What are the Determinants of Residential Relocation Intentions of Scottish Residents Post-Pandemic?

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Abstract

Following the COVID-19 pandemic, potentially permanent changes in work and travel patterns and preferences have persisted, which may lead to a shift in residential preferences. This may affect residential location in the long-term, which may in-turn shape urban areas and transport infrastructure. To investigate this in Scotland, UK, a survey was carried out in Autumn 2023 among a response panel of 726 Scottish residents to find the determinants in future relocation intentions post-pandemic. From this survey, it was found that over 40% of the sample anticipate relocating within the next 5 years. Determinants of these relocation intentions were found to be mostly related to dwelling attributes, household characteristics and age group. Renters are more prone to relocation than homeowners, as are younger respondents and those living by themselves. Preferences in location appear to be inclined towards a compromise between attractive surroundings of a less busy area, while still maintaining accessibility.

Introduction

Residential relocation choices are usually based on two fundamental categories: attributes of the residence, such as affordability and dwelling characteristics; as well as attributes of the location, such as accessibility to transport, schools and the workplace (Borgers & Timmermans, 1993; Ilham et al., 2024). Often, these factors can be trade-offs of each other (Kim, 2006). Which factors are prioritised more depends on a combination of life priorities (Coulter et al., 2016) and availability of resources (De Haas, 2021). Historically, proximity to the workplace has been a dominant factor in residential location choice, to the point where career changes have commonly been a driving factor of inducing relocation in the first place (Levine, 1998; Chi & Boydstun, 2017). Likewise, households with children tend to prioritise living within the catchment area of good schools according to their perceived importance of education (Jiao & Harata, 2007). Thereafter, prioritisation of dwelling characteristics or transport accessibility within the constraints of affordability tends to depend on how many activities are in or outside of the home respectively (Ilham et al., 2024). Understanding residential location choice is essential, due to its potential in shaping urban areas and transport infrastructure (Rodrigue, 2020).

In the wake of the recent COVID-19 pandemic, restrictions to mobility and out-of-home activities have been ongoing throughout a substantial portion of 2020 and 2021. This has consequently led to many potentially irreversible changes in mobility and activity patterns, which can be anticipated to remain long after pandemic restrictions have been lifted. Most notably, a considerable volume of work and education have migrated online, reducing a substantial number of regular trips, especially those made by public transport (Ceccato et al., 2022; Downey et al., 2022). Benefits of teleworking in particular have led to the desire of its continuation in the long-term (Adobati & Debernardi, 2022). Changes in residential location preferences may result as a consequence of these new circumstances. For example, the overall need to live near a workplace may diminish, leading to less constraints in choosing more desirable dwelling attributes in a more affordable area (Gallent & Madeddu, 2021). Likewise, spending more time at home or close to home may lead to a shift in priorities more towards pursuing more spacious dwellings with more outdoor space, with a lower need for transport accessibility (Melo, 2022). Thus, it is possible that preferential shifts of this nature may lead to urban decentralisation, which may consequently increase car dependency (Ilham et al., 2024).

Therefore, the aim of this paper is to investigate the determinants of relocation intentions based on empirical data taken over a year after the pandemic restrictions eased off in Scotland, UK.

Methodology

An online survey was administered through Qualtrics to a response panel of residents in every region of Scotland in order to cover a mix of rural and urban areas. It took place between October and November 2023, more than a year after pandemic restrictions gradually eased off in Scotland. From the 1192 responses collected in total, 726 were complete and valid. Questions asked to these respondents were based on a framework (Figure 1) developed combining established theories (Domarchi et al., 2008; Keeney et al., 2013; Van Acker et al., 2009) in order to examine the relationship between residential relocation intentions and travel-activity or social factors that could be affected by the effects of the pandemic (Ilham et al., 2024). From Figure 1, spatial aspects translate to questions about the current residence, past and potential future relocation. Likewise, it includes questions assessing the importance of potential reasons for the previous relocation and for the next anticipated relocation. Activity-related questions focus on work and shopping, while travel (or mobility) focuses on commute mode choice and duration, as well as household accessibility to different types of destination with particular modes of transport. Household desires and intentions are related to the relocation question about intentions to relocate, as well as a question assessing life priorities. Social norms are based on questions about the surrounding behaviour of people relevant to the respondent, while social role is related to all sociodemographic and household-related questions. Self-concept and perceived behavioural control are in questions of what extent the respondent thinks they can influence their household's relocation preferences and decisions.

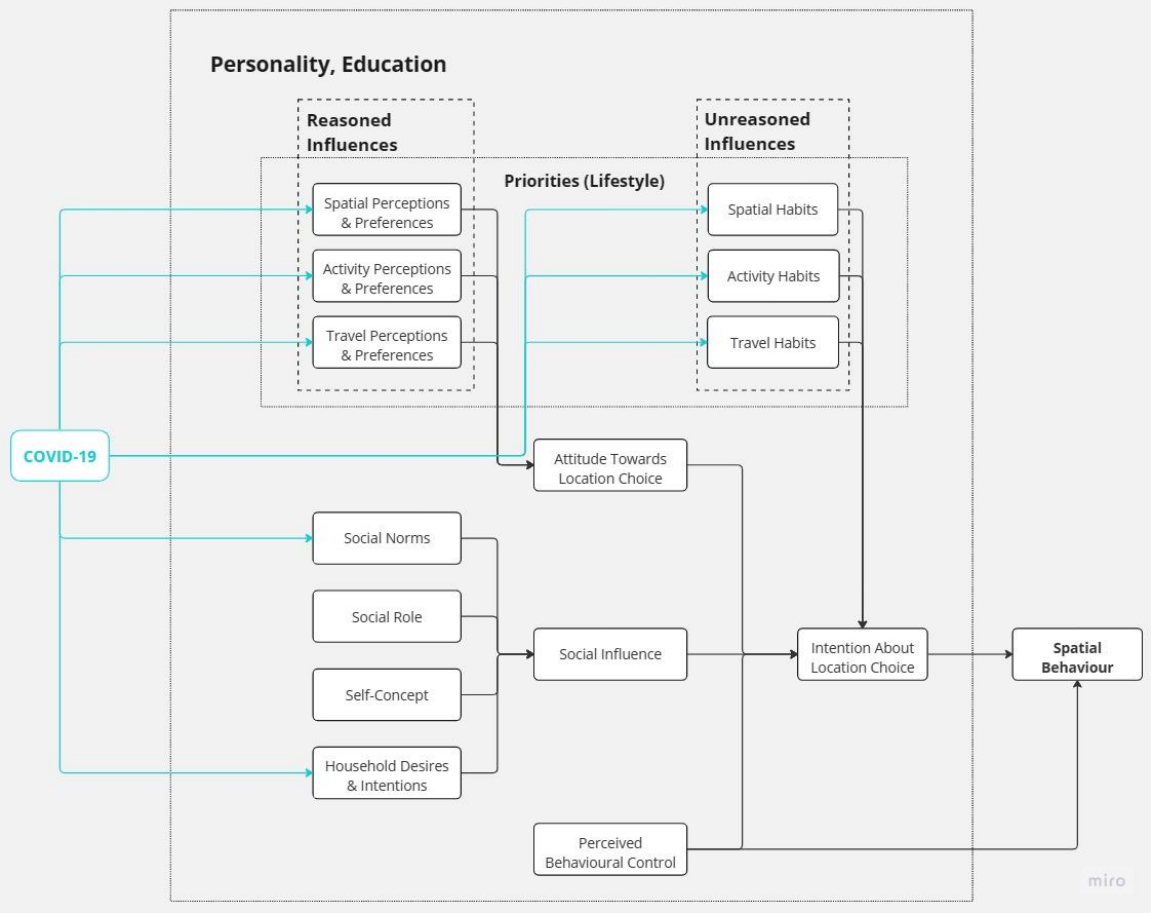

Figure 1 Theoretical Framework for Relocation Choice (Ilham et al., 2024)

One question in particular regarding the timeframe the respondent anticipates relocating next, where there are options for various timeframes, as well as 'never' and 'unsure', as shown in Table 1. Over a fifth of the sample are unsure about when they anticipate relocation in the future, hence they will be excluded from the analysis. This leaves 574 cases (under 80% of the sample) to analyse from the respondents who are definitive about their relocation intentions. Nearly a quarter of the sample do not plan on relocating in the future, leaving over 55% of the sample who are positive about relocation in the future. More than half of this group want to relocate within the short-term (under 5 years), while the rest are considering over the long-term. Thus, two different binary regression models could be carried out, one to find the determinants of intentions to relocate and another for short-term or long-term relocation. While an ordinal regression model is theoretically possible for the latter using the original timeframes, the nature of the distribution between them made it more appropriate to merge the first three timeframes together for a 5-year threshold. Table 1 shows the recoded binary values for the respective dependent variables, derived from the original variable from the survey.

Table 1 Descriptive Statistics of Dependent Variable(s)

Future Relocation Time	*Counts*	*Percentage*	*Binary for Intentions*	*Binary for Timeframe*
Unsure	152	20.9	N/A	N/A
Never	173	23.8	0	N/A
Within the next year	41	5.6	1	0
1-3 years from now	104	14.3	1	0
3-5 years from now	89	12.3	1	0
More than 5 years from now	167	23.0	1	1

With these recoded variables, each model can be formulated as:

$$\mathrm{Y}_n = \beta \mathbf{X}_n + \varepsilon_n, y_n = 1 \text{ if } \mathrm{Y}_n > 0, \text{and } y_n = 0 \text{ otherwise}$$

Here, Y_n is a latent variable corresponding to the observed dependent variable for each respondent n. Meanwhile, $\mathbf{X}$ represents the potential determinants of intentions to relocate or not, or timeframe of future relocation for those positive about relocating, depending on the model. β indicates the parameter estimate that corresponds to each determinant included in the model, whereas y denotes the observed value of the dependent variable, and ε represents an error term for each respondent n. The error term is specified to follow the Weibull distribution, giving rise to the logit formulation of the model. For the estimation of each binary logit model, the Maximum Likelihood Estimation (MLE) approach was leveraged (Washington et al., 2020). The models were conducted using the SPSS statistical package.

As for the potential determinants of the models, relevant variables were selected from each category based on Figure 1 and, where required, dummy variables were derived from some survey questions. However, there were some more complex questions that involved many ordinal variables in one go: reasons for future relocation, and attitudes towards mobility and teleworking. An Exploratory Factor Analysis (EFA) was carried out to reduce dimensionality of these variables, generating latent numerical variables for the model (Rahim et al., 2023).

Results & Discussion

From the results of the EFA, Table 2 shows that the 17 Likert scale variables representing potential reasons for relocation and their level of importance have been condensed into 4 latent factors. Potential reasons related to changes in household members and characteristics of the dwelling were easily defined as their own respective factors, while most of the remaining factors are either associated with either preference for urban areas or preference for less busy (rural or suburban) areas. Preferring to live in a less busy area is usually associated with attractive surroundings and, to a lesser extent, better outdoor space, a trait also associated with desirable dwelling attributes. On the other hand, preferring to live in an urban area includes all traits of accessibility, except for accessibility to the workplace. The latter, interestingly, is not associated strongly (i.e., loading > 0.5) with any factor. Rather, its strongest loading is tied between household dynamics and dwelling attributes. As for the other variable groups in Table 2, their factors are more straightforward two-fold divisions. Mobility is separated into views in favour of private cars and views in favour of alternative modes of transport, whereas attitudes towards teleworking vs commuting are self-explanatory. Also, views in favour of hybrid working are more strongly associated with views in favour of teleworking than commuting.

Table 2 Factor Analysis of Detailed Variable Groups

Factors	***Associated Variables***	***Loadings***
Reasons for Future Relocation [Overall Explained Variance: 61.442%]		
Importance of Household Dynamics	Birth of a new child	0.703
	New household member(s) moved in	0.800
	Household member(s) moved out	0.614
	Moved out to create a new household	0.643
	Accessibility to the workplace	0.394
Importance of Desirable Dwelling Attributes	Size of dwelling	0.795
	Quality of dwelling	0.808
	Affordability of the property	0.736
	Better outdoor space	0.589
	Accessibility to the workplace	0.394
Importance of Urban Area Attributes	Proximity to shops and services	0.762
	Public transport connections	0.756
	Parking availability and road connections	0.547
	Better internet connection	0.625
	Better delivery coverage	0.738
	Prefer to live in an urban area	0.680
Importance of Rural Area Attributes	Prefer to live in a less busy area	0.870
	Attractive surroundings	0.560
	Better outdoor space	0.473
Attitudes towards Mobility [Overall Explained Variance: 53.038%]		
Inclination to Private Automobiles	"I prefer the freedom and flexibility of driving my own car"	0.813
	"I value the privacy and personal space offered by the car"	0.844
	"Public transport is too unreliable to be a viable alternative to the car"	0.686
Inclination to Alternative Modes of Transport	"Public transport is helpful in reducing congestion"	0.674
	"I feel like I can explore places better walking and using public transport instead of driving"	0.578
	"I like the bonus of exercise offered by walking and cycling"	0.655
	"Finding a place to park is enough of a hassle to avoid driving whenever possible"	0.589

	"It is important to consider the impact on the environment when choosing your mode of transport"	0.749
	"It is important to have the possibility to choose among different means of transport to carry out a journey"	0.599
Attitudes towards Teleworking and Commuting [Overall Explained Variance: 77.158%]		
Inclination to Teleworking	"I value the greater flexibility and time efficiency offered by teleworking"	0.893
	"Teleworking allows a better balance between work and personal life"	0.899
	"Teleworking is much better for the environment than commuting to the office"	0.833
	"The hybrid working model achieves the best of both worlds"	0.722
Inclination to Commuting	"I prefer being able to socialise with others in a conventional workplace"	0.911
	"Travelling to a physical workplace gives me more motivation to be productive"	0.890

Regarding the results in the first model, Table 3 shows that the significant determinants for relocation intentions from the sample are predominantly related to characteristics of the dwelling or household. Renters are more prone to relocating than homeowners, as are those who value relocating for desirable dwelling attributes, higher income households, single-earner households over others and respondents who live on their own. On the other hand, respondents more satisfied with their current residential location are less prone to relocating, as are households with more children under the age of 18. From sociodemographics, age group is a strong determinant such that younger respondents are more prone to relocating in the future than older respondents. Interestingly, those more likely to relocate in the future are inclined to prefer attributes associated with both rural and urban areas, suggesting the desire for a compromise between the desirable characteristics of both.

Table 3 Determinants of Intentions to Relocate (574 cases)

Variable	***Coefficient***	***p-value***	***Variable Type***
Owner of property or renter	-0.785	0.032	Binary
Satisfaction with current residential location	-0.661	<0.001	Ordinal
Importance of urban area attributes	0.341	0.002	Latent
Importance of rural area attributes	0.211	0.052	Latent
Importance of desirable dwelling attributes	0.302	0.004	Latent
Monthly household income after-tax	0.277	<0.001	Ordinal
Single-earner household	0.543	0.054	Binary
Number of household members under 18	-0.290	0.017	Numerical
Solo household	0.932	0.014	Binary
Age group	-0.566	<0.001	Ordinal
R-Squared Goodness of Fit			0.216

Log-Likelihood at Intercept	522.825
Log-Likelihood of Final Model	526.485

As for the determinants of short-term or long-term relocation (5-year threshold), Table 4 shows that they are more focused towards dwelling characteristics. Thus, renters are much more likely to relocate sooner than homeowners. Meanwhile, the more bedrooms the respondent's current dwelling has, or the more satisfied they are with their current residential location, the more likely their next relocation will be in the long-term if at all. Consequently, those who give more importance to seeking desirable dwelling attributes are more likely to relocate within the short-term as opposed to the long-term. From the sociodemographic attributes, age group is a determinant such that younger respondents are more prone to short-term relocation, while older respondents are more prone to long-term relocation. Respondents living on their own are also more prone to short-term relocation, while households with more children under the age of 18 are more prone to long-term relocation if at all.

Table 4 Determinants of Short- or Long-Term Relocation (401 cases)

Variable	***Coefficient***	***p-value***	***Variable Type***
Number of bedrooms	0.290	0.024	Numerical
Owner of property or renter	1.427	<0.001	Binary
Satisfaction with current residential location	0.285	0.041	Ordinal
Importance of desirable dwelling attributes	-0.383	0.005	Latent
Number of household members under 18	0.329	0.017	Numerical
Solo household	-0.867	0.018	Binary
Age group	0.180	0.058	Ordinal
R-Squared Goodness of Fit			0.205
Log-Likelihood at Intercept			435.571
Log-Likelihood of Final Model			437.691

Based on the level of urbanity of where the respondent currently lives and where they plan to relocate to, an ordinal variable was derived assessing the net urbanity of the planned relocation pattern. However, this variable is only added as a potential determinant in a separate model to the results in Table 4, due to the limited number of cases for this particular variable. This is because respondents who were unsure of where to relocate, or considering relocating outside of Scotland, were excluded from this variable due to uncertainty of the urbanity of the relocation destination in these cases. Thus, less than 300 cases were analysed with this variable. However, the variable is found to be significant in this model (coefficient 0.386, p-value 0.068), implying that rural-urban migrations are more likely to be short-term, while urban-rural migrations are more likely to be across the long-term.

The results suggest that dwelling attributes have strong importance in future relocation intentions, while they are mainly unrelated with mobility, working or shopping patterns. Only a quarter of the

sample were influenced at least to some degree by the possibility of teleworking in their relocation intentions, while even less were influenced by the rise of online shopping. This indicates that the need for more desirable dwelling attributes in relocation may not be as strongly correlated to the pandemic-induced changes in mobility and activity as initially anticipated (Ilham et al., 2024). To solidify this, the overall level of importance for dwelling attributes collectively between past and future relocation is almost the same. However, effects from the pandemic do still remain to an extent.

Regarding relocation preferences aside from dwelling attributes, those with intentions to relocate tend to be inclined towards less busy areas for more attractive surroundings and better outdoor space like past studies have anticipated (Gallent & Madeddu, 2021). However, at the same time, they still value good accessibility to transport and services, albeit for non-commuting trips that were likely induced from the reduction in commuting (Ilham et al., 2024). Interestingly, those planning migrations to areas more urban than where they currently live are more likely to relocate within the short-term, while those planning to move to areas less urban than where they currently live are more likely to relocate in the long-term. However, there were limited cases within the sample to assess this change in urbanity. Likewise, most respondents within this group are planning relocation to an area with the same level of urbanity as where they currently live.

Conclusion

In light of recent studies on post-pandemic relocation intentions (Ilham et al., 2024), future relocation intentions in Scotland, UK are predominantly connected with dwelling attributes as anticipated. However, accessibility still appears to hold importance in future relocation intentions for non-commuting purposes, while importance of workplace accessibility has been reduced. Also, it is unlikely any relocations to less urban areas would occur within the next 5 years. Thus, while there is a possibility that future relocation intentions may favour less busy areas, it is more likely that a compromise between the desirable traits of urban and rural/suburban areas would be preferred. In other words, while a less busy area where desirable dwelling attributes can be achieved more affordably appears to be a likely preference for those intending to relocate in the near future, this is often coupled with maintaining good accessibility to non-commuting activities. With this combination of characteristics, relocation to rural areas as anticipated by some studies (Gallent & Madeddu, 2021) may not necessarily be the course of action for most relocation intentions within the sample.

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References

Adobati, F., & Debernardi, A. (2022). The breath of the Metropolis: Smart working and new urban geographies. *Sustainability*, *14*(2), 1028.

Borgers, A., & Timmermans, H. (1993). Transport facilities and residential choice behavior: a model of multi-person choice processes. Papers in regional science, 72(1), 45-61.

Ceccato, R., Baldassa, A., Rossi, R., & Gastaldi, M. (2022). Potential long-term effects of Covid-19 on telecommuting and environment: An Italian case-study. Transportation Research Part D: Transport and Environment, 109, 103401.

Chi, G., & Boydstun, J. (2017). Are gasoline prices a factor in residential relocation decisions? Preliminary findings from the American housing survey, 1996–2008. Journal of planning education and research, 37(3), 334-346.

Coulter, R., Ham, M. van, & Findlay, A. M. (2016). Re-thinking residential mobility: Linking lives through time and space. Progress in Human Geography, 40(3), 352-374. https://doi.org/10.1177/0309132515575417

De Haas, H. A theory of migration: the aspirations-capabilities framework. CMS 9, 8 (2021). https://doi.org/10.1186/s40878-020-00210-4

Domarchi, C., Tudela, A., & González, A. (2008). Effect of attitudes, habit and affective appraisal on mode choice: an application to university workers. Transportation, 35, 585-599.

Downey, L., Fonzone, A., Fountas, G., & Semple, T. (2022). The impact of COVID-19 on future public transport use in Scotland. Transportation Research Part A: Policy and Practice, 163, 338-352.

Gallent, N. & M. Madeddu. Covid-19 and London's decentralising housing market–What are the planning implications? Planning Practice and Research, 2021. 36(5): 567-577.

Ilham, M. A., Fonzone, A., Fountas, G., & Mora, L. (2024). To move or not to move: A review of residential relocation trends after COVID-19. Cities, 151, 105078.

Jiao, P., & Harata, N. (2007). Residential location choice behavior for different households: methodology and case study in Dalian, China (No. 07-1056).

Keeney, J., Boyd, E. M., Sinha, R., Westring, A. F., & Ryan, A. M. (2013). From “work–family” to “work–life”: Broadening our conceptualization and measurement. Journal of Vocational Behavior, 82(3), 221-237.

Kim, J. H. (2006). Amenity Valuing Differentiation in Residential Location Choice among Income Groups: A Stated Preference Approach. International Journal of Urban Sciences, 10(1), 41–57. https://doi.org/10.1080/12265934.2006.9693586

Levine, J. (1998). Rethinking Accessibility and Jobs-Housing Balance. Journal of the American Planning Association, 64(2), 133–149. https://doi.org/10.1080/01944369808975972

Rahim, A. N., A. Fonzone, G. Fountas, & L. Downey. On the attitudes toward automation in determining the intention to use automated buses in Scotland. Transportation Research Record, 2023. Volume: 2677(9), 384-396.

Rodrigue, J. P. (2020). The geography of transport systems. Routledge.

Van Acker, V., & Witlox, F. (2009). Why land use patterns affect travel behaviour (or not). Toward a “state-of-the-art” conceptual framework and an appropriate modelling technique. Belgeo. Revue belge de géographie, (1), 5-26.

Washington, S., Karlaftis, M., Mannering, F., & Anastasopoulos, P. (2020). Statistical and econometric methods for transportation data analysis. Chapman and Hall/CRC.