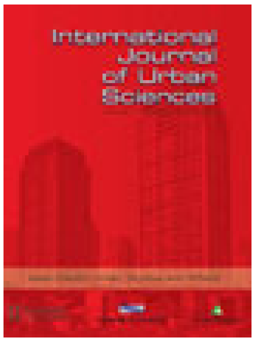

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Assessing the importance of housing, accessibility, and transportation characteristics on stated neighbourhood preference

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ABSTRACT
Beyond socioeconomic circumstance, residential location decisions are also predicated on many housing, transportation, and accessibility characteristics. Consequently, greater insight is needed on how these myriad characteristics are valued by individuals and connected to their neighbourhood preference to inform planners and decision makers concerned with urban growth patterns. Unfortunately, forecasting methods commonly lack the specificity needed to recognize how residential environment preferences influence future housing, land use, and transportation decisions. Often, these policy instruments rely exclusively on a set of observed socioeconomic characteristics to measure heterogeneity in revealed location decisions. Using stated preference data collected in Portland, Oregon, this study employed structural equation modelling techniques to examine the influence of these socioeconomic measures and latent constructs of rated single-family dwelling and non-automotive access importance on stated neighbourhood preference. Our study's findings suggest the importance placed on certain bundles of housing, transportation, and accessibility attributes, and not socioeconomic circumstance, directly affected neighbourhood preference.

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Stated preference; residential location choice; neighbourhoods; importance ratings

1. Introduction

Understanding the inherent trade-offs considered in choices of housing and neighbourhood, which underlie the residential location decision-making process, has long been an area of investigation for planning researchers. Such studies generally evaluate the connection between revealed land use or location choices and travel behaviours or patterns. The goal has tended to focus on a better representation of household taste variations in travel demand models, understanding of household self-selection into residential environments supportive of their preferred travel behaviours, and explanation of trade-offs in housing location and job accessibility faced by households. Yet, despite improved knowledge gained in these areas, travel demand and land use allocation models still commonly lack the specificity needed to explain how certain housing,

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land use, and transportation features influence residential environment preferences. This preference for where to locate may be expressed as the importance placed on housing and access attributes or a collection of pull factors, which are less prominent in planning applications than push factors related to changes in lifecycle stage or household composition (Olaru, Smith, & Taplin, 2011).

Often, these valuable policy instruments rely greatly on sociodemographic characteristics to measure differences in revealed location choices (Molin & Timmermans, 2003); when in fact, neighbourhood preference explained by housing, accessibility, or transportation characteristics may precede choice (Handy, Mokhtarian, Buehler, & Cao, 2004). Findings from past studies using only socioeconomic status to model revealed choice variation may therefore prove insufficient in advising the future demand for a particular neighbourhood context. Moreover, predictive models in practice continue to rely on observed demographic characteristics to predict neighbourhood preference, as though a household's socioeconomic constraints should prescribe future tastes and how land is allocated and zoned. Instead, the importance placed on one or many housing or location characteristics describing an ideal residential location, and not socioeconomic characteristics, may directly impact future neighbourhood choices. In response, an increased need to create toolkits capable of providing planning practice with more behaviourally sensitive models describing how the stated preferences for residential environment contexts may vary due to lifecycle and lifestyle attributes is asked of transportation research (de Abreu e Silva, 2014). To date, residential location choice studies have largely focused on lifecycle attributes, which may be proxies for lifestyle aspirations toward specific housing, transportation, and accessibility desires.

To address this identified need, our study examines neighbourhood preference variation as a function of the subjective measurement of an expressed importance for certain residential location characteristics. Specifically, a stated preference survey was administered to (i) define bundles of housing, accessibility, and transportation characteristics that were most important to an individual's residential location decision-making process and (ii) explore whether the rated importance of these bundled attributes was a more direct predictor of neighbourhood preference than lifecycle stage characteristics. Our study results are intended to bolster a growing evidence base aimed at providing practice with a more rounded representation of the objective and subjective drivers of future residential location decisions.

By investigating stated neighbourhood preference, this study offers a valuable perspective into the residential location decision process that complements the many studies using revealed preference methods. Conceptually, the design of a stated preference survey allows the testing of alternative residential environments that may be presently unavailable. An examination into the relationship between the bundled attributes of residential location aspirations and neighbourhood preference can also be succinctly conducted with these stated preference data and without the complexity needed to estimate a residential location choice model with revealed preference data (Walker & Li, 2007). While a hypothetical choice situation will likely differ from a real choice set with constraints, this study of stated choice will help to illuminate the underlying structure of the parameters directing neighbourhood preferences.

2. Literature review

Past stated preference studies have theorized the residential location decision process to be most influenced by housing, accessibility, and transportation characteristics (Walker & Li, 2007). In support, a recent literature review summarized past studies as typically modelling a decision maker's preference in dwelling unit, location, and accessibility as well as socioeconomic status characteristics (Schirmer, van Eggermon, & Axhausen, 2014). Other studies have suggested the added benefit of attitudinal measurement in explaining residential location preferences for urban and suburban environments (Bagley & Mokhtarian, 2002; Bohte, Maat, & van Wee, 2009).

One of the most explored housing characteristic in residential location choice studies has been dwelling type; however, past studies have also examined physical attributes related to property size, dwelling size, and privacy from neighbours. Hunt (2001) and Molin and Timmermans (2003) both noted survey participants preferred single-family detached units when presented an array of distinct dwelling type alternatives. Corroborating these findings, Senior and colleagues (2006) found homeowners favoured detached and semi-detached dwelling types over terraced homes or apartments. Beyond a singular importance in dwelling type, Olaru and colleagues (2011) found a latent construct also reflecting property size significantly predicted residential choice. Studying visual image inclusion in preference surveys, Jansen and colleagues (2009) found that having a detached house, large dwelling and property size, and limited contact with neighbours significantly influenced an individual's residential environment preference.

Characteristics of the physical environment surrounding a dwelling unit and accessibility afforded by its proximity to local activities (e.g. shopping) have also been frequently studied. One strategy to explain physical environment variation has been the grouping of neighbourhoods along a continuum that illustrates their relative distance to, density of, and diversity in accessible activity locations (Senior, Webster, & Blank, 2006). Another strategy, common in neighbourhood dissonance studies, has been to dichotomize the residential environment as either urban or rural (De Vos, et al. 2012; Schwanen & Mokhtarian, 2004). Meanwhile, other studies have assessed the presence of a single activity location such as a local park (Jansen, et al. 2009; Walker and Li 2007), quality in a nearby service such as a school (Morrow-Jones, Irwin Roe, 2004), or distance to urban facility such as a medical centre (Hoshino, 2013; Olaru et al., 2011).

Transportation facility access has also been regularly used to measure variation in stated neighbourhood preference with conflicting results. Regarding vehicle infrastructure, Hunt (2001) found that individuals preferred local streets in front of their dwelling unit over collector roads and local streets with speed bumps; while, Senior and colleagues (2006) and Walker and Li (2007) found no meaningful difference in residential preferences for on- and off-street vehicle parking facilities. As for non-automotive transport, Lund (2006) and Hoshino (2013) noted transit access as a determinant of residential location choice. Similarly, Olaru and colleagues (2011) discovered relocation decisions directly influenced a stated interest in station proximity; likewise, most individuals considered walking and bicycling access as an important characteristic. By contrast, Walker and Li (2007) found bike path access had no significant influence on residential location.

Finally, a recent stream of travel behaviour research has evaluated revealed neighbourhood decisions, supplemented with attitudinal measures, to better understand the residential location decision-making process. Khattak and Rodriguez (2005) found the stated importance of nearby shops and services, adjacency to sidewalks, and proximity to neighbours positively influenced the decision to reside in a neo-traditional neighbourhood. Using structural equation modelling, Bagley and Mokhtarian (2002) found an increased household size, respondent age, and scores for a set of latent attitudinal constructs (e.g. pro-alternatives) positively predicted the revealed choice of a traditional neighbourhood. In all, attitudinal measures have directly explained heterogeneity in location choices not exclusively accounted for by socioeconomic characteristics (De Vos et al., 2012; Olaru et al., 2011; Walker & Li, 2007).

Drawing on past research, we theorize that the stated importance for a bundle of distinct housing, accessibility, and transportation characteristics will directly contribute to an individual's neighbourhood preference. Our first hypothesis, informed by the residential preference literature, is that housing characteristics bundle together and are considered by individuals to be separate from locational characteristics describing land use accessibility and transportation options (Frank, Saelens, Powell, & Chapman, 2007; Molin & Timmermans, 2003). Our other hypothesis is that the importance individuals placed on these characteristics has a stronger effect on a stated neighbourhood preference, unconstrained by current economic conditions, than an individual's lifecycle stage described by socioeconomic measures. By distinguishing how the rated importance of residential location characteristics bundle together as latent constructs and comparing their relative impact on stated neighbourhood preference to that of socioeconomic condition, this study provides further insight into the complex nature of the residential location decision-making process.

3. Methods

3.1. Research design and data collection

An online cross-sectional survey of a probability sample was used to determine the importance of housing, accessibility, and transportation characteristic ratings on neighbourhood preferences. The survey instrument had four distinct sections designed to (i) collect participant background information, (ii) measure the importance level a participant places on a set of characteristics possibly impacting his/her residential location decision process, (iii) identify a neighbourhood preference, and (iv) conduct a choice-based conjoint experiment of neighbourhood- and commute-based trade-offs (not analyzed in this study). In the first section, participants provided information about their socioeconomic status and current transportation and housing circumstances. To understand survey participants' preferences for various types of residential environments, a set of visual images with descriptive text was utilized to provide a richer illustration of the physical characteristics for the four neighbourhood concepts. Participants were then asked to examine 17 items related to different housing, accessibility, and transportation characteristics and rate the importance (*very important*, *somewhat important*, or *not at all important*) of each attribute in his/her residential location decision-making process.

Participants were recruited from Portland, Oregon in two waves by mailing postcards with a link to the survey website. In the first wave, postcards were mailed to 8000 randomly selected individuals from 201,444 home addresses in the region during June

2014. This sampling strategy employed a stratified method in which 2000 postcards were mailed to housing units located in each of four objectively-defined neighbourhood types in the region (Currans, Gehrke, & Clifton, 2015). In November 2014, due to complications in the consistency and accuracy of multifamily unit address formats, a second wave of recruitment postcards was sent to 1982 addresses to oversample downtown residents. All participants of the Neighbourhood Transportation Study were invited to enter their name for a chance to win a gift card to an electronic commerce company. The response rate was 6.3% for the first recruitment wave and 8.1% for the second wave.

3.2. Survey participants

In total, 654 participants from the Portland metropolitan region completed the survey. The study sample consisted of 554 individuals, who offered sufficient information to examine the measures of interest. Table 1 summarizes select socioeconomic measures for the study sample. Inspection of stratified levels revealed a majority of participants reported a household size of two members, with a similar sample proportion having a household size of three or more members. One-third of the sample earned an annual household income between $50,000 and 99,999. A majority of participants reported being over 45 years old, while half the sample stated they were female. Although average household size of the sample (2.5) was equivalent to the study area, a further comparison of the sample to the region revealed the average survey participant was more likely to earn a higher annual household income and be older than the average Portland resident.

3.3. Stated neighborhood preference and importance rating measurement

In the survey instrument, visual collages of nine images complemented with text descriptions exemplified four independent neighbourhood concepts: central district, urban

Table 1. Descriptive statistics for sociodemographic and economic variables in sample and study area.

	Sample		Relative	Portland metro region	
Observed variable	*n*	%	Difference	*n*	%
Household size					
1 member	132	24	0.80	180,454	30
2 members	212	38	1.12	207,758	34
3 members	105	19	1.27	92,001	15
4 or members	105	19	0.90	126,677	21
Annual household income					
$0–24,999	62	12	0.57	124,519	21
$25,000–49,999	113	21	0.88	143,007	24
$50,000–99,999	185	35	1.09	194,782	32
$100,000 or more	174	33	1.38*	144,582	24
Participant age					
18–34 years	145	26	0.79	382,343	33
35–44 years	117	21	1.05	229,130	20
45–64 years	209	38	1.12	395,560	34
65 or more years	78	14	1.00	163,587	14
Participant gender					
Female	276	50	0.98	600,138	51
Male	267	48	0.98	570,482	49

Note: Portland Metro Region summary statistics were calculated from 2007 to 2011 American Community Survey. A star (*) indicates that the proportional differences for a variable were significant ($p < 0.05$) using a χ^2 test.

residential district, urban neighbourhood, and suburban neighbourhood (Figure 1). The images selected to visualize the four concepts were collected from an assortment of Google Street View (Google Inc., 2011–2014) screenshots. Image location was chosen by aggregating objectively defined neighbourhood types based on measurement of the activity density, employment entropy, and intersection density of the built environment. A detailed description of the overall visualization process, including the objective definition of these neighbourhood types, adoption criteria for image selection, and validation of the neighbourhood concepts is offered elsewhere (Currans et al., 2015).

Neighbourhood preference was measured by a participant's response to a question asking him/her to examine four image collages with text descriptions and then select

Figure 1. Preferred neighbourhood concepts in the neighbourhood transportation study.

the neighbourhood where he/she would most prefer to live. Text descriptions illustrated a bundle of neighbourhood attributes related to the typical dwelling type and living space; likely home ownership status; distance to retail, services, and entertainment activities; vehicle parking availability; and public transit access to regional centres that were objectively measured and visualized to be at different levels across the four concepts. Each neighbourhood context exists along a continuum with the suburban neighbourhood as the least urban context on the spectrum and the central district as the most urban of neighbourhood contexts. In the study sample, 49 (9%) participants preferred a central district, 99 (18%) preferred an urban residential district, 220 (40%) preferred an urban neighbourhood, and the remaining 186 (34%) participants preferred the suburban neighbourhood concept.

After selecting a preferred neighbourhood, participants were then asked to examine a set of 17 housing, accessibility, and transportation characteristics and indicate whether each item was very, somewhat, or not at all important. Table 2 summarizes the importance level that participants selected for each residential location characteristic. Examination of survey responses revealed that sampled residents placed the greatest importance on having dedicated parking at their residence (67%), walking to nearby places (65%), owning their residence (64%), having a 25 min or less commute (59%), and accessing parks and recreational areas (59%). In contrast, a higher proportion of participants stated being near high-quality public schools (51%), living near older homes (50%), living at the 'center of it all' (45%), biking to nearby places (37%), and living in a home with a large living space (32%) bared no importance in their residential decision-making process.

3.4. Statistical analysis

In this three-part analytic plan, an exploratory factor analysis (EFA) and subsequent confirmatory factor analysis (CFA) of the rated importance characteristics preceded the

Table 2. Importance ratings for various housing, accessibility, and transportation characteristics.

		Level of importance					
		Very		Somewhat		Not at all	
Observed characteristic	*n*	*n*	%	*n*	%	*n*	%
1: Owning a house/condo	540	**343**	**64**	133	25	64	12
2: Living in a home with a large living space	534	137	26	**226**	**42**	171	32
3: Living in a detached single-family home	536	**233**	**43**	172	32	131	24
4: Having a private yard	539	**262**	**48**	175	32	102	19
5: Having privacy from my neighbours	535	**278**	**52**	227	42	30	06
6: Living at the 'center of it all'	538	81	15	213	40	**244**	**45**
7: Having access to highways/freeways	534	119	22	**271**	**51**	144	27
8: Having a variety of transportation options	540	**251**	**46**	228	42	61	11
9: Walking to bus and/or rail stops	542	**257**	**47**	186	34	99	18
10: Having off-street parking at local destinations	529	98	19	**263**	**50**	168	32
11: Having dedicated parking at your residence	540	**362**	**67**	115	21	63	12
12: Having access to parks and recreational areas	541	**320**	**59**	196	36	25	05
13: Walking to nearby places	538	**352**	**65**	146	27	40	07
14: Biking to nearby places	536	155	29	185	35	**196**	**37**
15: Being near high-quality public schools	536	152	28	110	21	**274**	**51**
16: Living near established, older homes	531	76	14	188	35	**267**	**50**
17: Having a commute that takes 25 min or less	538	**320**	**59**	147	27	71	13

Note: The most frequently stated level of importance for each characteristic is shown in **bold**.

adoption of structural equation modelling (SEM) techniques to determine associations between the latent importance rating constructs and neighbourhood preference. The EFA technique was used to help generate a theoretic understanding of the internal structure of how observed importance characteristic ratings may improve construct measurement (Henson & Roberts, 2006). An assumption being that factors shaped by this exploratory technique may also be useful as operational descriptions. To test if these operational descriptions also represent theoretical constructs, SEM was then used – informed by the EFA results and past literature of how various characteristics may bundle together – to predict stated neighbourhood preference. Sample size restrictions prohibited a splitting of these collected data into subsamples to independently conduct the two analyses.

Sequential decisions based on the selection of factor model approach, extraction scheme, and rotation method guided the iterative EFA process (Ford, MacCallum, & Tait, 1986). The choice of principal axis factoring as a modelling approach facilitated the recovery of factors with low loadings and solutions with stable loadings and isolated factors (de Winter & Dodou, 2012). The extraction of factors was informed by an inspection of eigenvalues and scree plots (Hayton, Allen, & Scarpello, 2004), while the selection of a promax rotation allowed correlation between extracted factors in the final EFA model.

Guided by residential location choice theory, the items in the final factor model were then estimated with confirmatory factor analysis (CFA) to identify latent constructs reflecting the rated importance of housing, accessibility, and transportation characteristics. The application of a CFA permitted the specification of measurement models positing a relationship between sets of these observed indicators as latent constructs prior to their assessment in an SEM framework with path assignments (Anderson & Gerbing, 1988). An adoption of SEM in this two-step strategy enabled multiple latent constructs reflecting the rated importance for residential location characteristics to be estimated free of measurement error and predictive of stated neighbourhood preference, while also simultaneously testing for direct and indirect paths with self-reported socioeconomic variables (Golob, 2003). This structural model can be mathematically specified according to the following general equation:

$$\eta = \beta\eta + \Gamma\xi + \zeta$$

where β is the matrix of regression weights interrelating endogenous η variables, Γ is the matrix of regression weights relating exogenous ξ and to the endogenous η variables, and ζ is a vector of residuals for the endogenous latent variables (Maruyama, 1998).

4. Results

4.1. Exploratory factor analysis

Correlations between importance characteristics were analyzed prior to the EFA. The importance characteristics, reflecting a participant's rating of 17 items describing his/her residential location decision process, were coded 3 for *very important*, 2 for *somewhat important*, and 1 for *not at all important*. Table 3 shows a zero-order correlation matrix of the 14 retained rating items. Measures of the importance for living near older homes, high-quality public schools, and having a 25-minute or less commute were removed from this,

Table 3. Zero-order correlation matrix of importance rating characteristics.

Observed importance rating measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1: Owning a house/condo	---													
2: … home with a large living space	.18	---												
3: Living in a detached single-family home	.34	.26	---											
4: Having a private yard	.28	.26	**.68**	---										
5: Having privacy from my neighbuors	.17	.20	.35	.33	---									
6: Living at the ‘center of it all’	−.16	−.14	**−43**	**−40**	−34	---								
7: Having access to highways/freeways	.19	.18	.11	.07	.12	−.11	---							
8: … variety of transportation options	−.22	−.20	−.36	−.31	−.27	.33	−.11	---						
9: Walking to bus and/or rail stops	−.28	−.17	**−.41**	−.36	−.25	.32	−.14	**.57**	---					
10: … off-street parking …	.12	.17	.14	.11	.19	−.11	.25	−.15	−.18	---				
11: … dedicated parking at your residence	.32	.18	.27	.23	.26	−.23	.30	−.27	−.25	.36	---			
12: … access to parks …	−.07	−.08	−.11	−.09	−.10	.10	−.02	.23	.13	−.01	−.05	---		
13: Walking to nearby places	−.23	−.22	**.40**	−.33	−.30	**.41**	−.16	**.50**	**.50**	−.16	−.30	.24	---	
14: Biking to nearby places	−.08	−.15	−.04	−.04	−.13	.06	−.16	.24	.18	−.12	−.19	.32	.31	---

Note: Kendall rank correlation coefficients over 0.40 or under −0.40 appear in **bold**.

and subsequent, analyses because of item misinterpretation (e.g. older homes) or a lack of response variation within the study sample.

The EFA was next conducted to advise the development of theoretical constructs related to the importance level for housing, accessibility, and transportation characteristics of residential location decisions. Provided the subjectivity of EFA, Table 4 shows our separate factor solutions in line with the rule of eigenvalues above one (Kaiser, 1960). The two-factor solution represented the best balance between a priori theory and an empirical description of the data (χ^2 (64) = 292.75, $p < 0.01$). Of the salient loadings on Factor 2A, four items described transportation characteristics related to the residential location decision-making process; whereas, each high loading item on Factor 2B conceptually reflected either a housing or accessibility feature. Factor 2A was driven by the importance in having a variety of transportation options, walking to nearby places, walking to bus and/or rail stops, biking to nearby places, and having access to parks and recreational areas. In turn, the items reflecting Factor 2B included the importance of living in a detached single-family home, having a private yard, and living at the 'center of it all.' In general, the eight salient items in the two-factor solution only loaded on one distinct factor with the sole exception being the importance of biking to nearby places. Also of note, living at the 'center of it all' was the characteristic with the strongest negative loading. All items with strong loadings in the two-factor solution were retained for the CFA as were the three items with a factor loading greater than 0.30 or less than −0.30 on either factor.

4.2. Confirmatory factor analysis

Guided by the empirically-driven EFA results and a priori hypotheses concerning the relationship among importance rating characteristics, a CFA model was specified for the two latent constructs reflecting a rated single-family dwelling and non-automotive access importance to the residential location decision-making process. This analysis was conducted in R (R Core Team, 2014) using the 'lavaan' package (Rosseel, 2012), which enabled the use of categorical variables with a robust weighted least squares mean- and

Table 4. Summary of two exploratory factor analyses for importance rating characteristics.

Factor solution model:	One factor	Two factors	
Factor number:	1A	2A	2B
Observed importance rating measure			
1: Owning a house/condo	**0.42**	−0.16	0.30
2: … home with a large living space	0.38	−0.20	0.22
3: Living in a detached single-family home	**0.73**		**0.91**
4: Having a private yard	**0.66**		**0.87**
5: Having privacy from my neighbours	**0.49**	−0.21	0.32
6: Living at the 'center of it all'	**−0.58**	0.19	**−0.44**
7: Having access to highways/freeways	0.25	−0.28	
8: … variety of transportation options	**−0.66**	**0.75**	
9: Walking to bus and/or rail stops	**−0.69**	**0.64**	−0.13
10: … off-street parking …	0.28	−0.29	
11: … dedicated parking at your residence	**0.46**	−0.35	0.14
12: … access to parks …	−0.24	**0.42**	0.13
13: Walking to nearby places	**0.68**	**0.70**	
14: Biking to nearby places	−0.27	**0.63**	0.33
Eigenvalue	3.72	2.47	2.18
Percent of Variance Explained	0.27	0.18	0.16

Note: Factor loadings over 0.40 or under −0.40 appear in **bold**; Factor loadings between −0.10 and 0.10 not shown.

variance-adjusted (WLSMV) estimator. Choice of model fit indices and overall performance was guided by recommendations of Hu and Bentler (1999), while simulation results (Bandalos, 2014) established that a sample size greater than 500 cases offered sufficient power to reject models with a WLSMV estimator.

Two latent constructs measuring rated single-family dwelling and non-automotive access importance were entered into the final CFA model (Table 5). Although, the model chi-square was significant (χ^2 (13) = 67.48, $p < 0.01$) and root mean square error of approximation (RMSEA) was above 0.06; both the comparative fit index (CFI) and Tucker-Lewis Index (TLI) were above 0.95, supporting an acceptable model fit to the sample data. Items for each latent construct were above an acceptable standardized loading ($\beta \geq 0.40$). A significant, negative relationship existed between these two latent constructs.

4.3. Structural equation model

After identifying these two latent constructs, a path model predicting the impact of single-family dwelling and non-automotive access rating importance on stated neighbourhood preference was estimated. Neighbourhood preference was measured as an ordinal outcome, which reflected the existence of the four neighbourhood concepts on an increasingly urban continuum. Complexity in this path model specification was tested with exogenous socioeconomic and revealed residential location variables as direct predictors of the two importance rating constructs and neighbourhood preference. This analytic strategy allowed for an examination of whether the constructs of single-family dwelling living and non-automotive access had a more direct connection to unconstrained stated neighbourhood preference than lifecycle stage. Table 6 details the results of the estimated model, while Figure 2 offers a path diagram of this SEM analysis. Parameters for this final model were estimated using a probit link function with a WLSMV adjustment method. Model fit indices suggest an adequate fit to the data (χ^2 (132) = 590.30, $p < 0.05$, CFI = 0.89, TLI = 0.83, RMSEA = 0.03). Moreover, since model interpretations solely based on the direct link between a tested variable and an outcome may prove misleading, the standardized direct, indirect, and total effect of all tested variables on stated neighbourhood preference as an ordinal outcome is offered in Table 7. A description of standardized

Table 5. Confirmatory factor analysis of importance rating constructs ($N = 548$).

Parameter estimates:	B	SE (B)	β	*p*-value
Indicator variables				
Factor A: Single-family dwelling importance				
3: Living in a detached single-family home	1.00	---	0.95	---
4: Having a private yard	0.54	0.17	0.86	0.00
6: Living at the 'center of it all' *	0.32	0.08	0.70	0.00
Factor B: Non-automotive access importance				
8: Having a variety of transportation options	0.84	0.14	0.83	0.00
9: Walking to bus and/or rail stops	0.90	0.15	0.85	0.00
11: Having dedicated parking at your residence *	0.36	0.07	0.54	0.00
13: Walking to nearby places	1.00	---	0.87	---
Covariances				
Factor A ~~ Factor B	−3.96	1.04	−0.73	0.00

Note: Dashes (---) indicate the standard error was not estimated. A star (*) indicates the measure was reverse-coded. χ^2 (13) = 67.48, $p = 0.00$. CFI = 0.99, TLI = 0.98, and RMSEA = 0.09.

Table 6. Estimation results of structural equation model of stated neighbourhood preference with importance rating constructs and observed socioeconomic measures ($N = 530$).

Parameter estimates:	B	SE (B)	β	p-value
Measurement model				
Indicator variables				
Factor A: Single-family dwelling importance				
3: Living in a detached single-family home	1.00	---	0.91	---
4: Having a private yard	0.92	0.28	0.90	0.00
6: Living at the 'center of it all' *	0.36	0.11	0.63	0.00
Factor B: Non-automotive access importance				
8: Having a variety of transportation options	0.98	0.34	0.88	0.00
9: Walking to bus and/or rail stops	1.00	---	0.88	---
11: Having dedicated parking at your residence *	0.47	0.18	0.65	0.01
13: Walking to nearby places	1.00	0.57	0.88	0.08
Path Models				
Stated neighbourhood preference^ ~				
Factor A: Single-family dwelling importance	−0.28	0.11	−0.68	0.01
Factor B: Non-auto access importance	0.19	0.09	0.38	0.03
Household adults: 1	0.02	0.08	0.01	0.84
Household adults: 3 or more	0.14	0.09	0.06	0.10
Household children: 1	−0.17	0.11	−0.06	0.15
Household children: 2 or more	0.24	0.20	0.09	0.21
Household income: $0–24,999	−0.14	0.11	−0.05	0.19
Household income: $25,000–49,999	−0.15	0.08	−0.07	0.07
Household income: $100,000 or more	0.05	0.09	0.03	0.56
Participant age: 18–34 years	−0.16	0.10	−0.08	0.11
Participant age: 35–44 years	−0.04	0.11	−0.02	0.68
Participant age: 65 or more years	−0.18	0.11	−0.07	0.10
Revealed neighbourhood: Urban residential district	0.12	0.16	0.06	0.48
Revealed neighbourhood: Suburban neighbourhood	−0.06	0.12	−0.03	0.61
Revealed dwelling type: Single-family house	0.13	0.15	0.07	0.40
Factor A: Single-family dwelling importance ~				
Household adults: 1	−0.43	0.26	−0.08	0.10
Household adults: 3 or more	0.22	0.23	0.04	0.34
Household children: 1	0.26	0.27	0.04	0.35
Household children: 2 or more	1.54	0.43	0.23	0.00
Household income: $0–24,999	0.56	0.29	0.08	0.05
Household income: $25,000–49,999	0.15	0.22	0.03	0.49
Household income: $100,000 or more	−0.44	0.27	−0.09	0.11
Participant age: 18–34 years	−0.52	0.28	−0.10	0.07
Participant age: 35–44 years	−0.45	0.29	−0.08	0.12
Participant age: 65 or more years	−0.91	0.41	−0.14	0.03
Revealed neighbourhood: Urban residential district	−1.77	0.58	−0.36	0.00
Revealed neighbourhood: Suburban neighbourhood	0.09	0.20	0.02	0.66
Revealed dwelling type: Single-family house	1.35	0.38	0.29	0.00
Factor B: Non-auto access importance ~				
Household adults: 1	−0.14	0.21	−0.03	0.50
Household adults: 3 or more	−0.24	0.21	−0.06	0.24
Household children: 1	−0.13	0.24	−0.02	0.59
Household children: 2 or more	−0.77	0.30	−0.14	0.01
Household income: $0–24,999	0.57	0.26	0.10	0.03
Household income: $25,000–49,999	0.21	0.21	0.05	0.31
Household income: $100,000 or more	−0.01	0.19	0.00	0.98
Participant age: 18–34 years	0.51	0.21	0.12	0.02
Participant age: 35–44 years	0.55	0.23	0.12	0.02
Participant age: 65 or more years	0.57	0.26	0.11	0.03
Revealed neighbourhood: Urban residential district	0.65	0.27	0.16	0.02
Revealed neighbourhood: Suburban neighbourhood	−0.76	0.25	−0.21	0.00
Revealed dwelling type: Single-family house	−0.74	0.29	−0.20	0.01

Note: Dashes (---) indicate the standard error was not estimated. A star (*) indicates the measure was reverse-coded. A carrot (^) indicates an ordinal measure. χ^2 (132) = 590.30, $p = 0.00$. CFI = 0.89, TLI = 0.83, and RMSEA = 0.03.

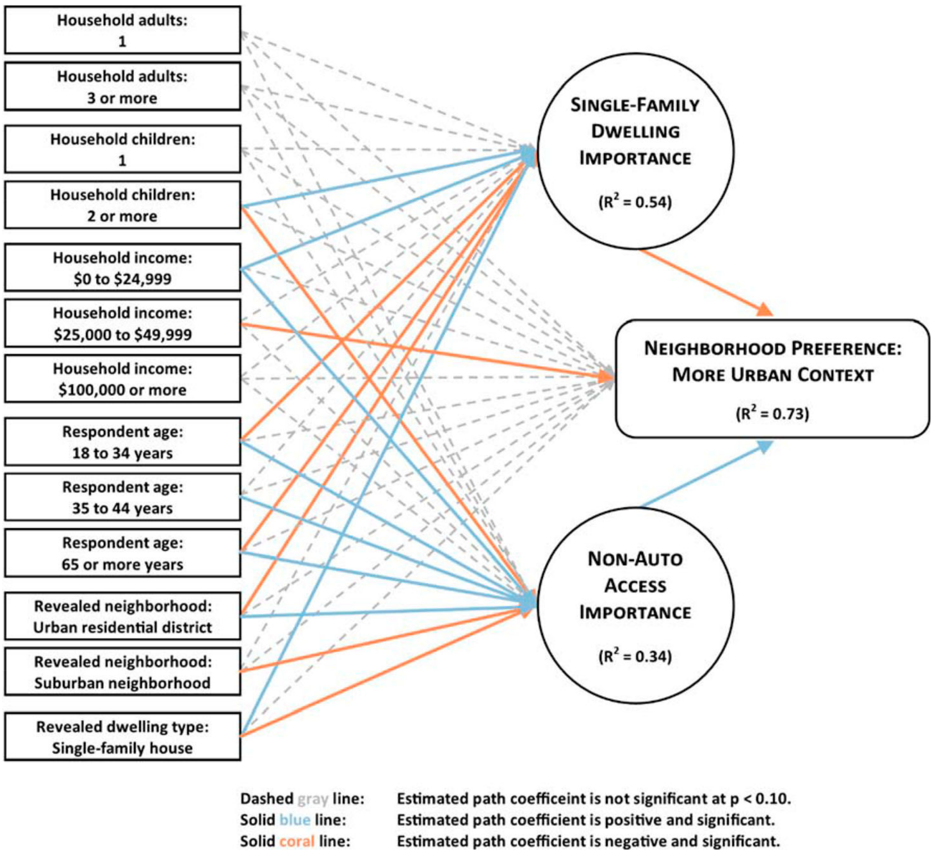

Figure 2. Path diagram of structural equation model with importance rating constructs and observed socioeconomic measures ($N = 530$).

Table 7. Standardized direct, indirect, and total effects of structural equation model with importance rating constructs and observed socioeconomic measures ($N = 530$).

	Stated neighbourhood preference ^		
Characteristic	Direct	Indirect	Total
Factor A: Single-family dwelling importance	−0.68		−0.68
Factor B: Non-auto access importance	0.38		0.38
Household adults: 1	0.01	0.04	0.05
Household adults: 3 or more	0.06	−0.05	0.01
Household children: 1	−0.06	−0.04	−0.09
Household children: 2 or more	0.09	−0.21	−0.12
Household income: $0–24,999	−0.05	−0.02	−0.07
Household income: $25,000–49,999	−0.07	0.00	−0.07
Household income: $100,000 or more	0.03	0.06	0.09
Participant age: 18–34 years	−0.08	0.12	0.04
Participant age: 35–44 years	−0.02	0.10	0.08
Participant age: 65 or more years	−0.07	0.14	0.07
Revealed neighbourhood: Urban residential district	0.06	0.30	0.36
Revealed neighbourhood: Suburban neighbourhood	−0.03	−0.09	−0.12
Revealed dwelling type: Single-family house	0.07	−0.28	−0.21

Note: A carrot (^) indicates an ordinal measure. χ^2 (132) = 590.30, $p = 0.00$. CFI = 0.89, TLI = 0.83, and RMSEA = 0.03.

parameter estimates permits informal comparisons of the strength of relationships in the final path model.

A negative association was found between the latent construct of single-family dwelling ($\beta = -0.68$, $p < 0.01$) importance and a stated preference for a more urban context. Non-auto access ($\beta = 0.38$, $p < 0.01$), in contrast, had a significant, positive direct and total effect on the preference for a more urban context. In fact, aside from one level of household income, these theoretical constructs were the sole significant direct determinants of stated neighbourhood preference. Socioeconomic characteristics reflecting the number of household adults, number of household children, and respondent age as well as revealed residential choices in neighbourhood and dwelling type were not significantly predictive of neighbourhood preference when the mediating effects of the two rated importance constructs were simultaneously estimated. However, a respondent's socioeconomic background and current residential circumstance was generally predictive of one or both of the importance constructs. Model results that when combined partially support our hypothesis of socioeconomic circumstance only having a direct impact on the construct attributes, which in turn directly influence the stated neighbourhood preference of an individual. Specifically, the importance of a single-family dwelling lifestyle to those middle-aged individuals residing in a household with at least two children earning a modest income is the direct driver of their preference for a less urban neighbourhood context. Meanwhile, younger and older adults, who have one or fewer household children and earn a lower income, desire a lifestyle defined by a rated importance for non-auto access.

A closer examination of the direct connection between socioeconomic circumstance and the importance of single-family dwelling attributes to an individual's residential location decision reveals both intuitive and unexpected findings. Predictably, an individual with at least two children living at home rated the bundle of attributes describing the importance of a single-family dwelling lifestyle ($\beta = 0.23$, $p < 0.01$) higher than an individual without children. Perhaps relatedly, a respondent was less likely to highly value a single-family dwelling lifestyle if he/she was under 35 years of age ($\beta = -0.10$, $p < 0.10$) or older than 65 years ($\beta = -0.14$, $p < 0.05$). The former individual may not be compelled to have a private yard and may instead express living in an area with great local accessibility as very important; whereas, an individual at retirement age may be indifferent to having a single-family detached house and private yard. Surprisingly, individuals whose annual household earnings were above \$100,000 and rated single-family dwelling importance was not significant and negatively related ($\beta = -0.09$, $p = 0.11$). The increased consumption potential of households earning a higher income may make them more disposed to rating the commonly competing attributes of living in a detached single-family structure with a private yard and living near the centre of it all with higher importance. As for current residential location characteristics, expectedly, an individual living in a single-family house ($\beta = 0.29$, $p < 0.01$) or within an urban residential district ($\beta = -0.36$, $p < 0.01$) was more likely to highly rate single-family dwelling importance.

In terms of non-auto access, individuals whose households earn an annual income below \$25,000 ($\beta = 0.10$, $p < 0.05$) were more likely to rate this transport-related construct positively. Also, participants who were at least 65 years old ($\beta = 0.11$, $p < 0.05$) were more likely to favourably rate non-auto access, which may similarly be associated with private vehicle inaccessibility. Similarly, participants younger than 35 years ($\beta = 0.12$, $p < 0.05$) and between 35 and 44 years old ($\beta = 0.12$, $p < 0.05$) rated non-auto access with a greater importance. These cohorts, both younger and older, may find that accessibility to all travel modes may alleviate household vehicle constraints and offer greater mobility options for commuting and non-work travel. Indicators comprising the non-auto access construct were independently rated; thus, an individual had the ability to rate all transportation-related items as being important to their residential location decision process. As anticipated, a participant residing in the most urban context in Portland, an urban residential district, rated the bundle of non-auto access attributes higher than those living in other neighbourhood types.

5. Discussion

The primary contributions of this study were twofold. One contribution was an assessment of the relative importance for different housing, accessibility, and transportation characteristic ratings as they relate to stated neighbourhood preference. Using exploratory and confirmatory factor analysis, two latent constructs describing the rated importance of single-family dwelling and non-automotive access were identified. While not mutually exclusive, the constructs appear to reflect distinct perspectives on the residential environment attributes that mattered most to residents. A strong negative correlation between the two constructs revealed that individuals who valued an importance in the single-family dwelling attribute bundle tended to rate non-auto access as a less imperative residential location characteristic.

The single-family dwelling construct was indicated by an individual's rated importance for having a residential environment with a detached single-family home and private yard as well as his/her indifference to living at the centre of it all. Of the four lifecycle-related characteristics, an increase in household children was most strongly associated with an increased rated importance in this bundle of housing and location characteristics. Conversely, the presence of at least two children had the strongest negative direct effect on the rated importance of non-auto access attributes. This transportation-related construct reflected the importance placed on living in a residential location with a variety of travel options – albeit less prominence placed on dedicated parking at the residence – and feasibility to walk to nearby bus stops, rail stations, and places.

Extensions of this research should explore construct refinement through the addition of housing, accessibility, and transportation characteristics to the survey instrument. For instance, the highest loading indicator of the housing and location construct was the importance of living in a detached single-family home. Is this result based solely on building structure importance or an artifact of living space requirements, some long-term goal of financial stability in retirement, or any other intrinsic meaning tied to the significance of having this dwelling type? Clearer insight may also be gained by dividing the accessibility characteristic of living at the 'center of it all' into items expressing proximity to specific activity locations (e.g. restaurant, market). This study and others hypothesized that location items bundle with attributes describing transportation access. Finally, parsing biking to nearby places into items distinguishing utilitarian and recreational travel may result in the latter characteristic being indicative of the non-auto access construct.

A second study contribution was an evaluation of whether the rated importance of these bundled attributes was a more direct predictor of neighbourhood preference than lifecycle stage. The constructs of single-family dwelling and non-auto access importance were each significant determinants of neighbourhood preference in the path analysis with socioeconomic and revealed residential location covariates. While the bundle of attributes describing an importance in single-family dwelling living had a stronger direct and total effect on stated neighbourhood preference, the construct reflecting access had a non-trivial effect on the stated desire to live in a more urban context. Lifecycle stage indicators of household size, income, and age were directly linked to the residential location attribute bundles, but mostly indirectly predictive of stated neighbourhood preference. This study demonstrates that socioeconomic circumstance, or lifecycle stage, directly influences an individual's rated importance for certain bundles of housing and transportation attributes, which in turn influences his/her unconstrained stated neighbourhood preference. By investigating unconstrained neighbourhood preference, this work sheds light onto the underlying structural parameters directing residential environment selection, which may in turn help inform policies centred on creating housing stock and urban design aspects substantiated by emerging rather than past conditions. Study findings also support more recent residential location research stressing the added benefit of subjective measurement to neighbourhood preference prediction (De Vos et al., 2012; Liao, Farber, & Ewing, 2015). Although difficulties persist in operationalizing these subjective metrics, understanding predispositions for specific housing and access attributes is paramount to better identifying how pull factors influence residential location choices.

While new and informative, results of this study are limited by both content and context. A simplified depiction of lifecycle stage resulted from an independent measurement of the four socioeconomic characteristics, which produced nonlinear connections to the importance rating constructs. Research extensions should explore the adoption of either latent class cluster analysis or heuristic assignment to define a set of lifecycle stages. Second, item ratings and neighbourhood preferences were self-reported and therefore imprecise illustrations of the joint decisions of a multimember household seeking to best satisfy the needs of all members. Likewise, while path models are valuable in identifying predictive links between variables of interest, a choice-based conjoint analysis would enable a more rigorous test of neighbourhood preference and minimize some omitted variable bias (Molin & Timmermans, 2003). Finally, an evaluation of constrained neighbourhood choice and neighbourhood dissonance may be rigorously explored by estimating the influence of the latent importance rating constructs within the context of an individual's present residential location and economic circumstances. These are all reasonable next steps to build upon the contributions of this study, which assessed the pathway between socioeconomic status and the rated importance for certain housing, accessibility, and transportation attribute bundles with neighbourhood preference.

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No potential conflict of interest was reported by the authors.

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