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Implementing smartphone enabled collaborative travel: Routes to success in the tourism domain

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ABSTRACT

Smartphone technology can help identify current and anticipate future patterns of behaviour and, with its social networking capabilities, allow users to imagine and organise collaborative travel opportunities, such as lift share. This has led to the development of collaborative apps designed to enable activities like lift sharing. Such apps require new norms of behaviour to establish a user base and research has yet to address the socio-cultural barriers to both the use of this technology to organise travel and the sharing of personal space that collaborative travel entails. This paper reports the findings of a study which designed, built and tested a collaborative travel app in the tourism domain. Data derived from exploratory interviews, post-trial interviews and a questionnaire reveal that user age and extent of mobile engagement play a less significant role than expected, while other aspects of the social exchange, notably social tie strength, trust and obligations play a more marked role. A conceptual framework and discussion of strategies to address these barriers provides insight into appropriate contexts and routes for implementation of collaborative travel apps.

1. Introduction

The widespread adoption of smartphones (Mintel, 2015) has co-evolved new ways for people to go about everyday activities. Meanwhile, social media have forged new opportunities to connect leading to a growing sharing economy, while GPS tracking on mobile devices, given the right platform, can spontaneously reveal opportunities to facilitate forms of social exchange. One such opportunity is travel collaboration, such as lift share. This has been recognised by app developers and resulted in a number of collaborative travel apps reflecting interest in collaborative travel from the public sector and large commercial organisations keen to manage traffic congestion and environmental impacts, including greenhouse gas emissions. Collaborative travel apps shift the responsibility for action to the individuals involved and fit well with the UK government's localism agenda (Localism Act, 2011) at a time of public sector funding cuts. While there is rapid growth in use of various location based services like Google maps, little is known about public acceptance of collaborative travel apps. The impetus for the research reported here was the ongoing policy agenda to address a range of externalities of car use (see for example, HM Government, 2011). Collaborative travel has scope to make more efficient use of car space and reduce overall vehicle mileage. For example, the current aim of public sector lift share initiatives is reduced traffic congestion and emissions (see for example, Dorset County Council, 2014). In addition, though not a focus of the current study, cost savings are often promoted as a benefit for users. This paper reports on a study which explored the potential for user uptake of collaborative travel apps, identifies factors most likely to influence adoption and suggests routes to success.

The interest in collaborative travel arises due to two factors: the underutilisation of vehicle capacity (car occupancy averages 1.58 in the UK (Parliament UK, 2010)); and the socially embedded and habitual nature of car use (Schwanen et al., 2012) which suggests it is worth focusing on the car as a preferred mode of transport. However, accessing this underutilised resource has been fraught with problems related to coordinating potential collaborators, an aspect which smartphone technology can aid, and socio-cultural barriers related to the sharing of personal space. The latter is similar to the challenge of shifting people from personal cars to public transport where the presence of others can detract from the journey experience (Gardner and Abraham, 2007). While recent research has focused on demographics, vehicle access and the motivational factors for lift share (Delhomme and Gheorghiu,

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2016), less attention has been paid to the socio-cultural barriers. This paper sets out to extend the existing knowledge of trust and reciprocity in online exchanges that facilitate offline activity. It also explores the role of social ties, what has been termed 'fleeting ties' (Dickinson et al., 2015) and the role of community. A conceptual framework is developed which lends insight into contexts where it might be best for policy makers to intervene.

The study context is tourism as this is a key domain for smartphone use (Mintel, 2014) as people are on the move, seek out information and use travel services. It is a field where travel collaboration has been deployed, for example, in long-distance lift share to festivals (see, for example, Greener Festival, 2012), and tourists share travel routines (Dickinson et al., 2013).

2. Sharing economy and collaborative travel

The emergence of web 2.0 has led to a rapid growth in online sharing and a growing sharing economy operating online, offline and in-between (Harvey et al., 2013). Communities of interest have found new ways to connect and relational communities have thrived even when geographically distant (Wellman, 2001), though place related communities have arguably declined (Putnam, 1995). This dispersal of social networks poses some barriers to sharing economies where online activities initiate offline sharing of resources, however, there have been a number of successful moves to re-localise sharing, such as Freecycle (Nelson and Rademacher, 2009) and Streetlife (streetlife.com), where new localised connections have been forged online. The advent of smartphones has made it even easier to share through social networking apps and systems such as Facebook have thrived in a mobile environment. Mobile technology brings more immediate opportunities to share information, experiences and location based data, the latter being especially relevant to travel.

Lift share has an established heritage often based around routine journeys like the trip to work. This has largely been organised in reciprocal dyads where lift giving is alternated or costs shared. Various forms of shared car arrangements have also emerged from short term car hire to car clubs (see for example, Kent and Dowling, 2013) as an alternative means of accessing cars without vehicle ownership or standardised hire options. The interest of this paper lies in collaborative travel where spare vehicle capacity is utilised by others either for lifts or for transport of goods. The focus is on private car owners collaborating with each other to reduce car trips or with non-car owners to improve transport access. Recent research indicates women, those with children and younger people are more likely to lift share (Delhomme and Gheorghiu, 2016).

Until recently, most collaborative travel of this form required a degree of prior organisation to arrange pick up times and locations and therefore suited long-term arrangements of a routine nature or long distance travel where high costs were involved. A variety of Internet based systems have been designed to enable people to find both regular and occasional lift share partners (see for example, carsharedorset.com (Dorset County Council, 2014) and gocarshare.com). The widespread uptake of mobile technology affords new opportunities to extend these systems to more opportunistically organise collaborative travel as mobile systems can identify potential lift matches based on location data and alert users to opportunities that are timely and spatially relevant.

Collaborative travel is a material form of social support (Carrasco and Cid-Aguayo, 2012). It arises through social capital, that is the relationships between people (Coleman, 1988), and the benefits individuals gain from fulfilling mutual obligations (Currie and Stanley, 2008). Typically lift-share depends on existing social ties or establishing new social ties often through institutionally organised activities such as work based travel plans.

Theory has identified a range of social ties: strong, weak, negligible (Granovetter, 1973) and fleeting (Dickinson et al., 2015). All have a potential role in collaborative travel and we tap into weak-tie relationships, with more informal acquaintances, when we need access to vehicles that are otherwise not available (Lovejoy and Handy, 2011). Dickinson et al. (2015) describe fleeting ties which are temporary and impermanent relationships that can provide significant resources, but then disappear once the need for support has passed with no ongoing commitment. Fleeting ties generally provide sources of information, predominantly online, but may also be utilised for more physical support, for example in ad-hoc lift share arrangements through apps such as GoCarShare.

Social capital is built on trust which exists in generalised and personalized forms. For instance, there is generalised trust in a community and personalized trust in known individuals. In the context of smartphone enabled travel collaboration initially trust is generalised to the community of users until trust is built up through individualized relationships. Trust is a multi-dimensional concept that has been categorised into honesty, benevolence, competence and predictability (Mcknight et al., 1998). Honesty and benevolence can be applied in a generalised form to the community of users engaged in smartphone enabled travel collaboration, however, competence is task specific (Flavián et al., 2006) and predictability is based on a specific trustee's actions (Vidotto et al., 2012), therefore the latter concepts cannot be generalised across a community but would apply once ties are established between individuals.

Collaborative travel can be categorised as a negotiated, reciprocal or generalised exchange. In a negotiated exchange there is an economic reward. For example, using the Bringbee app, a user can be paid to collect shopping for another user (Bringbee, 2014). In reciprocal exchange, on the other hand, there is not normally any recompense for lifts as people typically take it in turns with another person or persons in their social network. For example, parents taking it in turns to take their children to sport training or users of carsharedorset.com who take it in turns to give lifts. Typically we seek to benefit others more than ourselves in these arrangements. Gouldner (1960) saw this as a mechanism to avoid powerful individuals exploiting others and a contributor to stability in society. To reinforce this, a state of indebtedness is felt as a threat to an individual's status and power, thus people seek to avoid this (Greenburg and Shapiro, 1971; Lampinen et al., 2013). For example, people accepting lifts may offer a small financial contribution to cover the driver's costs, especially if they are not immediately able to reciprocate. To this end, negotiated and reciprocal exchange can be somewhat blurred.

Previous research has shown that people often turn to the market to avoid indebtedness, the sense of loss of freedom and sense of humiliation (Harvey et al., 2013; Marcous, 2009). For instance, someone might choose to pay for a taxi rather than take a lift and Marcous (2009) suggests there may be some preference to seek help from more distant ties to avoid tensions in closer social networks. This suggests fleeting ties (Dickinson et al., 2015) might be an important resource in collaborative travel. Early research on reciprocity recognised that some people do not have the ability to reciprocate (for example, children, the elderly and people with certain disabilities) (Gouldner, 1960), Uehara (1995) and Marcous (2009) identified that even where such people are in need of help they are inclined to reject assistance. In these instances, when people receive help but are unable to offer tokens of thanks, Uehara (1995, p. 498) describes help as "'morally unavailable' to people" and identifies this is a significant area for research. On the other hand, people offering help also have concerns about exploitation (Lampinen et al., 2013) making the balance of giving and receiving a critical issue.

With the advent of social networking systems, there has been a shift from reciprocal exchange in dyads to more communal sharing or generalised exchange. Collaborative systems where there is no economic reward represent this form of exchange which may be asymmetric as a user broadcasts a request to a wide network of other users and, should she receive help, she may never repay that debt of help directly to the user who helped. While there is growing interest in this form of

exchange, there is much less research in this area. In particular there is a need for research where online exchanges lead to offline activity to facilitate the exchange, as in a travel collaboration app, and new theory is needed to understand unconditional and non-reciprocal gifts (Harvey et al., 2013). In generalised exchange the norms of reciprocity persist. For instance, Lampinen et al. (2013) found that people would rather give too much or withdraw from participation altogether in an online community exchange system and, in sharing events, the need to reciprocate is so strong that people need to be persuaded to take things for free (Albinsson and Perera, 2012).

Harvey et al. (2013, p. 2) identify that "future research should attempt to understand how networked technologies can help to reduce the experience of interpersonal indebtedness that occurs in gift economies with different forms of property." This may be especially important in the transport field as the largest gains from collaboration may come from sharing private vehicles as this is an underutilised resource (Fremstad, 2014). At the present time, new models of economic exchange are emerging that provide alternative ways to access resources such as cars without ownership (Bardhi and Eckhardt, 2012). Theory suggests it will take time for people to both develop appropriate norms for sharing privately owned vehicles and to like this form of sharing as preferences have emerged for personal vehicle ownership (Fremstad, 2014). There is no established social structure for lift share in the UK outside of reciprocal dyads and ad-hoc sharing of long trips based on negotiated exchange.

Safety remains a primary concern in travel collaboration, particularly related to travelling with strangers (Cruickshanks et al., 2013) where concerns can be magnified for women and those with children (Loukaitou-Sideris, 2014). Use of mobile media also raises concerns about online privacy in relation to what data are made accessible to others and how data might be used (Buchanan et al., 2007). A specific concern for a travel collaboration app is location tracking and the potential for a user's location data to be revealed to others (Sadeh et al., 2009).

Age is also a potential barrier to smartphone enabled travel collaboration. While older people are a diverse group, many can benefit widely from mobile technology (Nikou, 2015) and travel collaboration is a potential solution to their increasing accessibility needs (Musselwhite and Haddad, 2010), however, their reluctance to engage with technology due to lack of skills is widely reported (Barnard et al., 2013; Nikou, 2015). As of November 2014, only 43% of people aged 65 + owned a smartphone in the UK compared to the national average of 75% (Mintel, 2015). A review of the young-elderly (60–75) suggests that functional challenges in using technology are not the only barriers to use and other sociological and psychological factors are also significant (Nikou, 2015).

The adoption of smartphone enabled travel collaboration is therefore likely to be influenced by a wide range of factors related to individuals and the social context. The emergence of new technology has altered the way communities form and interact and therefore existing theory needs to evolve to understand the nuances of the emerging social interaction. These issues were explored during a project which developed a deployed a purpose built collaborative travel app. The findings build on recent work on sharing of car space (Delhomme and Gheorghiu, 2016), focused on demographics, vehicle access and motivations, to better understand the social exchange aspects, specifically reciprocation costs, trust, social tie strength and sense of community together with mobile engagement.

3. Methodology

The study was based on a phased design where a series of exploratory interviews identified theoretical concepts to inform the design of a collaborative travel app, which was developed and then tested. The trial outcomes were explored using post-trial participant interviews (see Table 1 for details of design phases and participant numbers).

Table 1
Design phases.

	Dates	N
Phase 1 exploratory interviews		
Community and collaboration contexts	May to June 2012	15
Temporal experiences	July to Sept 2012	29
Phase 2 app acceptance		
Trial	July and Aug 2013	37
Post-trial interviews	July and Aug 2013	11
Questionnaire	Summer season 2012 and 2013	339[a]

[a] A total of 359 questionnaires were returned, 20 questionnaires were excluded due to missing values.

Concurrent to this app development and testing a questionnaire tested acceptance across a wider population.

The exploratory research and collaborative travel app trial focused on camping tourism. This form of tourism is relatively under researched given its market share in the EU (EuroStat, 2012) and provides a spatially bound context for study where a temporary, but fluid community forms (Dickinson et al., 2015). There is a degree of shared travel routine to local attractions (Dickinson et al., 2013) that presents scope for travel collaboration.

A campsite was purposefully selected due to the willingness of the owners to provide researchers with access to its visitors. It was medium sized (approximately 100 pitches), provided pitches for tents and camper vans and was located on a bus route about 5 km from the seaside town of Swanage, UK. The questionnaire was also distributed at this site and three other sites within the same destination area, one larger, one smaller and one incorporating static caravans. The findings from the four campsites were similar so the data were collapsed into one data set for subsequent analysis.

The phase 1 exploratory interviews (n = 45) focused on two aspects: 1) the participants' community and collaborative contexts both at home and during camping, and the use of mobile technology to access social capital; and 2) the temporal experiences of participants based on a narrative interview strategy which asked participants to recount the previous day. The interviews were semi-structured and lasted around 40 min. A thematic analysis identified and explored concepts of relevance to the collaborative app development which informed the app design and phase 2 questionnaire design.

Phase 2 focused on acceptance of the app context. Participants for the collaborative travel app trial were recruited on-site during their stay at the campsite, with participants coming into and out of the trial on a rolling basis depending on their length of stay. A sub-sample took part in in-depth interviews (n = 11) to explore the experience of using the app.

The phase 2 questionnaire (n = 339) was designed to test the acceptance of the app concept with a large sample. The acceptance of the collaborative travel app was explored using two cartoon sketches (see Figs. 1 and 2, and also Dickinson et al., 2013) which illustrated a lift share and collaborative shopping scenario. Respondents were asked to indicate their willingness to use the app for each scenario based on a balanced 5-point scale. Based on the literature and exploratory interview phase, a series of independent variables were hypothesised to influence app acceptance: reciprocity costs (including obligations, privacy and safety concerns); trust (including honesty and benevolence); strength of social ties; desire for digital disconnection while camping, mobile ownership and use of social network sites; sense of community at the campsite; and socio-demographic variables (age, presence of children, gender). Smartphone ownership, use of social network sites, presence of children and gender were measured using categorical variables, age was a continuous variable, while the remaining variables used 5-point balanced scales. Following a pilot in 2012 the final items were selected. Items for the scales were derived as follows.

Nine items measured reciprocal obligations, privacy and safety which were derived from the phase 1 analysis which identified

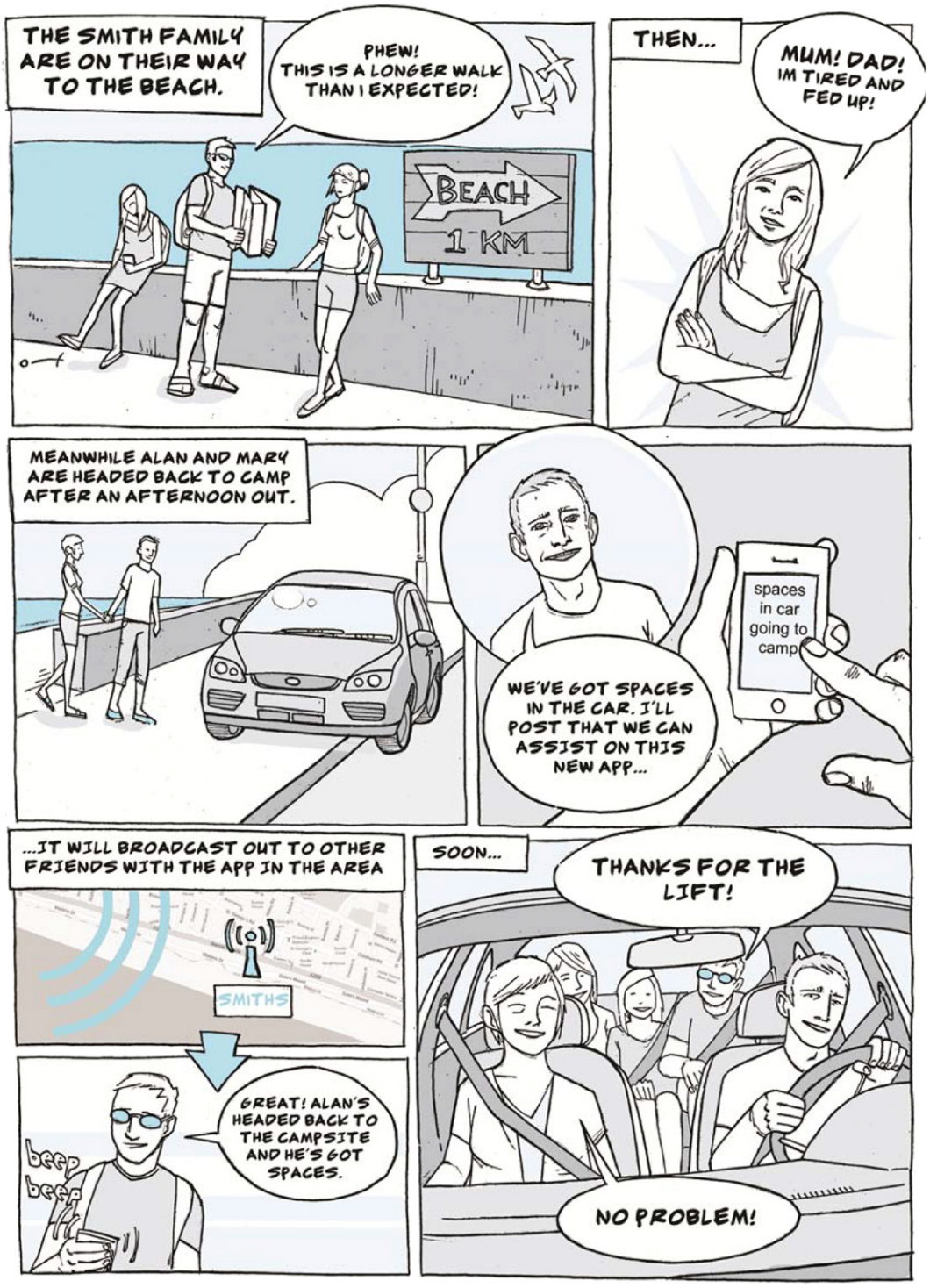

Fig. 1. Lift share scenario.

concerns about exploitation by other users and commitments to the exchange process. Items on safety focused on concerns about safety during collaborative travel which, given the unique nature of the trial, were developed specifically for the study. Privacy measures were adapted from Buchanan et al.'s (2007) online privacy scale to reflect the mobile context. The items on trust focused on generalised trust in the campsite community rather than personalized trust, though there is some overlap as campsite tourists can know other visitors on the campsite. Exploratory interviews suggested honesty and benevolence as sub-latents of trust were transferable to the app scenarios and items were derived from Flavián et al. (2006). Two further trust items were derived from the generalised trust scale (Mannemar Sonderskar, 2001). Based on Granovetter's (1973) framework of strong, weak and negligible ties and Dickinson et al.'s (2015) concept of fleeting ties, respondents answer five statements about their level of comfort in using the app with people of varying tie-strength. Exploratory interviews suggested there were a number of concerns about use of mobile technology during camping and for some participants it was a time to avoid mobiles and technology in general. Six items were developed specifically for the study to measure this aspect. Four items were developed specifically

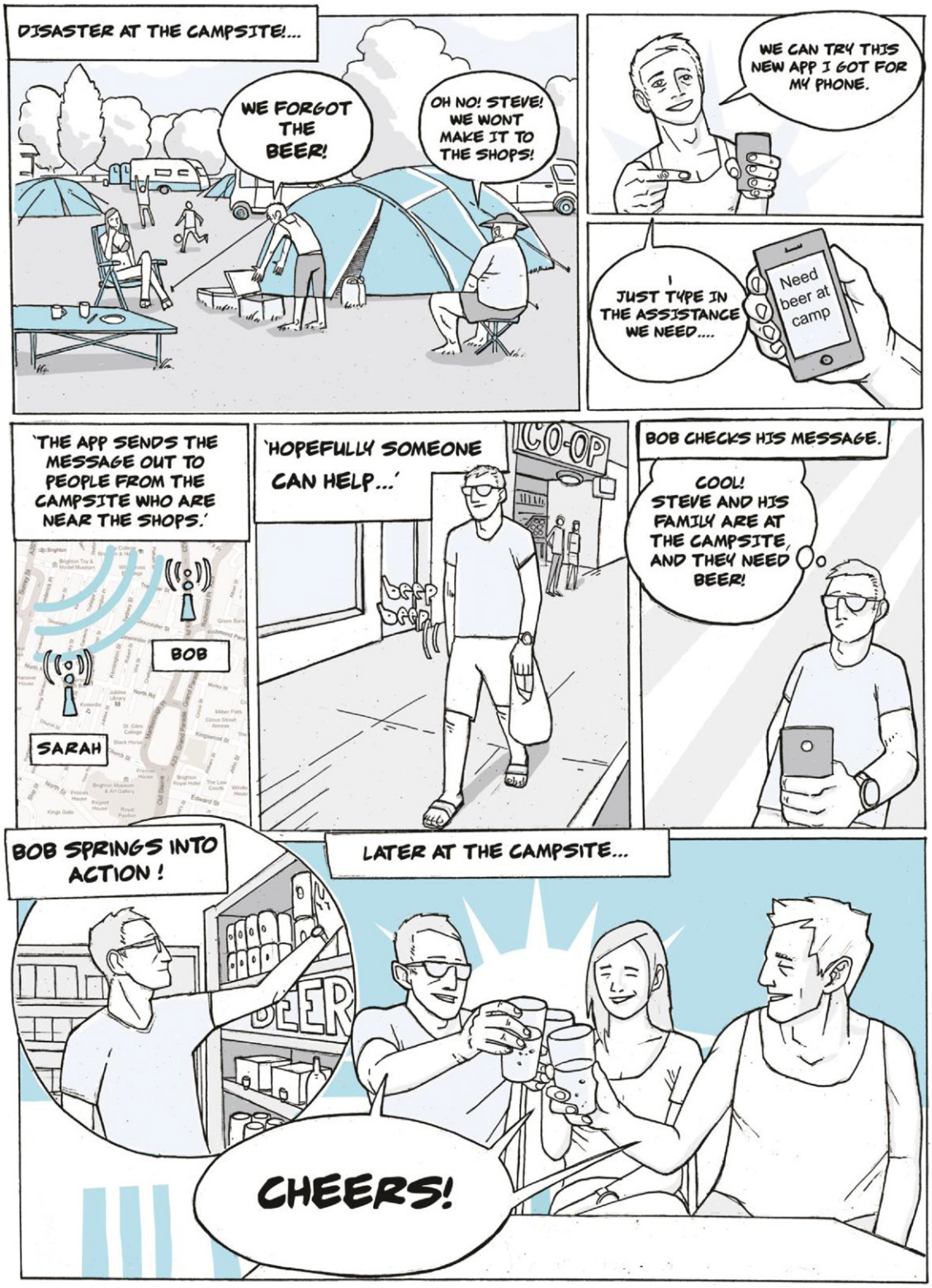

Fig. 2. Shopping scenario.

for the study to measure sense of community based on shared interests, feelings of belonging and emotional attachment.

The qualitative interviews (phase 1 exploratory interviews and phase 2 app trial) were based on a heterogeneous sampling strategy which sought participants across a range of ages, genders, camping experience and group characteristics. The qualitative interview data were subject to thematic analysis.

A convenience sample was used for the questionnaire with all available tourists approached in a traverse of the campsite or by the researcher positioning themselves prominently and handing out questionnaires to adults as they passed. In the resulting quantitative sample women were slightly over represented (57%). The mean age of 47 reflects the middle aged camping population (57% were aged 35–54) who come with children (55%) in a mean group size of 4.6. The

Table 2
Mobile phone ownership.

Type of mobile phone	%
No mobile	2
Smartphone[a]	60
Advanced mobile (includes internet access)	17
Talk and text mobile	20
Not sure	1

[a] Smartphones had been owned for a mean of 3 years.

sample was relatively well educated (66% had post-18 qualifications) and relatively affluent (33% had household income over £50,000). The majority were British (95%), typically staying for one week (mean of 6 nights), with 61% first time visitors to the campsite. Car (74%) and campervan (24%) dominated travel to the campsite, however, mode of travel during the stay was more varied including significant walking (66%), use of the local steam train (27%), bus (15%), and cycling (15%). Smartphone ownership was similar to the UK average for the time (Mintel (2015) reports 60% owned smartphones in July 2012 rising to 68% by June 2013) (Table 2) and was associated with relative affluence ($\chi^2 = 19.645$, df = 8, $p = 0.012$), while 60% used social network sites.

The variables captured by the questionnaire were subject to multiple ordinal regression using a logit link function to evaluate the influence of variables simultaneously on the two app acceptance scenarios. Four models were generated each validated by the parallel lines test and goodness of fit recording non-significant results ($p > 0.05$). The first two models focused on respondent attributes (age (a continuous variable), gender, presence of children, mobile owned and use of social media (categorical variables)), with one model for each app acceptance scenario. For the final two models, ordinal variables capturing social exchange variables and desire to avoid mobile technology were subject to exploratory factor analysis using principal components analysis to derive factor scores for each concept. A six factor solution emerged as anticipated from the prior pilot study design. There were no low values in the communalities table, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was good at 0.875 and Bartlett's Test of Sphericity was significant ($p < 0.001$). The six factors accounted for 65% of the total variance which is adequate (Doise et al., 1993). Multiple ordinal regression was then applied to six factor scores.

4. Acceptance of the collaborative travel app concept

There was a mixed response to using the app in both scenarios described (Table 3) and some variability in responses across the two scenarios with some very unwilling to use the app for shopping but willing to lift share.

4.1. Respondent attributes

Initially demographic (age, gender, presence of children) and mobile use variables were explored for their influence on app acceptance (Table 4). Older respondents show a decline in willingness to use the app, however, while there are small differences related to gender and presence of children these are less marked. Owners of smartphones and users of social media show more willingness to use the app. Multiple ordinal regression was then applied to these variables (Table 5). The

Table 4
Respondent attributes and willingness to use the travel app.

	% willing to use the lift share scenario	% willing to use the shopping scenario
Age		
18–24	58	57
25–34	58	48
35–44	48	50
45–54	44	47
55–64	27	36
65+	24	31
Gender		
Male	40	41
Female	45	46
Children present in group		
Yes	45	46
No	41	41
Mobile owned		
Smartphone	46	48
Advanced mobile	33	39
Talk and text	38	33
User of social media		
Yes	46	49
No	39	38

Table 5
Ordinal regression on respondent attributes.

	Lift share scenario			Shopping scenario		
N	267			272		
Link function	Logit link			Logit link		
Pseudo R-Square (Nagelkerke)	0.053			0.035		
	Lift share scenario			Shopping scenario		
	Estimate	Wald	*p*-Value	Estimate	Wald	*p*-Value
Threshold						
Very willing to use	−1.000	2.019	0.155	−2.548	12.689	0.000
Willing to use	1.092	2.450	0.118	−0.170	0.061	0.805
Uncertain	2.492	12.292	0.000	1.102	2.534	0.111
Unwilling to use	3.693	25.432	0.000	2.248	10.116	0.001
Very unwilling to use (base)						
Age	0.029	7.385	0.007**	0.010	0.860	0.354
Gender						
Male	0.071	0.095	0.759	0.075	0.107	0.744
Female (base)						
Children						
Yes	0.306	1.731	0.188	0.011	0.002	0.964
No (base)						
Mobile phone						
Smartphone	−0.017	0.003	0.960	−0.291	0.788	0.375
Advanced mobile	−0.001	0.000	0.998	−0.202	0.298	0.585
Talk and text (base)						
Use of social network sites						
Yes	−0.347	1.869	0.172	−0.395	2.412	0.120
No (base)						

** Significant at <0.01.

Table 3
Willingness to use the travel app.

In the context of your current camping holiday, how willing would you be to use the travel app for:	Very willing to use (%)	Willing to use (%)	Uncertain (%)	Unwilling to use (%)	Very unwilling to use (%)
The lift share scenario (Fig. 1)	10	33	30	16	12
The shopping scenario (Fig. 2)	7	37	29	16	12

models indicate that age is significant for the lift share scenario, though the model does not fit well. As 'very unwilling to use' was the higher value of the dependent variable, the positive coefficient means as age increases the willingness to use the app for lift share declines. The other variables (gender, presence of children, mobile owned and use of social media) were not significant, though clearly the lack of a smartphone would be a real barrier to actual use. There are no significant effects for the shopping scenario.

Previous studies have identified that older people engage less with technology (Barnard et al., 2013; Nikou, 2015) and analysis confirms that smartphone ownership declined with age ($\chi^2 = 64.901$, df = 10, $p < 0.001$) in this study. However, despite anticipated problems in recruiting older participants due to lack of familiarity with smartphone technology, age did not emerge as a barrier during the app trial. Of the 37 trial participants, while only three (8%) were young-elderly (60–75) (Nikou, 2015), this reflects the questionnaire sample at the trial campsite where a similar 8% of respondents were over 60. No participants were aged over 75, however, this group are rarely represented in campsite tourism. All three of the young-elderly participants were interviewed. One used their own smartphone (James) while two borrowed project smartphones for the trial duration (Judith and Thomas). All three were active participants.

While social media use was found to have no effect in the quantitative work, the qualitative work explored this further as social media users are more familiar with engaging online with people they do not know and draw on what Dickinson et al. (2015) have termed 'fleeting ties'. Use of social media fosters a sense of belonging (Munar and Jacobsen, 2014) and Geoff (phase 2 trial) explains how you get to know people through social media:

> "If they kind of posted some of their interests in things… you got to know them without kind of meeting them. So from some of their kind of tourist locations they went to, you can make general assumptions about them a little bit maybe."

A willingness to engage with social media is therefore likely to foster more acceptance of a collaborative travel app, however, the ordinal regression indicates no effect.

4.2. Social exchange and digital technology factors

Factor scores were derived for five constructs related to the sharing exchange: sense of community; trust; obligations to others; mobile privacy; and safety. In addition a sixth factor focused on the desire to avoid mobile technology (Table 6). Multiple ordinal regression was then applied to this group of factor scores to understand their influence on the two app acceptance scenarios. Given that age was found to play a role in the lift share scenario acceptance, this was included in the lift share model. The models were both improved (Table 7). Age continued

Table 6
Factor matrix.

	Factor 1 Mobile privacy	Factor 2 Trust	Factor 3 Desire to avoid mobile technology	Factor 4 Obligation	Factor 5 Safety	Factor 6 Sense of community
I would like to return to this campsite in the future						0.678
I feel people staying at this campsite share my interests						0.657
I feel part of a community at this campsite						0.753
I feel emotionally attached to this campsite						0.767
People staying at this campsite would not deliberately try to take advantage of the campsite community		0.822				
Most people at this campsite would try to be fair		0.824				
People staying at this campsite would not compromise the wellbeing of other visitors		0.847				
I think I can have confidence in people staying at this campsite to keep promises made		0.655				
Most of the time people at this campsite try to be helpful		0.651				
Camping is a time to avoid mobile communication			0.884			
When camping I like to engage with the natural world and switch off mobile phones			0.907			
I switch off my phone to avoid intrusion from work			0.775			
Mobile technology is an intrusion in a camping holiday			0.881			
I prefer not to use the electronic gadgets when camping			0.818			
I only carry my mobile phone for emergencies when on holiday			0.809			
I might feel obligated to carry out a task				0.714		
I do not want to make any commitments				0.857		
It can be complicated to sort out arrangements				0.743		
I am concerned about privacy				0.616		
People might pursue unwanted friendship				0.600		
I don't want to take responsibility for other people				0.717		
I want to enjoy quality time with my friends/family				0.615		
I don't want to be let down				0.576		
The task might demand too much of my time				0.751		
I am concerned about my privacy while using mobile phones	0.789					
I am concerned about people I do not know obtaining personal information about me from my mobile phone activities	0.891					
I am concerned about identity theft from my mobile	0.896					
I am concerned that mobile app developers will use my personal information for other purposes	0.875					
I am concerned about mobile apps that track my location	0.778					
I am concerned that consumers have lost all control over circulation of their information through the use of mobile technology	0.792					
I am concerned about people online not being who they say they are	0.651					
The safety of lone women					0.788	
Your car when giving lifts					0.790	
Lift sharing with children present					0.762	
Your personal belongings when giving lifts					0.832	
Personal safety when giving lifts					0.843	
Personal safety when receiving lifts					0.828	

Table 7
Ordinal regression on social exchange and digital technology factors.

	Lift share scenario			Shopping scenario		
N	240			268		
Link function	Logit link			Logit link		
Pseudo R-Square (Nagelkerke)	0.390			0.308		
	Lift share scenario			Shopping scenario		
	Estimate	Wald	*p*-Value	Estimate	Wald	*p*-Value
Threshold						
Very willing to use	−1.151	4.632	0.031	−3.026	133.088	0.000
Willing to use	1.431	7.532	0.006	−0.262	3.626	0.057[a]
Uncertain	3.198	33.441	0.000	1.171	59.056	0.000
Unwilling to use	4.537	58.425	0.000	2.433	136.535	0.000
Very unwilling to use (base)						
Factor 1 Mobile privacy	−0.321	5.424	0.020*	−0.209	2.726	0.099
Factor 2 Trust	4.26	11.144	0.001**	0.466	14.473	0.000**
Factor 3 Desire to avoid mobile technology	−0.003	0.001	0.980	0.012	0.010	0.922
Factor 4 Obligation	−1.020	50.259	0.000**	−0.852	41.140	0.000**
Factor 5 Safety	−0.255	3.268	0.071	−0.259	4.035	0.045*
Factor 6 Sense of community	0.073	0.343	0.558	0.295	5.972	0.015*

[a] Not significant though close to significant at $p = 0.05$.
* Significant at <0.05.
** Significant at <0.01.

to play a role in willingness to lift share. Consistent to both models, as trust increases there is more willingness to use the app and as concerns for obligation to others rise there is less willingness to use the app. The desire to avoid mobile technology is not significant in both models.

The role of trust identified in the ordinal regression is reinforced by the exploratory research as users exploiting other users emerged as a key concern. This chimes with Lampinen et al. (2013) who note fears about being cheated or getting an unfair deal. However, it appears concerns about exploitation may have been overplayed in the interviews as during the actual trial opportunism did not prove to be an issue and conversely participants were concerned about making demands on others.

With respect to exploitation there was discussion of embedding virtual credit in the app, including some credit for first time users. However, in the design phase this was rejected as participants recognised that some users might not be able to offer help, for example, a backpacker visiting the campsite cannot give others a lift or collect shopping. Similarly, a user feedback mechanism was rejected as participants realised they could provide negative feedback and then meet that person as the system is localised and community based. As Lampinen et al. (2013, p. 669) suggest "formalising the exchange of tokens of appreciation and/or linking such behaviour to one's online reputation or profile would be antithetical to the spirit of indirect exchange".

The significance of social obligation is reinforced by the trial findings where offers of help dominated in contrast to requests for and acceptance of help which reflects the theory on reciprocity (Gouldner, 1960). Feelings of indebtedness inhibit app use since they threaten a user's status, power and freedom of action with respect to the donor of help. For instance, Julie (phase 1 interviews) explains "I'm not very good at accepting help… you see that as a sign of weakness". These feelings persist in this generalised exchange where a help receiver will not be expected to directly reciprocate with the help giver. Also, in collaborative travel people are exchanging favours rather than goods. Suhonen et al. (2010) argue that this presents a problem as favours lack a market value. The lift provider has to live up to the expectation to deliver the lift and this reduces their flexibility. In this respect some participants were protective of their personal flexibility and found offering or accepting a lift represented a commitment that then became spatially and temporally defined. For instance, Richard (phase 2 trial) described how the weather meant plans were last minute and it was therefore difficult to take other people into account.

Cars provide mobile leisure spaces, "bubbles of privacy moving through public spaces" (Sheller, 2004, p. 44). It is difficult to break free from the flexibility provided by the car as the car has enabled new 'flexible socialities' and created new modes of movement rather than simply replacing public transport (Urry, 2007, p. 119). Certain requests for help, such as lift requests, would mean giving up comfort and flexibility of the personal car or the certainty of achieving the task.

Camping tourists form a temporary place based community by coming together at a campsite, sharing facilities and some interests. In essence a temporary neighbourhood is formed (Dickinson et al., 2015), however, this is different to other forms of community which typically emerge as a product of long term residence in a location or are self-generated through shared interest. At the campsite, physical presence is fleeting and the shared interest in local leisure opportunities is not universal. While community members normally build up knowledge of one another, at the campsite stays are often too short to build social ties. The questionnaire analysis found a stronger sense of community increases willingness to use the app in the shopping scenario, but not the lift share scenario. In other more enduring community contexts, sense of community is likely to play a more significant role and this comes through in participant interviews. For instance, Adam (phase 1 interviews) speaks of having a 'good neighbourly spirit' at home and his wife goes on to speak of how they frequently collaborate with their neighbours:

> "There is a real community spirit and we often share lifts and things with neighbours. The other day you took a neighbour to where you were going and equally now, a neighbour is looking after out cat and we've helped look after each other's children".

The presence of young children is a factor that influenced collaboration in home life and parenthood facilitates collaborative experiences. For example, Alice (phase 1 interviews), with two young children, explains how "we look after, we help sometimes pick up other people's kids from nursery and they help us in return. We'll feed them if they're stuck". Interest based communities also provide services as can be seen in Donald's (phase 1 interviews) response:

> "Generally as sort of cyclists we quite often have got help from other people and have helped other people quite a lot. A number of times you know we've helped people with repairs or we've got a lift off somebody when we've had a major breakdown and things."

Donald goes on to explain why they experience this sense of collaboration in the cycling community:

> "…if you're in a nice, small municipal site in France or something and another couple of cyclists or tourist turn up, then it's most likely you'll chat to them and ask them where they've been and you know what their experiences are and stuff like that. You're in a relative minority… you've obviously got similar interests, so you tend to chat a bit more…"

This sense of being similar, and to some extent different to others, enables collaboration whether in a home or tourism setting, however, home environments present a more stable community. We also see that different types of communities provide different 'services' (Wellman and Wortley, 1990).

Concerns about mobile privacy and personal safety decreased willingness to use the app though patterns are differ between the two scenarios. Safety concerns of women and people with children were expressed during exploratory qualitative work and as safety concerns go up there was less willingness to use the app for shopping. Mobile

Table 8
App acceptance relative to other users.

Who would you feel comfortable using this app with?		Very comfortable	Comfortable	Uncertain	Uncomfortable	Very uncomfortable
People you have got to know during your stay on the campsite	Comfort declines relative to strength of social tie ↓	16	54	19	6	5
People on the campsite who share your leisure interest (e.g. climbers)		10	40	31	11	8
People you have met briefly at the campsite		4	28	38	18	13
People staying at the campsite who you have not met		2	13	41	26	18
Other tourists in the area		2	7	36	32	23

privacy was also raised in qualitative work and as concern increases there is less willingness to use the app for lift share.

The desire to avoid mobiles while camping emerged as a complex and often contentious issue during interviews. Several couples were observed engaging in good-humoured arguments about the repeated checking of mobiles. The quantitative analysis revealed no significant effects on either of the app use scenarios. This reflects the ambiguity expressed by interview participants who desired time without mobiles, but valued the immediate access to information resources facilitated by smartphones and the sense of security that absent family members could contact them if necessary. For instance, Jocelyn (phase 2 trial) states that "when I go on holiday I turn the phone off because I have it on all the time at work… I want to be away from technology". Yet despite this desire to switch off her mobile she volunteered to take part in the app trial and was therefore required to carry a mobile switched on all the time. This suggests that the desire to avoid technology would suppress engagement with a collaborative travel app but would not lead to complete disengagement.

Strength of social tie is important to the material support accessible through the app and quantitative analysis confirms perceived level of comfort in app use declines relative to the strength of social tie (see Table 8). Collaborative travel utilises personal car space which involves social interaction and impacts on personal routine. While the fleeting ties described by Dickinson et al. (2015) facilitate sharing of travel information, they are less likely to enable physical travel. Exploratory interviews found participants were concerned that unwanted commitments might emerge and there was also a desire for face-to-face contact prior to travel collaboration, suggesting the need for at least negligible ties (Granovetter, 1973). The majority of collaborative travel described by participants at home took place among known-ties such as neighbours or fellow leisure participants.

The questionnaire explored the social norms of using the app and results suggest a more positive impact if friends (stronger ties) are seen using the app than people in general at the campsite (Table 9). Those who use social network sites responded more positively to getting involved if others in general at the campsite were seen using the app (mean rank = 155 compared to 181 for non-users, U = 15,092.5, z = 2.575, $p = 0.01$, r = 0.14 (small effect)). Similarly users of social network sites indicated a higher level of comfort in using the app with other tourists in the area (mean rank = 156 compared to 177 for non-users, U = 14.548, z = 2.140, $p = 0.032$, r = 0.12 (small effect)), people at the campsite they had not met (mean rank = 154 compared to 181 for non-users, U = 14.947, z = 2.646, $p = 0.008$, r = 0.15 (small effect)) and people they had met briefly (mean rank = 154 compared to 182 for non-users, U = 15.124.5, z = 2.712, $p = 0.007$, r = 0.15 (small effect)). These are all relationships where there is no existing social tie and implies those who use social network sites are more willing to make links to those outside of their existing social groups.

5. Discussion and conclusion

The analysis reveals some significant barriers to user adoption of smartphone mediated travel collaboration, however, some presumed barriers play a much smaller role than anticipated, notably age and the desire to avoid mobiles, the latter having no effect (Fig. 3). As per Nikou (2015), other sociological and psychological factors are more significant. Given that smartphone ownership continues to rise, lack of access to technology will be a declining barrier and smartphone use was pervasive at the campsite despite a desire by some to avoid mobile use in the campsite context. Therefore, though technology will be a barrier for some, it is other aspects of social exchange that play a more marked role: social tie strength; trust; and reciprocity costs, particularly obligations.

Existing travel collaboration was found to revolve around known social ties and while some participants were willing to collaborate with unknown others the evidence for this taking place was sparse. Activities such as lift share or collection of shopping are forms of material support which are typically organised through our most accessible social ties (Wellman and Wortley, 1990). There is not an established norm for this form of exchange beyond known ties (Fremstad, 2014), therefore successful implementation is more likely in communities where social ties are established. It would therefore be prudent to target established groups who can then be encouraged to reach out to less know individuals to extent the network to fleeting ties.

One user described the app as a 'double behaviour change' as she needed to engage not only in collaborative travel, but also organise this through a smartphone app. Targeting groups that already embrace the idea of collaborative travel would therefore be helpful as, in addition, people need to learn about the way the system operates (Lampinen et al., 2013). For instance, Jocelyn (phase 2 trial) explained how she posted some initial messages that timed out very quickly as she did not understand the time frame could be adjusted. Social networks include 'lurkers' who observe activity but do not interact, especially as they learn about the system (Suhonen et al., 2010). These lurkers need to convert to active participants as collaborative travel systems require 'reciprocal interdependence' (Markus, 1987). Visualising the exchange process and successful exchanges not only demonstrates that things are happening, but also explains the system to novice users. Research on online exchange systems suggests that systems make both active and passive behaviour visible to all, so users realise the lurkers are viewing requests, even if they are not acting on them (Suhonen et al., 2010). Norms for use are best initiated by observing other users, preferably friends, and therefore user champions can play a role in the adoption of travel collaboration apps.

While social tie strength relates to individualized trust, generalised trust in the community of users is also important to reduce concerns about exploitation. While online systems such as eBay have developed rating systems for users, qualitative findings indicate this is not ideal in exchange systems where users meet in a personalized context of travel. Generalised trust is therefore a difficult barrier to tackle and one that will take time to establish in any user network.

This also relates to obligations, a reciprocity cost which emerged overall as a significant barrier to acceptance. While exploitation by

Table 9
Establishing norms to use the app.

Please indicate your agreement with the following statements about the travel app.	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
I would use the app if I knew that my friends/people I know at the campsite were using it	13	50	23	7	6
If I see other people from the campsite using the app it would encourage me to get involved	8	44	28	15	5

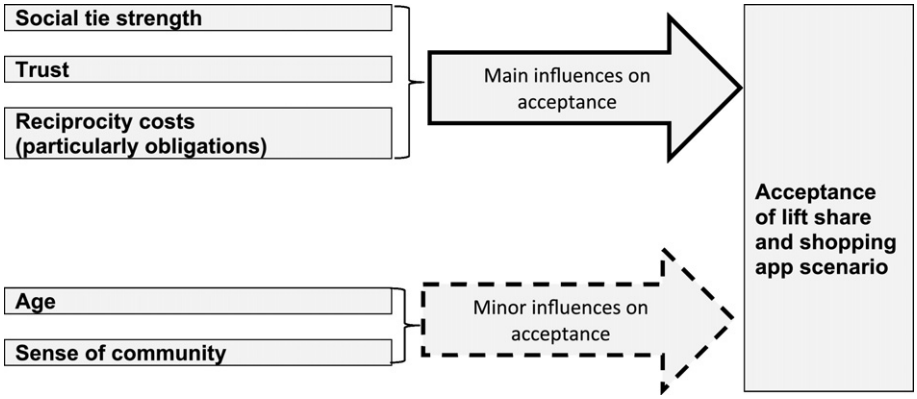

Fig. 3. Conceptual framework of factors influencing acceptance of collaborative travel app.

other users was an initial concern, during the trial this translated to a profound reluctance to make demands on other people to avoid the sense of indebtedness (Greenburg and Shapiro, 1971) which persists in generalised exchange. Maintaining a reciprocal balance is vital in a collaborative travel system and emerges as a significant theoretical and practical challenge which currently reduces the viability of these apps. While further research is needed to explore mechanisms to overcome this barrier, work in other forms of community exchange suggest user protocols can establish norms for reciprocal exchange (Nelson and Rademacher, 2009). Freecycle, a successful online community set up to exchange unwanted household items, has such a protocol. Its guidelines state users should make offers before posting requests and asks users to limit the number of wanted requests. This successfully maintains a constant supply of goods on offer. The key aims of travel collaboration are to reduce car use and improve transport access options for the community. In initiatives to reduce car use a protocol should include guidelines that users make a commitment to ask for lifts as well as offer their spare vehicle capacity to others. People like to give back to the community when they receive something and this triggers new offers (Lampinen et al., 2013). Help givers also enjoy the experience and receivers play an important role for providers of lifts or other transport services. Therefore systems should highlight the rewarding nature of the exchange experience for providers of help (Suhonen et al., 2010) to reduce the sense of imbalance.

Data privacy was raised as a core issue in exploratory work and was partially confirmed by the questionnaire study. People were particularly concerned about location data being made available to other users or being mined externally from system data. Conversely app users, while aware their location would be tracked, expressed little concern. This reflects a group willing to engage with the idea, but also a general disregard for these issues in the download and use of many mobile apps that embed forms of tracking. Therefore while data privacy currently dominates governmental debates and it is clearly vital to build secure systems, there is mixed evidence that potential users are concerned. Further work is needed to understand the data privacy challenges presented in collaborative travel systems. Safety during collaborative travel was also a concern and it is recommended that initiatives target a community where children's travel is not a priority. Collaborative travel is unlike sharing of other property where its use can be independent of the person offering the help. The personal space of cars (Gardner and Abraham, 2007) has implications for the ritualised use of that property (Harvey et al., 2013).

The spare capacity of cars is a plentiful resource that could be utilised more widely to benefit society. Its use represents a shift of responsibility for collective transport from publically organised provision to individuals and groups as it is individually owned cars that provide the resource. While users of a collaborative travel app might benefit from cost savings through shared use, there are significant socio-cultural barriers to overcome. This requires new norms to be established. This is especially important to shift collaborative car use from an accepted form of travel among known ties to wider use among more fleeting ties. Generalised exchange through more fleeting tie groups would open up the resource and provide more critical mass for an effective network of users, however, the evidence suggests initiatives should begin with known tie groups where analysis indicates more acceptance.

Finally, these findings are specific to the camping tourism domain and the UK. While the scenarios have wider relevance, the community context is unique. The sense of community had less effect than anticipated due to the temporary nature of the tourist community. Contemporary communities are self-generated, while the scenarios and trial embedded people into a temporary place based community fabricated around the campsite. In other cultural and location contexts community may play a more significant role. Given the decline in place based communities (Putnam, 1995) and a view that contemporary neighbourhood must be re-imagined (Kempen and Wissink, 2014), use of a purely locational metric as the basis for a community of users, such as a village or housing area, is unlikely to be successful. The evidence from theory and this study suggests most success with a collaborative travel app is likely to be achieved where social networks of individuals are self-generated around shared interests and there is some knowledge of other users. Such networks can be comparatively dispersed, yet collaborative travel requires participants who are located close together in dense networks to make meaningful travel connections. Implementation might therefore focus initially on established social groups with a locational connection, for example sports clubs, large workplaces or community based initiatives with scope to scale up once a group or groups are established.

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