteria**:
  - Age of majority (over 18 years)
  - Place of residence near the city center of Darmstadt
  - Relocation in the last five years
  - proportions correspond to the Lincoln population in terms of
    - Length of residence in years
    - New citizens of Darmstadt

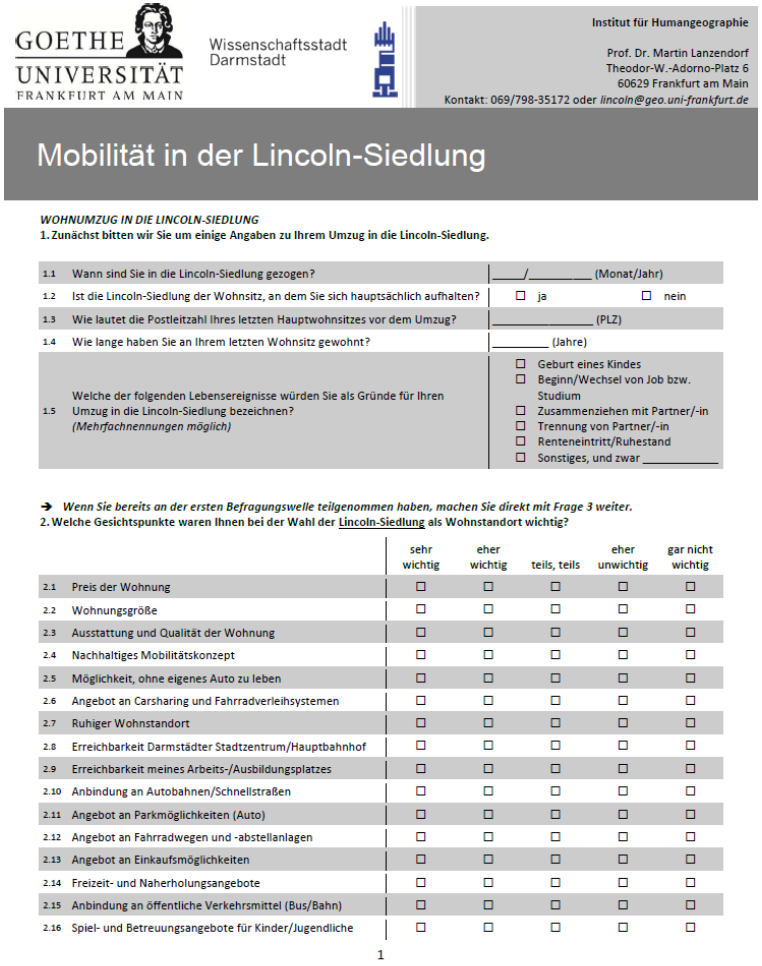


Method: Questionnaire

Contents of the questionnaire

- Factors for residential location
- Travel behavior (current and before the relocation)
  - (Car) ownership and mode use
  - Focus on route purposes
- Attitudes towards different modes and the *Lincoln-Siedlung*
- Socio-demographic characteristics

➢ Slight adjustments to the questionnaire of the control group



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Mobilität in der Lincoln-Siedlung

WOHNUMZUG IN DIE LINCOLN-SIEDLUNG

1. Zunächst bitten wir Sie um einige Angaben zu Ihrem Umzug in die Lincoln-Siedlung.

1.1	Wann sind Sie in die Lincoln-Siedlung gezogen?	____/_____ (Monat/Jahr)
1.2	Ist die Lincoln-Siedlung der Wohnsitz, an dem Sie sich hauptsächlich aufhalten?	☐ ja ☐ nein
1.3	Wie lautet die Postleitzahl Ihres letzten Hauptwohnsitzes vor dem Umzug?	_____ (PLZ)
1.4	Wie lange haben Sie an Ihrem letzten Wohnsitz gewohnt?	_____ (Jahre)
1.5	Welche der folgenden Lebensereignisse würden Sie als Gründe für Ihren Umzug in die Lincoln-Siedlung bezeichnen? *(Mehrfachnennungen möglich)*	☐ Geburt eines Kindes ☐ Beginn/Wechsel von Job bzw. Studium ☐ Zusammenziehen mit Partner/-in ☐ Trennung von Partner/-in ☐ Renteneintritt/Ruhestand ☐ Sonstiges, und zwar _____

➔ ***Wenn Sie bereits an der ersten Befragungswelle teilgenommen haben, machen Sie direkt mit Frage 3 weiter.***

2. Welche Gesichtspunkte waren Ihnen bei der Wahl der Lincoln-Siedlung als Wohnstandort wichtig?

		sehr wichtig	eher wichtig	teils, teils	eher unwichtig	gar nicht wichtig
2.1	Preis der Wohnung	☐	☐	☐	☐	☐
2.2	Wohnungsgröße	☐	☐	☐	☐	☐
2.3	Ausstattung und Qualität der Wohnung	☐	☐	☐	☐	☐
2.4	Nachhaltiges Mobilitätskonzept	☐	☐	☐	☐	☐
2.5	Möglichkeit, ohne eigenes Auto zu leben	☐	☐	☐	☐	☐
2.6	Angebot an Carsharing und Fahrradverleihsystemen	☐	☐	☐	☐	☐
2.7	Ruhiger Wohnstandort	☐	☐	☐	☐	☐
2.8	Erreichbarkeit Darmstädter Stadtzentrum/Hauptbahnhof	☐	☐	☐	☐	☐
2.9	Erreichbarkeit meines Arbeits-/Ausbildungsplatzes	☐	☐	☐	☐	☐
2.10	Anbindung an Autobahnen/Schnellstraßen	☐	☐	☐	☐	☐
2.11	Angebot an Parkmöglichkeiten (Auto)	☐	☐	☐	☐	☐
2.12	Angebot an Fahrradwegen und -abstellanlagen	☐	☐	☐	☐	☐
2.13	Angebot an Einkaufsmöglichkeiten	☐	☐	☐	☐	☐
2.14	Freizeit- und Naherholungsangebote	☐	☐	☐	☐	☐
2.15	Anbindung an öffentliche Verkehrsmittel (Bus/Bahn)	☐	☐	☐	☐	☐
2.16	Spiel- und Betreuungsangebote für Kinder/Jugendliche	☐	☐	☐	☐	☐

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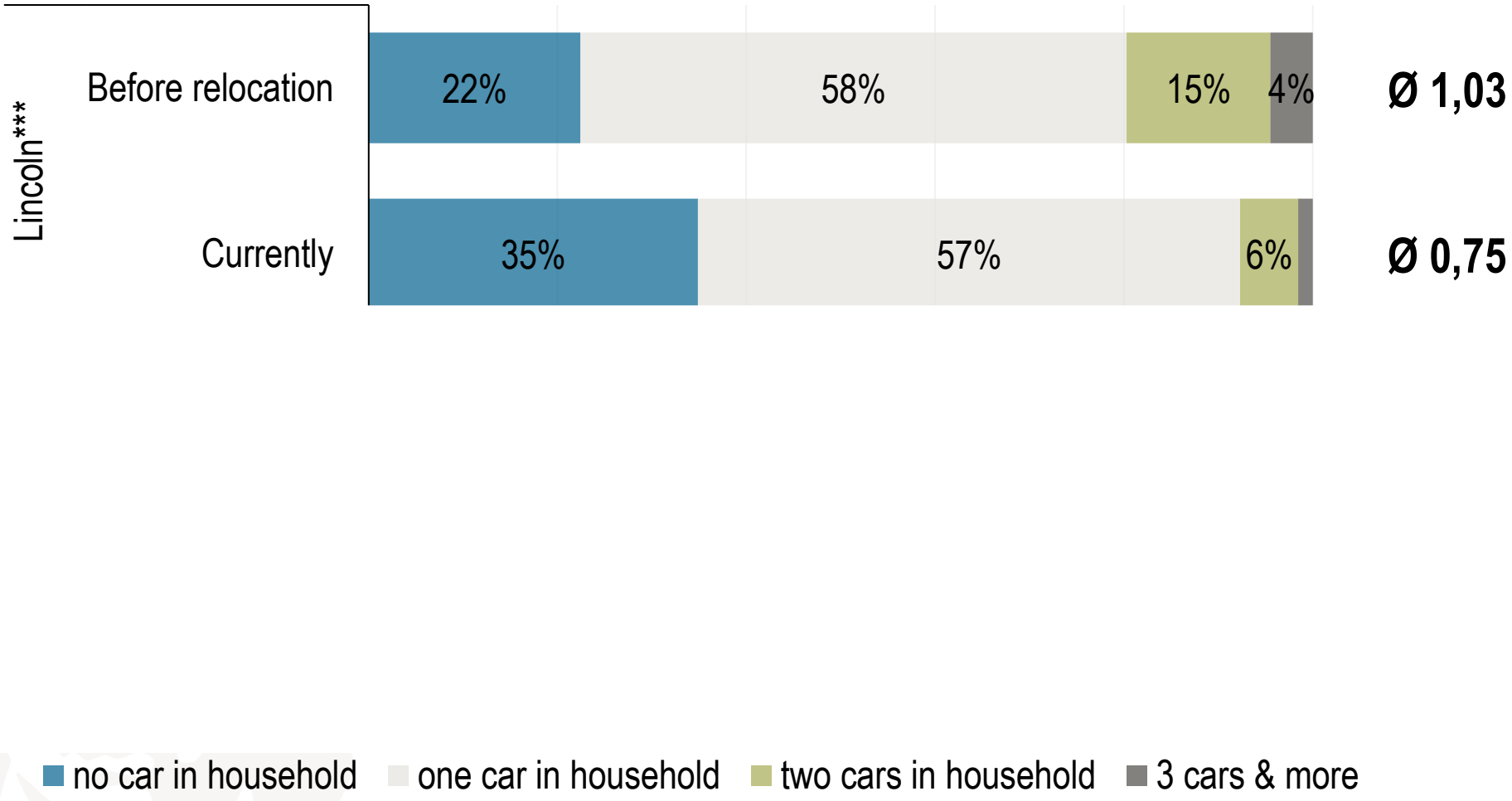
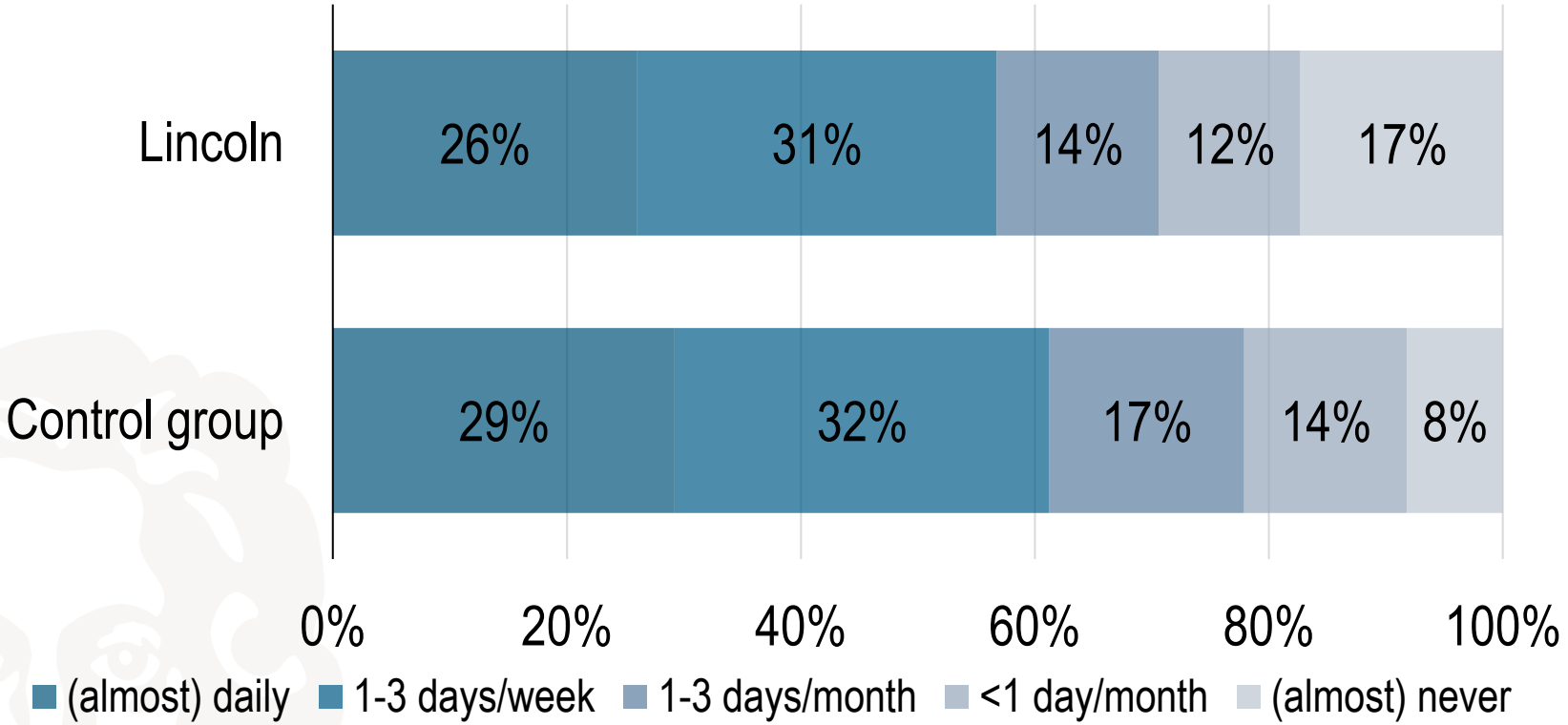
Results: Car ownership in the household



Source: own survey 2023;
Lincoln N=293; Control group N=659

*T-test (difference test) with *p < 0.1; **p < 0.05; **p < 0.01*

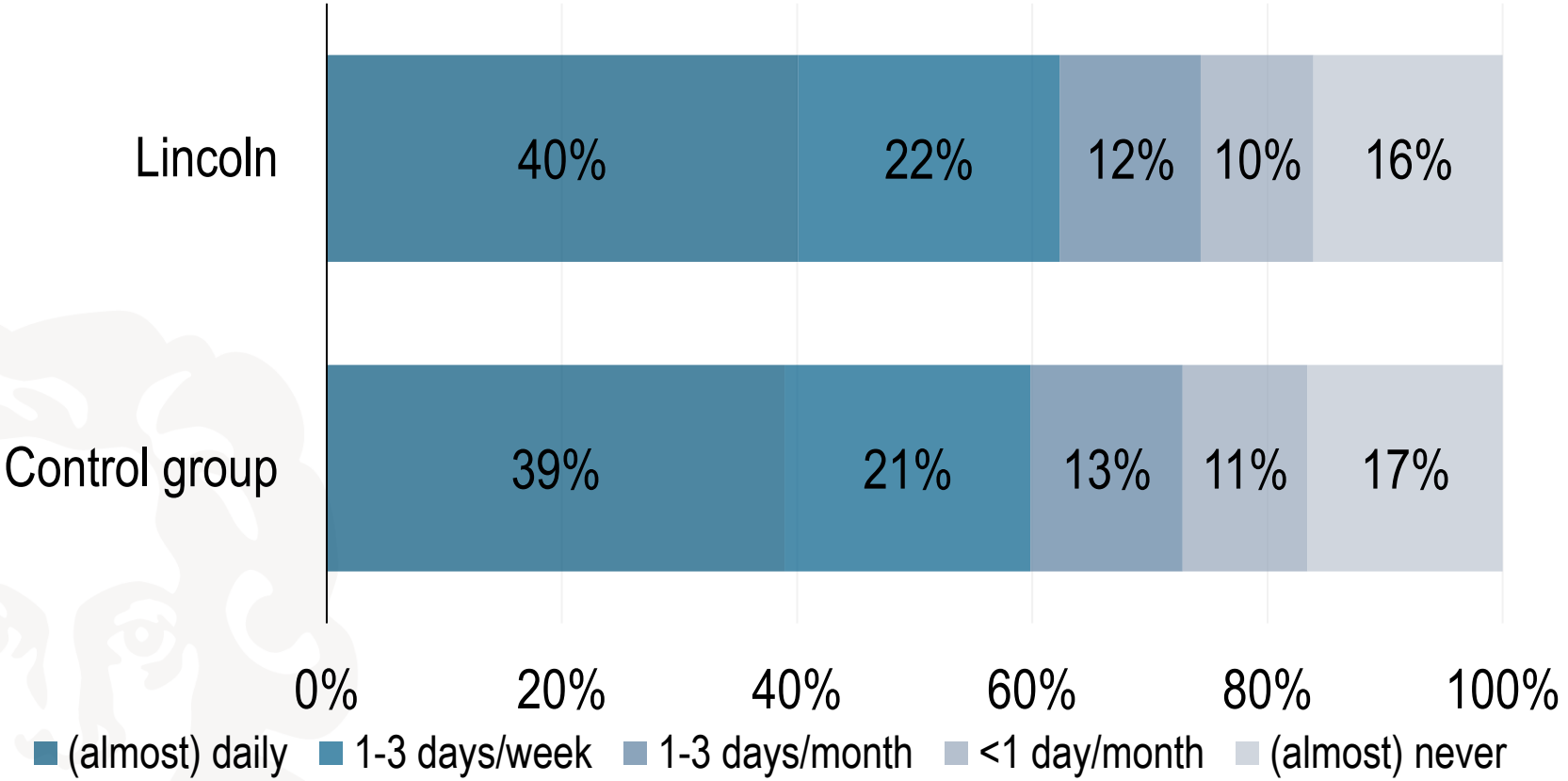
Results: Usage of the private car**



Source: own survey 2023;
Lincoln N=293; Control group N=659

Two-sample Wilcoxon rank-sum (Mann-Whitney) test *with* $*p < 0.1$; $**p < 0.05$; $**p < 0.01$

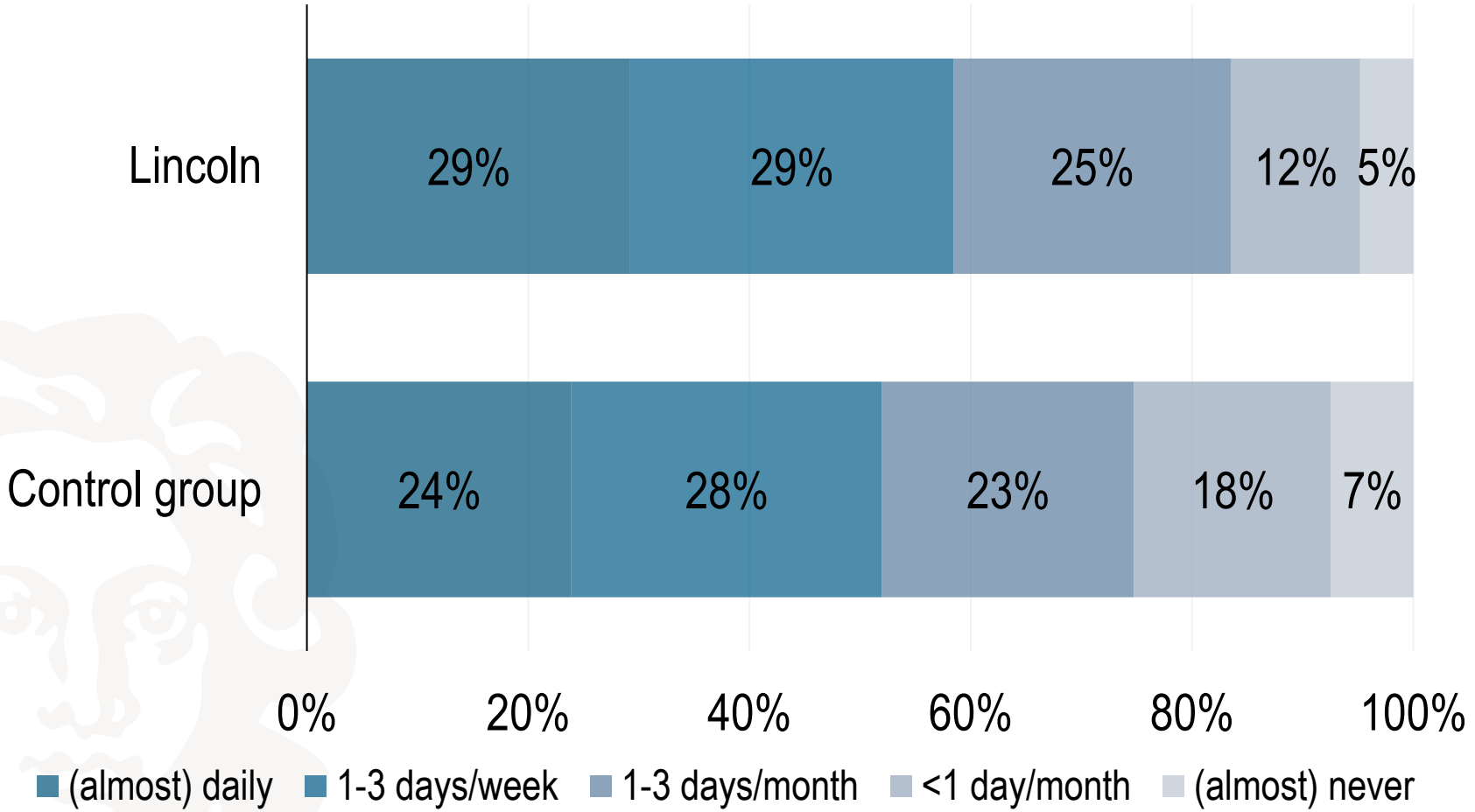
Results: Usage of bicycle



Source: own survey 2023;
Lincoln N=293; Control group N=659

Two-sample Wilcoxon rank-sum (Mann-Whitney) test *with* $*p < 0.1$; $**p < 0.05$; $**p < 0.01$

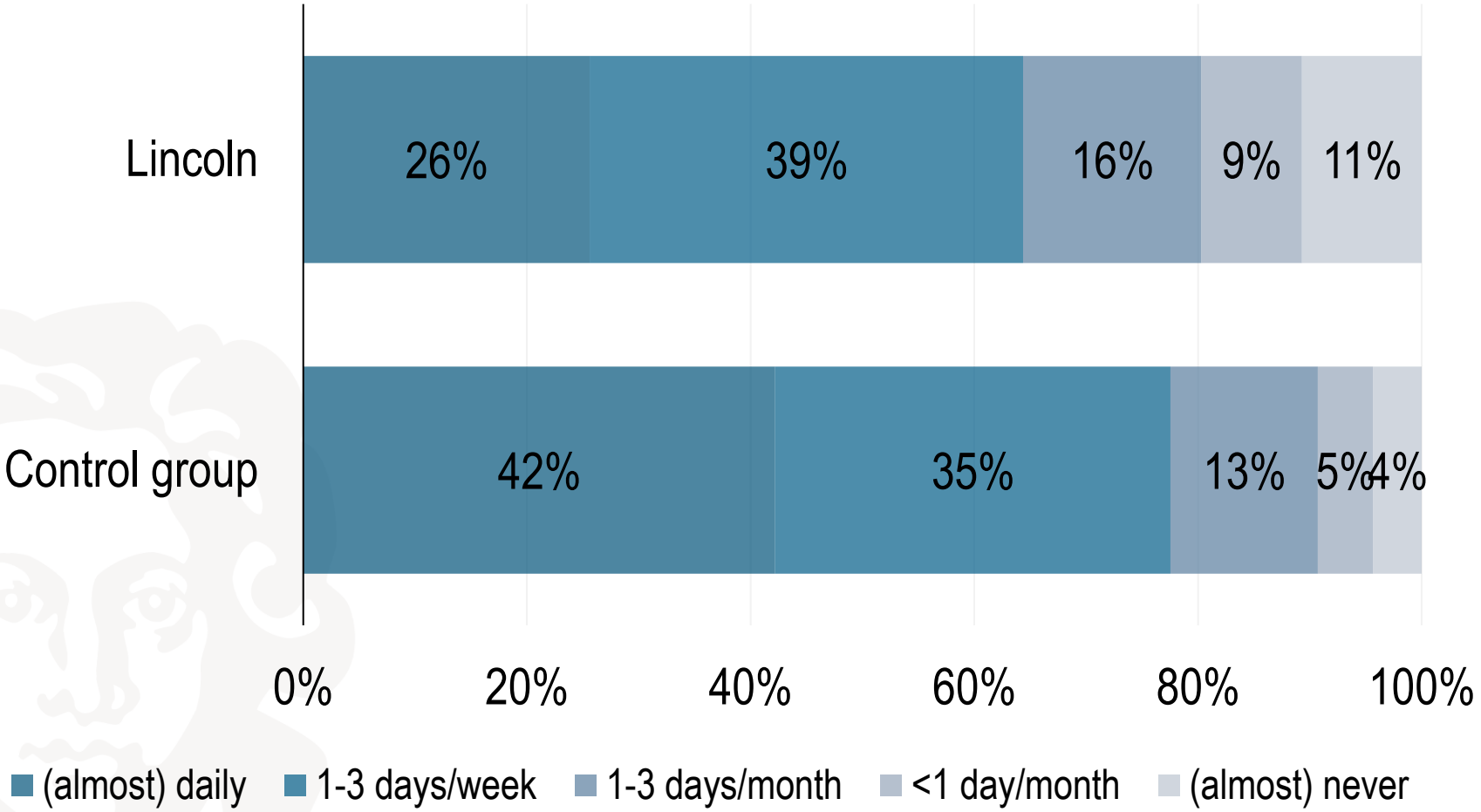
Results: Usage of public transport***



Source: own survey 2023;
Lincoln N=293; Control group N=659

Two-sample Wilcoxon rank-sum (Mann-Whitney) test *with* $*p < 0.1$; $**p < 0.05$; $**p < 0.01$

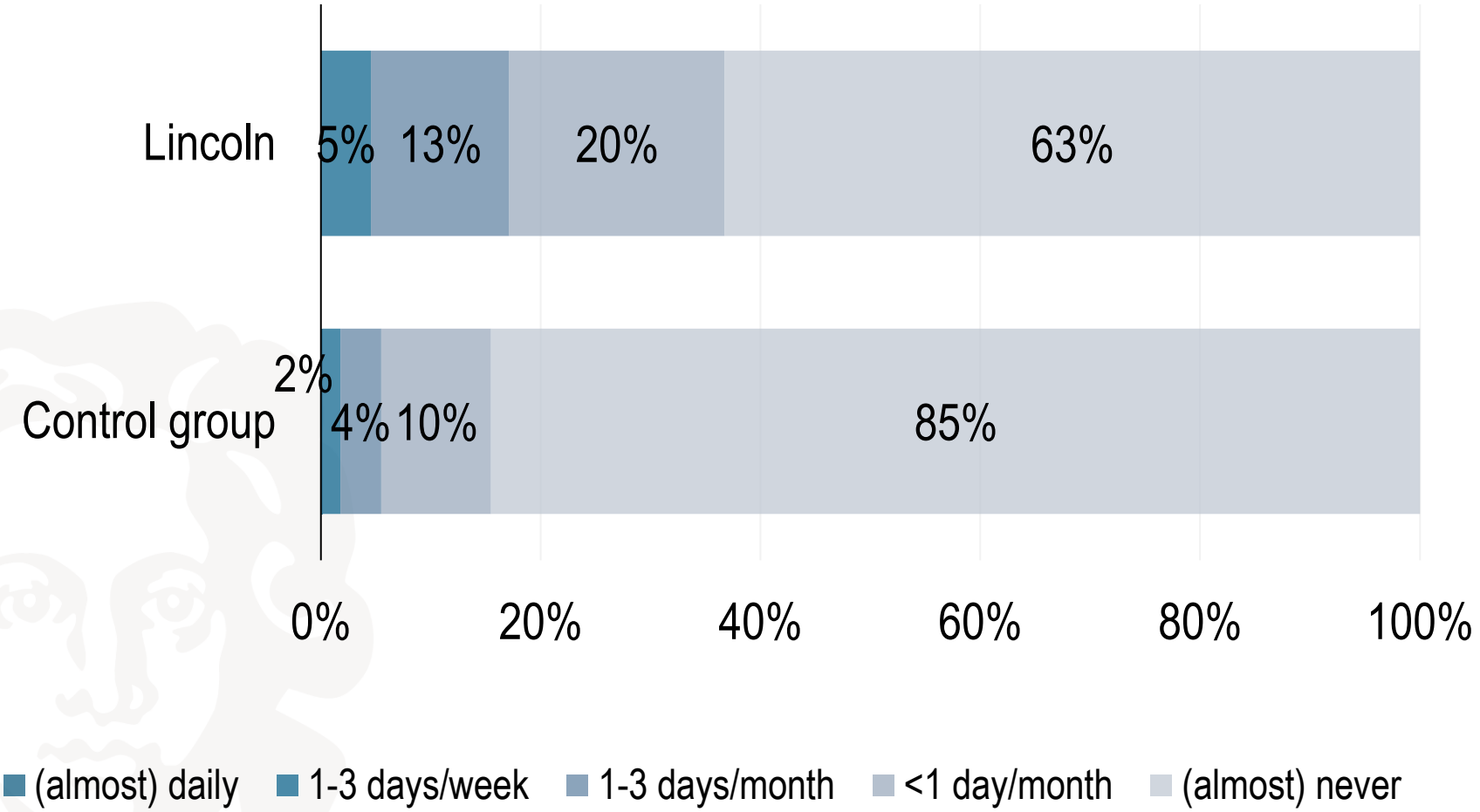
Results: Usage of walking (for the whole trip)***



Source: own survey 2023;
Lincoln N=293; Control group N=659

Two-sample Wilcoxon rank-sum (Mann-Whitney) test *with* $*p < 0.1$; $**p < 0.05$; $**p < 0.01$

Results: Usage of car sharing***



Source: own survey 2023;
Lincoln N=293; Control group N=659

Two-sample Wilcoxon rank-sum (Mann-Whitney) test *with* *$p < 0.1$; **$p < 0.05$; **$p < 0.01$*

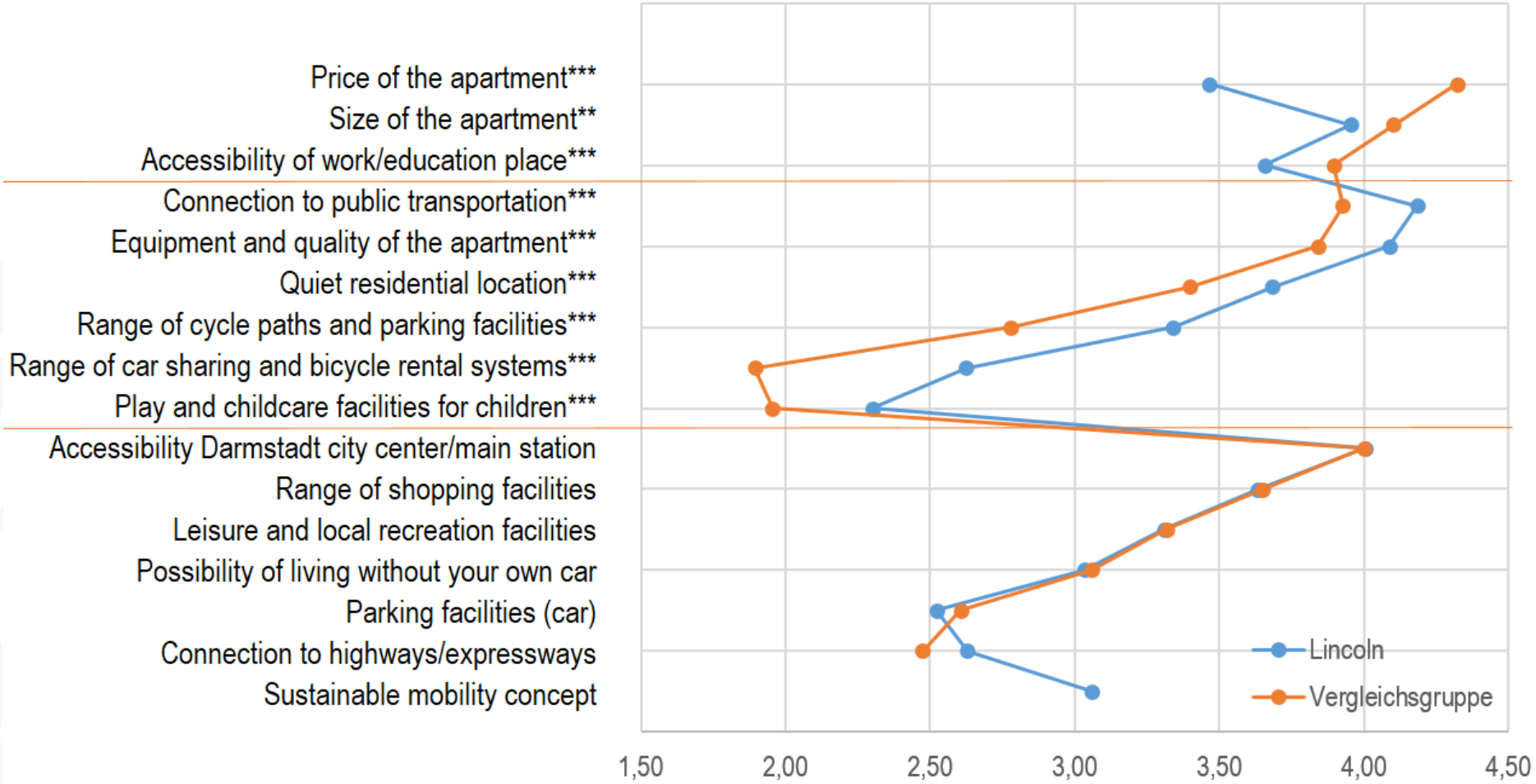
Results: Residential location factors

	⌀	Lincoln	Control group
Price of the apartment	**4,07**	3,47	4,32
Size of the apartment	**4,06**	3,95	4,10
Accessibility Darmstadt city center/main station	**4,00**	4,18	3,93
Connection to public transportation (bus, train)	**4,00**	4,00	4,00
Equipment and quality of the apartment	**3,91**	4,09	3,84
Accessibility of work/education place	**3,83**	3,66	3,89
Range of cycle paths and parking facilities	**3,65**	3,63	3,65
Quiet residential location	**3,48**	3,68	3,40
Range of shopping facilities	**3,31**	3,31	3,32
Sustainable mobility concept	**3,06**	3,06	
Possibility of living without your own car	**3,05**	3,03	3,06
Parking facilities (car)	**2,94**	3,34	2,78
Connection to highways/expressways	**2,58**	2,52	2,61
Leisure and local recreation facilities	**2,52**	2,63	2,47
Range of car and bike sharing schemes	**2,11**	2,63	1,89
Play and childcare facilities for children	**2,05**	2,30	1,95

Source: own survey 2023;
Lincoln N=293; Control group N=659

Results: Residential location factors

- Sorted by difference between Lincoln and the control group



Source: own survey 2023;
Lincoln N=293; Control group N=659

*T-test (difference test) with *p < 0.1; **p < 0.05; **p < 0.01*

Results on mobility-related attitudes

- Attitude towards different means of transportation
- Summary variable per mode of transport
  - 4-5 variables summarized in each case
- The higher the score, the more positive the rating (scale from 1-5)

	Lincoln	Control group	T-test
Car	2,61	2,70	0,18
Public transport	3,92	3,98	0,18
Cycling	3,45	3,48	0,61
Walking***	4,02	**4,21**	0,00
Sharing**	**3,48**	3,34	0,01

Answers were partially recoded
T-test (difference test)
*with *p < 0.1; **p < 0.05; **p < 0.01*

Source: own survey 2023; Lincoln N=293; Control group N=659

Conclusion

Summary & Conclusion

- Lincoln residents use sustainable modes more often than other movers in Darmstadt
  - ➢ Reduction in car ownership after moving to the *Lincoln-Siedlung*
  - ➢ Less car use & more usage of public transport compared to other recent movers
- In terms of residential location factors & mobility-related attitudes, there are no major differences between residents of the *Lincoln-Siedlung* & other parts of Darmstadt

- Further research: Multivariate models to investigate whether the differences in mode use between Lincoln residents and other recent movers persist

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Thank you very much for your attention!

Looking forward to your question and the discussion!

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