

Article

Factors Affecting Propensity to Lift-Share for Children's Activities

Sarah-Anne de Kremer ¹, Tracy Ross ², Marcus Paul Enoch ^{3,*}  and Fredrik Monsuur ⁴

¹ Jaguar Land Rover, Abbey Road, Whitley, Coventry CV3 4LF, UK; sdekreme@jaguarlandrover.com

² School of Design and Creative Arts, Loughborough University, Epinal Way, Loughborough LE11 3TU, UK; t.ross@lboro.ac.uk

³ School of Architecture, Building and Civil Engineering, Loughborough University, Epinal Way, Loughborough LE11 3TU, UK

⁴ South Western Railway, 30 Stamford Street, London SE1 9LQ, UK; fredrik.monsuur@swrailway.com

* Correspondence: m.p.enoch@lboro.ac.uk

Abstract: Research Problem: Families with children travel by car more frequently than any other household type and hence significantly contribute to transport externalities. Lift-sharing is a potential time-effective and convenient means of mitigating these effects. Whilst some research has been conducted on lift-sharing for the school run, there is little research beyond this context, particularly around lift-sharing for children's activities (e.g., sport). Study Aim: Consequently, the aim of this study was to assess the current prevalence of lift-sharing (for children's activities and other types of trips) in families with young children, the factors influencing its uptake, the experiences and attitudes of regular lift-sharers, and whether previous literature findings on reciprocity applied in this context to gain a deeper understanding of how and why families participate in activity lift-sharing. Research Design: A mixed-methods approach was applied, comprising (1) a travel survey of 474 families to establish socio-demographic and activity factors that influence lift-share prevalence for activity trips; and (2) 15 semi-structured interviews with parents to further explore how and why families participate in activity lift-sharing. Results: Factors influencing lift-sharing decisions for activity travel were number of cars owned, number of seats in the car, settlement type, income, time of day and location of the activity, number of children attending, parking availability, whether the activity is a sporting activity or not, and number of close friends of the child at the same activity. Salient motivating factors triggering lift-sharing included intentions to reduce chauffeuring and parents wanting their children to socialise. Trust was an initial imperative component of lift-share formation, and attitudes towards reciprocity supported previous literature findings relating to the variability of acceptable reciprocation and the role of fairness.

Keywords: lift-sharing; family; children's activities; online survey; interviews; travel behaviour transport



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1. Introduction

Family groups are a significant contributor to car trip miles and, by extension, to the associated impacts on society, e.g., road traffic collisions, traffic congestion, delays, noise, air pollution, energy use, and carbon emissions [1]. The Department for Transport [2] reported that, in 2017, more car trips (of any car occupancy level) were made by people in GB households containing two adults living with one or more children than in any other type of household. Personal car use is attractive because it offers more flexible trip times, greater comfort, and greater convenience than alternatives such as public transport [3]. For families (especially with young children), these advantages are magnified because they face increased time pressures due to chauffeuring/chaperoning/childcare responsibilities [4,5]. Moreover, parents can be apprehensive about allowing young children to use these alternative modes by themselves [6]. Despite this, McCarthy et al. [7] found families with young children are a largely under-researched group in terms of their travel

behaviours. It was therefore of value to explore the travel mode choice decisions of family groups as a unit.

Given the travel constraints facing families with children, one promising option is to have them sharing journeys with other families, such that there are both fewer vehicle miles travelled, and considerably fewer carbon dioxide emissions per passenger mile compared to lower/average occupancy car trips [8].

The literature on lift-sharing is predominantly either for all trip purposes or for commuting trips. It shows that lift-sharing is influenced by (1) socio-demographics; (2) attitudes and values; (3) motivations; (4) situational factors; (5) social networks, and (6) spatial factors, often with conflicting findings as detailed below.

1.1. Socio-Demographic Factors

Younger drivers (generally aged under 25) [9–11] and women [12,13] had a higher propensity to lift-share, as did households with fewer owned vehicles [14,15], more children [16], and a lower income level [9,10,17]. People of the same sex and people who held the same job level were also more likely to lift-share with one another [18].

1.2. Attitudes and Values

A need for independence decreased lift-share propensity [12], as did values of higher privacy and personal space [17,18]. Contradictory findings on the safety of sharing with a stranger were found by different authors: Cools et al. [19] identified it as an insignificant issue, and Woodcock et al. [20] identified it as a barrier. Gardner and Abraham [21] found ‘a desire to socialise with people they know’ to increase propensity to lift-share, whilst Canning et al. [22] found that people responded better to formalised employer-led schemes. Both Delhomme and Gheorghiu [16] and Wang et al. [23] noted environmentally engaged people were more likely to participate. Perceived differences in social values were noted as a barrier [13].

1.3. Motivations

Wanting to save money by not driving as often was found to be a key driver of lift-sharing by several authors [14,16,17,19,22,24–26]. Buliung et al. [14] noted that money-saving was a stronger factor than time saving, though Delhomme and Gheorghiu [16] found lift-sharers generally did so to save time. DeLoach and Tiemann [25] stated lift-sharing was influenced [by commuters] perceiving a net benefit of social capital gain and maintenance of social capital, alongside money-saving, time-saving and the value of autonomy and flexibility.

1.4. Situational Factors

Identified barriers to lift-sharing include inflexible work schedules [9,10,12–14,19,20,27]; good parking availability [17,19,22,26]; and wanting to have a car at work in the event of an emergency [24].

1.5. Social Networks

Lovejoy and Handy [28] found people who were part of a more active, or larger, social network were more likely to lift-share; and that lift-sharing is more likely to occur at workplaces with a higher number of employees [27].

1.6. Spatial Factors

Longer trip distances were associated with an increased likelihood of lift-sharing [9,19,29,30]. Buliung et al. [14] found that spatial proximity to lift-sharing matches was an influential enabling factor, and Van der Waerden et al. [26] found that employees living further from their workplace lift-shared more often. In terms of the effects of settlement type, findings are mixed. Delhomme and Gheorghiu [16] and Neoh et al. [27] found that people living in large cities were more likely to lift-share. Contrarily, Ferguson [29] found it to be more

common in non-urban areas, and Teal [9] found that the size of an urban area did not have any effect.

In addition to the literature above on factors influencing propensity to lift-share, the relevant theories of social exchange and reciprocity can be applied in this context. Social exchange theory is concerned with the balance of a relationship in terms of rewards, costs, and resources obtained [31]. People look to maximise the rewards and minimise the costs [32]. Social exchange theory attempts to explain what is not economical in social exchange situations by considering the exchange process alongside the concepts of reciprocity and altruism [33]. Reciprocity is a key exchange rule/norm; if a person supplies a benefit or service, the receiving person or group should respond in kind [34]. Reciprocity is defined as ‘equality of exchange between persons’ [35]. When individuals are unable to reciprocate, the sense of ‘ought’ and fairness is disturbed [36], and feelings of guilt can develop in the person who is ‘in debt’ [37]. Lift-sharing has previously been studied in relation to reciprocity [38], identifying the need for protocols to establish norms for reciprocal exchange and the importance of trust within sharing communities. However, the contexts were tourism and rural communities, with little knowledge relating specifically to families with children.

A clear gap in current knowledge is an understanding of lift-sharing in a family context. One of the few studies in this context is by Arbour-Nicitopoulos et al. [15], which examined the prevalence of lift-sharing for the school run. They found that children in non-lift-sharing households were younger, whilst the most common reasons given for driving children to school were for convenience, safety of the child/children, and because there was no other option. Gheorgiu and Delhomme [39] also studied lift-sharing for children, and the predominant predictors were number of children, perceived peer and family pressure, comfort and independence of travel. However, the data were for school and children’s out-of-school trips combined, so specific findings relating to the latter could not be extracted. De Kremer et al. [40] identified that families in the UK with young children take frequent, short car trips to chaperone their children to and from children’s activities, with many of these being outside of school time and school locations. Just over half of all trips to and from children’s activities (17 out of 33, 52%), all of which were by car, were less than 1 mile in length. Such characteristics potentially make these journeys more highly polluting (due to the cold engine effect) than longer trips, and more susceptible to being changed if a suitable alternative was available. This led to lift-sharing for children’s activities being the focus of the current study.

The aim of this study, therefore, was to assess the current prevalence of lift-sharing (for children’s activities and other types of trips) in families with young children, the factors influencing its uptake, and the experiences and attitudes of regular lift-sharers to gain a deeper understanding of how and why families participate in activity lift-sharing. The study also sought to determine whether previous literature findings on reciprocity applied to a context in which it had been under-researched.

2. Materials and Methods

The research used a mixed-methods approach and comprised quantitative data from an online survey and qualitative data from in-depth, semi-structured interviews.

2.1. Online Survey—Data Collection

An online survey of 474 households was administered, focusing on the lift-sharing behaviour of families with young children. This collected quantitative data on lift-sharing prevalence, activities attended by children, and demographic information about each household. The population set for this study comprised households across England that included at least one child between the ages of 4 and 11 because it is children of primary school age who are most dependent on their parents for travel [41–43]. Survey respondents answered questions on their family unit as a whole.

The survey was initially piloted with 10 individuals and then with 150 respondents before being rolled out to the full sample. MRFG, a market research company/participant recruitment agency [44], was then engaged to recruit the survey respondents in July 2019 through its ‘online access panel’. This consists of a pre-recruited pool of self-selected members who are paid to complete online surveys. The survey was conducted both under the ethics procedures of Loughborough University’s Ethics Approvals (Human Participants) Sub-Committee and the MRFG’s internal Institutional Review Board and data protection procedures.

Participants were assessed for study eligibility through the inclusion of screening questions to ensure each respondent’s household fitted the requirements of the study. Quota sampling was adopted, which sought to ensure a balanced and representative sample on key socio-demographic variables by weighting panel respondents prior to sampling to better represent the study population [45]. In this case, the population of families with dependent children in England was divided into relevant strata known as ‘quality controls’, which were socio-demographic variables about the household that could potentially influence lift-sharing prevalence, i.e. no. of people, no. of adults, no. of children, settlement type, no. of cars and income level [46].

The total number of intended respondents assigned to each stratum in the sample was based on the corresponding proportion in the population (households with dependent children) and the intended study sample size of 500). The survey had no identifiers. The survey took respondents approximately 15 min to complete to reduce participant burden and thus maximise responses and consisted of 26 questions (see Table 1). The survey link was active for 2 weeks.

Table 1. Online survey questions.

Sections	Questions	Format
Demographic household data:	(1) Number of people in household	Number
	(2) Number of adults in household	Number
	(3) Number of children in household	Number
	(4) Settlement type	Rural, Village, Town, City
	(5) Income level	Less than GBP 20,000, GBP 20,000–GBP 39,999, GBP 40,000–GBP 59,999, GBP 60,000–GBP 79,999, GBP 80,000–GBP 99,999, More than GBP 100,000
	(6) Number of smartphones in household	Number
	(7) Number of cars in household	Number
	(8) Number of seats in car used most often	Number
Lift-sharing behaviour:	(1) Times in a typical week members of their household gave one-way lifts to people outside of their household	Number
	(2) Times in a typical week members of their household received one-way lifts from people outside of their household	Number
	(3) Lifts given and received for children’s activities	Number
Activities:	Number of regular children’s activities attended per week	Number

Table 1. Cont.

Sections	Questions	Format
Characteristics of a specific, named, regularly attended children's activity:	(1) Activity type	Sport, Non-sport
	(2) Number of children at activity	Number
	(3) Length of activity	Number of minutes
	(4) Day type	Weekend or weekday,
	(5) Time of day	Morning, Afternoon, Evening
	(6) Length of attendance	The past month, The last 6 months, The last year, Between 1 year and 5 years, More than 5 years
	(7) Trip time to activity	Number of minutes
	(8) Parking availability	Always, Often, Sometimes, Never
	(9) Activity as an extension of the school day or not	Yes, No
	(10) Number of children their child is close friends with	Number
Lift-sharing for the named, regularly attended children's activity:	(1) How often they lift-shared for the specific, named activity	At least sometimes, Never
	(2) Share of the lifts in the arrangement (i.e., equity)	I and/or my partner are always the lift-share driver, I and/or my partner are mostly the lift-share driver, I and/or my partner share the lifts equally with another parent, another parent mostly provides the lifts for my child, another parent always provides the lifts for my child

2.2. Online Survey—Data Analysis

The rank-based non-parametric Kruskal–Wallis H test (also known as the Kruskal–Wallis one-way analysis of variance test) was applied to examine the influence of various socio-demographic factors on the propensity to lift-share in general, and on the propensity to lift-share for children's activities using SPSS Version 26.0 [47]. This calculates the amount of variance in the data that can be attributed to households being in different socio-demographic groups. The formula is below:

$$H = (N - 1) \frac{\sum_{i=1}^g n_i (\bar{r}_i - \bar{r})^2}{\sum_{i=1}^g \sum_{j=1}^{n_i} n_{ij} (r_{ij} - \bar{r})^2} \quad (1)$$

n_i is the number of observations in a group, r_{ij} is the rank of the individual observation about the household from a group, and N is the total number of households in that group. The formula can be simplified as 'total variance' divided by 'residual variance'.

Binary logistic regression was subsequently used to model the frequency of lift-sharing for a specific named activity. This variable was initially coded on a categorical scale ranging from 'always' to 'often', 'sometimes' or 'never', and for convenience recoded into a binary variable, where 'always' and 'often' were coded as 1 and 'sometimes' and 'never' were coded as zero. The model thus predicts the probability of being in each lift-sharing category. The binary logit model can be formulated as follows:

$$P_{ij} = \frac{\exp(x_{ij}\beta)}{1 + \exp(x_{ij}\beta)} \quad (2)$$

The independent variables were tested for multicollinearity, but this did not occur, so it was appropriate to model the socio-demographic and activity variables. The formula shows how the probability P for individual I for a certain outcome j can be estimated. The

probability depends on the values of the independent variables X . The parameters β are estimated with the maximum likelihood estimation method. The formula can be used to calculate the probability for each outcome category j for individual I , and these probabilities add up to 1.

2.3. Semi-Structured Interviews—Data Collection

The initial participants for the semi-structured interviews were recruited via an email to staff at Loughborough University and neighbouring consenting employers. These were supplemented by other volunteers through snowball sampling, which involves referrals from initially sampled participants to other potential participants or households that fit the inclusion criteria [48].

The sample comprised 15 parents (12 females and 3 males) aged between 29 and 52, each representing a household that included at least one child between the ages of 4 and 11, and who were involved in regular lift-share arrangements for at least one child's activity at the time the interview was conducted. Household income levels ranged from the 'less than GBP 20,000' bracket to the 'GBP 50,000 to GBP 74,999' bracket.

The interview was piloted in full, separately, with two participants. This was to test the study instruments, the interview questions and their wording, to ensure participant understanding and accuracy of the data collected. The interviews were conducted face-to-face under the auspices of the ethics procedures of Loughborough University's Ethics Approvals (Human Participants) Sub-Committee. All interview conversations were captured using a voice recorder and transcribed in full by the researcher. A process of quality checking was undertaken to ensure the accuracy of the transcripts.

The questions were intended to understand lift-sharing in the children's activity context and aimed to encourage participants to describe their experiences of lift-sharing for children's activities and the attitudes they have towards lift-sharing. The questions also aimed to extract people's motivations for lift-sharing and the enablers and barriers for lift-sharing that they had experienced. Key topics of the interviews included levels of, and attitudes towards, reciprocity, communication channels used, responses to ideas for technologies to assist with communications about lift-sharing, safety precautions, and relationships between families. As there are few previous studies on these specific topics, and in general for children's activity lift-sharing, the interview questions were based on conclusions of previous research involving lift-sharing in other contexts, including the work commute and the school run, and on social exchange theory and mechanisms of reciprocity.

2.4. Semi-Structured Interviews—Data Analysis

An in-depth thematic analysis was carried out on the open-ended questions from the interview, aided by the use of NvivoTM 10 software [49,50]. The coding strategy was partially theory driven (deductive) and partially data driven (inductive) [51]; thus, the researcher began with a starting list of top-level codes/themes based on the research questions and the conceptual framework [52,53], and added multiple inductive codes as appropriate during the coding process. To validate the inductive and deductive codes used in the analysis of the interview data, one additional researcher read through all 14 interview transcripts and moderated the inductive and deductive codes used by the primary researcher.

3. Findings and Discussion

The results of the survey are presented first in Sections 3.1–3.5 and indicate the factors that affect propensity to lift-share. This is followed in Sections 3.6 and 3.7 by the outcome of the thematic analysis of the semi-structured interviews, which provided an understanding of the role of attitudes, logistics and relationships in lift-sharing for children's activities.

3.1. Survey Findings: Sample Description

The sample description can be seen in Table 2. Chi-square tests of association suggested the survey sample was representative compared to the overall population for ‘number of children in household’ and ‘income level’, but not for number of people in household, number of adults in household, settlement type, or number of cars in household, and so care needed to be taken when interpreting the results.

Table 2. Online survey sample description.

No. of People in Household	Study Sample		Population	
	N	%	N	%
2	32	7	7,544,404	49
3	152	32	3,437,917	22.3
4	199	42	2,866,800	18.6
5	56	12	1,028,477	6.7
6 or more	35	7	519,277	3.4
No. of adults in household	Study Sample		Population	
	N	%	N	%
1	66	14	1,573,255	25
2 or more	408	86	4,850,686	75
No. of children in household	Study Sample		Population	
	N	%	N	%
1	164	35	3,600,000	45
2	230	49	3,185,000	40
3	57	12	893,000	11
4 or more	23	5	304,000	4
Settlement type of household	Study Sample		Population	
	N	%	N	%
Rural or Village	18 + 65	18	493,105	8
Town or City	258 + 133	82	5,807,833	92
No. of household smartphones	Study Sample			
	N	%		
0	6	1		
1	87	18		
2	181	38		
3	128	27		
4 or more	72	15		
No. of cars in household	Study Sample		Population	
	N	%	N	%
0	53	11	1,123,670	17
1	276	58	2,474,262	39
2 or more	145	31	2,826,009	44

Table 2. Cont.

No. of People in Household	Study Sample		Population	
No. of car seats used most	Study Sample			
	N	%		
4	49	12		
5	330	78		
7	42	10		
Income of household	Study Sample		Population	
	N	%	N	%
Under GBP 20,000	86	18	5,778,000	21
GBP 20,000-GBP 39,999	176	37	11,187,000	41
GBP 40,000-GBP 59,999	109	23	5,783,000	21
GBP 60,000-GBP 79,999	64	14	2,409,000	9
GBP 80,000-GBP 99,999	22	5	969,000	4
Over GBP 100,000	17	4	1,085,000	4

3.2. Survey Findings: Propensity to Lift-Share

Figure 1 below compares frequencies for giving lifts in a typical week to frequencies for receiving lifts in a typical week, for the 474 households:

Frequency of receiving lifts	≥10	1			1	1			1		1	2
	9						1		1			2
	8					1				1		
	7						1		3	2	1	1
	6	2		2		1	3	2	2			3
	5	2		1		1	8	2	1			1
	4		1	2	3	5	5	2		1	1	1
	3			1	7	1	1	2	4	1		3
	2	3	3	11	5	1				1	2	3
	1	3	20	5	1	1	2	1	1	1		
	0	281	9	7	4	3	2	2		2	1	6
		0	1	2	3	4	5	6	7	8	9	≥10
Frequency of giving lifts												

Figure 1. Frequency of giving versus receiving lifts, in a typical week, for trips of all purposes.

Two hundred and eighty-one households (i.e., 59%) neither gave nor received any lifts in a typical week. Of those that did share, more were ‘givers’ of lifts than were ‘receivers’ of lifts. In a typical week, 36 households gave at least one lift while receiving zero lifts, 97 households gave more lifts than they received, 37 households received more lifts than they gave, and 59 households gave the same number of lifts as they received.

3.3. Survey Findings: Factors Influencing Propensity to Lift-Share in General

Table 3 summarises the results of the Kruskal–Wallis H test for each independent variable, on the dependent variable, which was the number of times in a typical week they lift-share:

Table 3. p values from Kruskal–Wallis H-test for influence of variables on propensity to lift-share in general.

Independent Variable	p Value for the Effect of the Variable on Propensity to Lift-Share in General	Statistically Significant? ($p < 0.05$)
No. of people in household	0.069	NO
No. of adults in household	0.373	NO
No. of children in household	0.046	YES
Settlement type	0.001	YES
No. of smartphones in household	0.529	NO
No. of cars in household	0.104	NO
No. of seats in car used most often	0.022	YES
Income level	0.462	NO

Kruskal–Wallis H tests for the following variables revealed a statistically significant effect. All other comparisons were non-significant.

Number of children in household: $X^2 (3, N = 474) = 8.107, p < 0.05$. Pairwise comparison post hoc tests found that households with four or more children lift-shared significantly more frequently than households with three children. This finding supports Delhomme and Gheorghui [16], who found that French drivers from households that included a larger number of children were more likely to lift-share in general, for all purposes. This result could be due to households with four or more children being subject to greater time restrictions [4].

Settlement type: $X^2 (3, N = 474) = 16.442, p = 0.001$. Households in cities lift-shared significantly more frequently than households living in towns. Similarly, Delhomme and Gheorghiu [16] found drivers living in a large conglomeration were more likely to lift-share for all purposes, and Neoh et al. [27] found that people living in an urban area were more likely to lift-share for the work commute. It could be due to increased opportunity. This would also align with the results of Kaufman [54], who found that a larger pool of people to potentially lift-share with was an enabler for lift-sharing.

Number of seats in car used most often: $X^2 (3, N = 421) = 7.601, p < 0.05$. Households using a car with four available seats lift-shared significantly more frequently than households using a car with five available seats. It appears that a lack of available seating in a family car is not a barrier to inter-household lift-sharing.

3.4. Survey Findings: Descriptive Statistics for Propensity to Lift-Share in General

Figure 2 draws on the survey results to compare frequencies for giving lifts in a typical week for children’s activities to frequencies for receiving lifts for children’s activities in a typical week for the 474 households.

Most households, 351 of 474, neither gave nor received any lifts in a typical week for children’s activities. Of the lift-sharers, the sample was skewed towards being ‘givers’ of lifts rather than ‘receivers’ for children’s activities. In total, 46 households gave more lifts, 24 households received more lifts, and 53 households gave and received the same number of lifts.

Frequency of receiving lifts	5	0	0	0	0	0	0
	4	0	0	2	0	0	0
	3	2	1	3	3	0	1
	2	7	5	16	0	3	0
	1	4	34	10	1	1	0
	0	351	14	9	1	3	3
		0	1	2	3	4	5
Frequency of giving lifts							

Figure 2. Frequency of giving versus receiving lifts, in a typical week, for trips for children’s activities.

3.5. Survey Findings: Factors Influencing Propensity to Lift-Share for Children’s Activities

Table 4 summarises the results of the Kruskal–Wallis H test for each independent variable on the dependent variable, which was the number of times in a typical week they lift-share for children’s activities:

Table 4. *p* values from Kruskal–Wallis H test, for influence of variables on propensity to lift-share for children’s activities.

Independent Variable	<i>p</i> Value for the Effect of the Variable on Propensity to Lift-Share for Children’s Activities	Statistically Significant? (<i>p</i> < 0.05)
No. of people in household	0.273	NO
No. of adults in household	0.990	NO
No. of children in household	0.435	NO
Settlement type	0.002	YES
No. of smartphones in household	0.140	NO
No. of cars in household	0.006	YES
No. of seats in car used most often	0.003	YES
Income level	0.045	YES
No. of regular activities attended per week	0.562	NO

Kruskal–Wallis H tests for the following variables revealed a statistically significant effect. All other comparisons were non-significant.

Settlement type: χ^2 (3, *N* = 474) = 14.791, *p* < 0.05. Pairwise comparison post hoc tests found that households in cities lift-shared significantly more frequently for children’s activities than households living in a town. This was the same for lift-sharing in general, and one additional explanation here is that there may be increased opportunities for children to take part in activities in cities, and thus activity attendance could be higher amongst these children, leading to increased activity lift-sharing.

Number of cars in household: χ^2 (3, *N* = 474) = 12.126, *p* < 0.05. Families with zero cars lift-shared less frequently for children’s activities than families with two cars. This was the opposite to what was anticipated and to the current literature, where the majority of lift-share studies assessing the influence of number of cars owned by a household identified

that households owning fewer cars were more likely to lift-share for the work commute or school run e.g., [9,14,17,29]. It was predicted that households with fewer cars would share activity lift-share responsibilities with other families more frequently because a car might not always be available to chaperone a child to or from an activity. An explanation could be that households owning zero cars do not sign up their children to activities because they know they are unable to (independently) chaperone their children to and from the activity.

Number of seats in car used most often: $\chi^2 (2, N = 421) = 11.578, p < 0.05$. Households using a car with four available seats lift-shared more frequently for children's activities than households using a car with five available seats. It appears that a lack of available seating in a family car is not a barrier to inter-household children's activity lift-sharing.

Income level: $\chi^2 (3, N = 474) = 8.107, p < 0.05$. Higher income parents lift-share more to/from children's activities, which could be due to the children in these households attending a greater number of extra-curricular activities per week [55], and also to greater time constraints resulting from additional chaperoning responsibilities. This aligns with Arbour-Nicitopoulos et al. [15], who found that higher income families lift-shared more frequently for the school run, but is in contrast to the results for general lift-sharing, whereby lower income individuals and households lift-share more frequently to save money [9,10,17,29].

Table 5 shows the results of the binary logistic regression model used to model the influence of socio-demographic and activity factors on propensity of a family to lift-share for a specific activity.

Table 5. Logistic regression model results, and the model fit statistics.

Variable	Coefficient	Standard Error	Z	p Value	95% Confidence Interval	
Number of children at activity	−0.0401	0.0162	−2.47	0.013	−0.0718	0.0083
Time of day	0.6876	0.2404	2.86	0.004	0.2164	1.1586
Parking availability	0.7794	0.2439	3.20	0.001	0.3105	1.2574
Activity as an extension of the school day or not	0.8027	0.2747	2.92	0.003	0.2642	1.3412
Number of children their child is close friends with	0.1619	0.0402	4.02	0.000	0.0831	0.2408
Settlement type	−0.4283	0.2339	−1.83	0.067	−0.8868	0.0301
Sport or non-sport	−0.5079	0.2983	−1.70	0.089	−1.0927	0.0767
Income level	0.4723	0.2308	2.05	0.041	0.0199	0.9248
Model fit statistics	Value					
Pseudo R ²	0.1289					
AIC	7.203					
BIC	37.78					
Log likelihood (final)	−220.93788					

From the model, families with young children were more likely to lift-share for an activity that:

(1) has a smaller number of children attending. The direction of this association was unexpected due to the conclusions in the literature that lift-sharing propensity was greater at workplaces with a higher number of employees [27], and that spatial clustering of lift-share matches increases lift-share propensity for commuting [14], and trips of any purpose [28]. A possible explanation for this finding is that children might find it easier to form closer friendships with other children at the activity when the number attending is smaller.

(2) is held in the evening. A reason for the increased propensity of evening lift-sharing could be due to the evening routine of families being more highly conducive to lift-share arrangement formation. Families may face higher time pressures during weekday mornings, due to the combinations of the school run and work commute and, therefore, may not wish to involve other families in their morning routine.

(3) has restricted parking. This finding aligns with motivations for lift-sharing for the work commute [17,19,22,26].

(4) occurs when the child attending has a higher number of close friends at the activity. This result matches the findings of Arbour-Nicitopoulos et al. [15], who found that closer friendships between families increased the likelihood of lift-sharing for the school run, and Lovejoy and Handy [28], who found that closer ties and an increased size of a person's social network were associated with increased lift-share arrangements between households. Thus, level of friendship between children at the activity and their families is a key factor in lift-share formation.

(5) is a sport rather than a non-sport activity. An explanation for this finding could be that children at sport activities form closer friendships than children at non-sport activities, due to a greater sense of camaraderie. It has been established that closer friendships between families are conducive to lift-share formation [15,28].

(6) occurs as an extension of the school day. It could be that only one direction of lift-sharing is required in this situation; for example, if an activity takes place at the end of the school day, then the children would already reside at the location, and thus only the return trip would need to be provided.

(7) is located in a town compared to those not in a town. Implies that households living in a larger settlement are more likely to lift-share for children's activities than households living in a smaller settlement.

(8) is attended by children from families that have a higher level of income than those of a lower income. As before, children in these households may attend a greater number of extra-curricular activities per week [15,55].

3.6. Interview Findings: Attitudes towards Activity Lift-Sharing

The thematic analysis of the semi-structured interviews enabled greater understanding of reciprocity, motivation, barriers and enablers for families who currently participate in activity lift-sharing. It should be noted at this point that amongst the interviewees, the lift-sharing arrangements were made exclusively by the parents of the children being given or receiving lifts, perhaps reflecting the sometimes ad hoc or short-term nature of the activities and the involvement of the participants.

3.6.1. Levels of and Attitudes towards Reciprocity

Three types of reciprocity were observed from the interviews. These were 'shared lifts equally', 'relaxed rota system' and 'non-reciprocal'. The six households classified as 'sharing lifts equally' can be further subdivided as households that split the lifts so that one household provided the lift to the activity and the other household provided the return lift back from the activity (two households), whereas the remaining households (four households) split the lifts whereby one household provided all lifts to and from the activity one week, and the following week the other household in the arrangement would provide all required lifts. For one household classified as 'shared lifts equally', the current personal situations of each parent/family within the arrangement were taken into account when assigning lift-share responsibilities—a household subject to greater time pressures than usual would be assigned fewer responsibilities to provide lifts. The social principles of 'group gain' apply in this context. Multi-household lift-share arrangements where offers and requests for lifts were based on the needs of the recipient household specifically would be an example of the group gain exchange rule, whereby lift favours are 'pooled' together by families in the arrangement [56]. Five households adhered to a relaxed rota system where reciprocity was a loose aim; additional lifts provided one week

would not be ‘carried forward’ and taken into consideration when deciding on lift-share responsibilities/lift allocation for the following week. The interviewees in this type of arrangement thought that the lifts provided were likely to balance as reciprocal in the long term. Almost all of the activity lift-share arrangements described occurred over the time span of multiple months or years. Social exchange theory posits that exchange relationships can continue over time if rewards are received and if positive reinforcement exists for those in the relationships [33]. Two of the households in non-reciprocal arrangements provided all lifts to and from the activity and expressed dissatisfaction with the arrangement, and this aligns with the fundamental beliefs of social exchange and interpersonal relationships that the sense of fairness in a social exchange is disturbed when there is a lack of equity in the exchange [36,57]. One parent had agreed to partake in a non-reciprocal agreement because the parent(s) of the other household involved were under greater time constraints, whereas the other interviewee provided all lifts because the other household in their arrangement did not own a car. These types of arrangement align with the altruism rule from Meeker’s ‘rules of social exchange’ [56], whereby the person providing the favour in the exchange provides the benefit regardless of the cost that they themselves experience.

When asked for their response to a hypothetical lift-sharing scenario where their child was offered a lift with no immediate suggestion by the other parent of expecting a lift or favour in return, six participants indicated they would act so as not to become indebted to the family offering the lift favour by offering an immediate lift or favour of their own. This finding would align with the theory that motives for an action can be both egoistic and altruistic [57]; the motives could include improving their families’ own situation alongside improving the situation of another family. All interviewees appeared to adhere to the social conventions of reciprocity. An ‘asking rule of reciprocity’ is ‘If you want someone to do you a favour, [then you tend to] do something for them first’. Three households described how they would provide extra/additional lifts for an activity if they knew they would be unable to provide a lift for this same activity on a subsequent day. It is probable that the underlying motivation is to hope to receive additional lifts on a subsequent occasion, aligning with the theory that motives for an action can be both egoistic and altruistic [57]. One participant described how their household would ‘bank’ lifts:

“Or my husband will say I’m away in two weeks’ time, so let’s bank a couple... So, he kind of offers to do more when he is here, because he knows sometimes he’s not”. [P8]

The degree of reciprocity in the arrangements described varied in part due to disparities in attitudes towards reciprocity [58]. These behaviours align with the theories of Blau [59], who proposed that people dislike becoming indebted to others in exchange relationships, and that social pressures for re-equilibrium will influence social exchanges that have become imbalanced.

Some parents in two household activity lift-share arrangements would prefer to have a larger pool of parents at the activity that they could potentially lift-share with and stated their interest in a potential technology to match them with other parents for lift-sharing. This would align with the results of Kaufman [54], who found that a larger pool of people to potentially lift-share with was an enabler for lift-sharing. This preference for a larger pool of parents to potentially lift-share with would only apply and be beneficial in instances where the parent already had some kind of relationship with the other parents in the pool. Levels of friendship and familiarity have links to trust; the attributes of parents the participants said they would be willing to lift-share with mostly related to trustworthiness, in the sense of allowing their child to be in the care of a parent. Trust was an initial imperative component of lift-share formation for children’s activities, and it has been established previously that social proximity is a function of trust in social networks [60].

3.6.2. Motivating Factors, Enablers and Barriers to Lift-Share Arrangement Formation

The most salient motivational factor, covering intrinsic and attitudinal influences, was the parent wanting to save time (eight participants). This was cited more frequently than the parent wanting to save money on fuel (four participants). Similarly, Delhomme and Gheorghiu [16] reported that people were motivated to lift-share for trips of all types of purpose for the time savings, followed by saving money on petrol. This is in contrast to multiple other studies of lift-sharing for the work commute, which found that saving money on fuel was the primary motivator [14,17,19,22,24–26]. Contemplation of why time-saving would be the primary motivating factor for children’s activity lift-sharing but not in other contexts requires an understanding of the number of ‘legs’ of the trip involved and who is present for each leg of the trip in each lift-sharing context. In the typical work commute lift-share, a person might complete two trip legs, one outward leg to work and one return leg back home. A person participating in a work commute lift-share arrangement would not experience a reduction in the number of trips legs; whether the person travelled by car independently or as part of a lift-share arrangement, they would complete two trip legs. In an activity lift-share, however, where parents do not remain at the location for the duration of the activity, a parent could reduce their trip leg responsibilities by half. A parent would be responsible for two outward legs and two return legs for an activity if they did not partake in lift-sharing. It might be advantageous to promote the time-saving benefits of lift-sharing to parents.

Another factor was that their children enjoyed the social aspect of the shared lift (five participants), and an increased level of confidence when arriving at the activity in a group (three participants). Cools et al. [19] also found that a desire to socialise with friends was a motivating factor for lift-sharing when studying the work commute. A related enabler for lift-sharing for children’s activities was a child being close friends with other children in the lift-share arrangement (seven participants). This closely aligns with the results of Arbour-Nicitopoulos et al. [15] on the topic of lift-sharing for the school run. One important thing to note here is that friendship instability is a common phenomenon amongst children and adolescents (Poulin and Chan, [61]). Children might be close friends one week, and this friendship might have dissolved by the week after. This could be an additional complicating factor that is not encountered in adult lift-shares, such as for the work commute.

Also important was the perception that multiple cars driving from a similar origin to the same activity at the same time would not be necessary (eight participants). Buliung et al. [14], who studied lift-sharing for the work commute, and Lovejoy and Handy [28] found similar results. As reasoned by Lovejoy and Handy [28], spatial proximity is key, as it determines the size of the favour requested; if the family collecting another child does not have to drive out of their way, then the size of the favour given will be perceived as smaller. Households of increased spatial proximity are burdened less when providing lifts for children’s activities; spatial proximity could have implications for the balance of the social exchange.

3.7. Interview Findings: Logistics of Activity Lift-Sharing

The thematic analysis of the semi-structured interviews enabled greater understanding of the use of communication channels and the consideration of safety precautions for families who currently participated in activity lift-sharing.

3.7.1. Communication Channels

The primary communication channels used to request and confirm lift-share responsibilities varied between lift-share arrangements. Six participants primarily communicated using technologies to arrange the lift-shares, six participants mostly arranged the lifts face-to-face, and two participants arranged the lifts primarily face-to-face but in conjunction with the use of technologies to communicate reminders about lift responsibilities.

3.7.2. Utilisation of Synchronous and Asynchronous Communication Channels

Twelve participants communicated at least some of the time using text messaging—An asynchronous communication channel. Considering the types of texts that parents sent to arrange lift-sharing, two participants always sent the other parent a reminder text about the lift-share on the day of the activity. One participant only sent or received a text message about the lift-share if the situation deviated from the norm in some way, in comparison to when they sent a confirmation text before each pickup when their lift-share arrangement was originally established. This indicates a time component impacting level of trust in the other household and in the confidence of the interviewee that the lift-share arrangement would operate smoothly, both of which had increased over time.

Justifications for the use of text messaging as a communication channel included the afforded ease of conveying timing and facts (three participants), the ability of the text receiver to respond at a time convenient to them (two participants), and the less intrusive nature of the communication style compared to a phone call (two participants). Limitations of text messaging to arrange lifts were potential misinterpretation of the meaning or tone of a text message (one participant) and the opinion of it being more difficult to build a relationship with another parent using texts only (two participants).

A limitation of text messaging in lift-share arrangements of more than two households was also identified. One participant described a situation where text messaging had been inadequate as a communication channel for a lift-share arrangement involving three households. The participant had set up a group text function, but replies were not visible to all group members in every instance. Note, the interviews were conducted prior to the increase in use of WhatsApp groups by the adult population, which has solved this issue.

“So I’ve set up a group contact so that I can text them both at the same time. But, of course, I text them by group, or they text me by group, and if I reply to them, to a text, it only replies to one of them of course. It does not reply to both. But they reply”. [P2]

Four participants used the synchronous communication channel of (usually mobile) phone voice calling, not as the primary communication channel, but for ‘last minute’ communication when plans needed to be changed or confirmed. These participants noted that phone voice calling was preferable in this situation because the parent communicating the message would know for certain if the message had been received or not. When parents deem it to be necessary, the need for a definitive answer or response to a request or change in lift-share responsibility is greater than the social pressure to not want to ‘burden’ the receiver of a phone call.

The favouring of asynchronous communication in general for children’s activities aligns with the propositions of Hutchby and Tanna [62] that people engage in asynchronous communication such as text messaging because the receiver is not required to focus their attention on the communication channel. Another reason as to why parents might prefer asynchronous communication via mobile phone could be that mobile phones are a type of hardware that is carried on the person the majority of the time [63] (Richardson, 2012). This topic is certainly one that merits exploration in future work.

3.7.3. Safety Precautions

Three participants detailed behaviours they carried out to ensure child safety in the lift-share arrangement. One participant instructed her child and the other children at the activity to stay together and not to leave a child unaccompanied at the end of the activity, as a safety precaution, in the event of a parent forgetting their lift-share pickup responsibility:

“You think ‘oh goodness are they going to be picked up?’ The lads know to stay together so that’s the thing. Nobody leaves anybody standing”. [P7]

Another participant always waited outside the child's house until the child entered when dropping them off after an activity:

"Even now, now they're older, we'll sit at the end of the drive until he's gone in the house". [P5]

A further participant took safety precautions to ensure that the child they had collected from an activity was safe crossing the road when arriving at their home destination, by exiting the car also and instructing the child as to when it was safe for them to cross. All participants interviewed were aware that using the correct child car seat during a lift-share was the responsibility of the driver rather than the parent of the child. It was noted by two participants that additional planning was needed to provide sufficient appropriate car seats. Interestingly, the study by Arbour-Nicitopoulos et al. [15] on lift-sharing for the school run, that also involved child chaperoning, did not explicitly identify these child safety implications.

3.7.4. Relationships between Families

The thematic analysis of the semi-structured interviews enabled greater understanding of the role that relationships between families played for those currently participating in activity lift-sharing. The most cited qualities that would make ideal candidates for a lift-sharing arrangement for an activity were trustworthiness (seven participants), familiarity (eleven participants), reliability (five participants), safe driving ability (seven participants) and punctuality (three participants). Regarding trustworthiness, it has been established previously that social proximity is a function of trust in social networks [60]. Witnessing another parent's attention to safety could increase confidence in their driving ability, for example, the enforcement of seat belt use:

"And my friend is very strict with the seatbelts. If it's at all twisted, we will not set off till it's sorted out. So, she's quite safety conscious. That makes me feel better". [P9]

A matching programme for lift-sharing in the children's activity context, which could assist users in finding additional parents to lift-share with, would need to facilitate relationship-building between potential lift-sharing households prior to lift-sharing. Most interviewees were interested in such a technology. Interviewees suggested that an activity lift-share matching technology could enable parents to meet face-to-face before agreeing to lift-share, to build rapport and to show each other any important documents such as a driving licence.

Two participants introduced the idea of a 'hierarchy' of lift-share providers, whereby parents would be recognised based on a level of friendship. Most interviewees, 11 out of 14, explicitly stated that they would not lift-share with a parent they did not know. Four participants would be unwilling to lift-share with a person they were not acquainted with because they would be unfamiliar with their driving style. This explicit description of a hierarchy of lift-sharers draws parallels with research into childcare sharing arrangements, whereby a hierarchy of carers often exists between households in the same social networks [64].

3.7.5. In Loco Parentis

Three participants recalled situations where they had felt uncomfortable in the role of managing the behaviour of someone else's child, including a situation in which the responsibility to relay a message about the poor behaviour of a child to that child's parents had fallen to them as the lift provider:

"I went to collect him, and the other lad had done something wrong at the hobby. And the person [activity organiser] came up to me and said to pass the message on to his parents that he'd done something wrong, which I did not think was my position to do that". [P5]

These included a situation where they needed to ask a child to quicken the process of getting ready after an activity but did not feel comfortable doing this, and where a parent had to mediate a disagreement between children during the car trip. These incidents can arise due to the complexities of children's friendships. Friendship instability is a common phenomenon amongst children and adolescents [61]; children's friendships can sometimes be more volatile than adult friendships. This could be an additional complicating factor that is not encountered in adult lift-shares, such as for the work commute.

4. Conclusions and Implications

This research has shown that various socio-demographic factors can influence the frequency of lift-sharing in families with young children, and various socio-demographic, situational and social network-related activity factors can have an impact on the probability of lift-sharing occurring for a specific activity. Households with two cars, living in a larger settlement, and earning a higher income had a greater propensity to lift-share for children's activities. Lift-sharing was more likely to occur for a children's activity possessing the following features: sporting activity; held at the end of the school day; fewer children attending; restricted parking; children at the activity have formed closer friendships. The study built on knowledge from previous research (predominantly in the context of the work commute and the school run) and identified factors that influence lift-share prevalence and likelihood in the new context of children's activities.

The results of the research also demonstrated that the attitudes and behaviours associated with lift-sharing for families with young children conformed with the existing literature on reciprocity. Reciprocity in this context had received little attention prior to this. In this study, although satisfactory arrangements were mostly reciprocal in nature, in agreement with Gergen [34], the balance of acceptable reciprocity varied [58], and the motivation was not always to maximise personal benefit, as found by Nye [32] and Chadwick-Jones [33]. However, parents did strive not to tip that balance completely, that is, neither wishing to become indebted to others [57,59] nor being in the position of receiving no lifts in return [36,65], although these calculations of 'fairness' extended over relatively long periods of weeks and months.

Parental motivations for activity lift-sharing and conditions conducive to this type of lift-sharing emerged in the study. The ability to save time was the most cited motivator, cited more frequently than saving money on fuel, which was previously found to be a key influential factor in the general and work commute-specific literature. Parents with young children are also commonly motivated by the opportunity for their children to socialise with the other children in the lift-sharing arrangement. The most cited enabler for activity lift-sharing was the children in the arrangement already having an established friendship before the lift-share arrangement commenced.

Additional considerations apply to children's activity lift-sharing. These include increased safety precautions to ensure child protection and the requirement for spare child car seats for any children provided with a lift to or from an activity. Another complicating factor for activity lift-sharing is the instability of child friendships [61].

Considering that a recent review of research on current lift-sharing platforms uncovered little on lift-sharing for children's activities, this study remains one of the few to focus on this specific opportunity to improve transport sustainability [66]. The results have implications for stakeholders wishing to increase the prevalence of lift-sharing. Specifically:

Parents could or should:

- Support their child in forming close friendships with other child attendees.
- Decide on a set of rules for lift-sharing together. For example, in the event of a child misbehaving at an activity, the activity leader should contact that child's parent or guardian to discuss the matter, rather than passing on a message to whoever provides the lift favour.
- Be aware that the communication channel for lift favour arrangement considered most appropriate can be situation-dependent and is influenced by the time gap until the

lift favour is provided. Parents could come to an agreement on how to communicate based on the time gap to lift favour.

Activity organisers could:

- Organise formal social events to strengthen social connections.
- Support the development of new friendships and strengthening of existing friendships between children at the activity.
- Limit the number of child attendees to stimulate lift-share arrangement formation, recognising that this may require more complex logistical changes if it is not to impact them financially).
- Consider the impact of the location and the time that an activity is held. An ideal location and time slot for a child's activity would be an activity held at a school in the evening, starting immediately after the last lesson of the day.
- Choose a location with limited parking provision (whilst recognising that this may pose challenges).

Solution providers and policy makers could:

- Acknowledge that parents will value the time-saving aspect of lift-share arrangements, recognise the importance of the social connection or provide a solution that enables the development of social connections. An existing level of trust and friendship between parents of children attending an activity is the essential component of lift-share arrangement formation.
- Recognise that the balance of lifts can vary between fully reciprocal and non-reciprocal, and that this can change over time.
- Target behaviour change policies at higher income, particularly city-dwelling families with two cars, to encourage activity lift-share arrangement formation. Behavioural change policies could also be targeted at families in other socio-demographic groups, but less success within these groups might be expected.

Overall, the key finding is that social connectivity leads to lift-share formation, rather than lift-share arrangements being formed between families that do not have a prior social connection. With a better understanding of how and why parents lift-share for children's activities, existing activity lift-share arrangements can be supported, and new arrangements can be encouraged.

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