If You Are Happy and You Know It, Say "I'm Here": Investigating Parents' Location-Sharing Preferences

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Abstract. A diary approach was used to explore location-sharing preferences of 126 parents with young children with the goal of investigating which elements play a role in their decision to share their location. During a 3-week user study, we daily collected parents' preferences of location sharing along with data related to the physical and social context, their interest in socializing with other parents and their emotional states. Our analysis points out several insights for this previously underexplored user group. In particular, our results suggest a relative greater importance of the context, both physical and social, with respect to individual traits such as personality, trust dispositions, and demographic characteristics. Moreover positive and negative emotions seem to influence the intention to share location information in a peculiar way: positive moods like happiness seem to encourage private sharing with selected people such as partner, relatives, friends and nearby parents, yet, when parents experience a negative mood, such as being worry, angry or sad, their intention to share publicly on the web is higher.

Keywords. Parents, location sharing, Day Reconstruction Method.

1   Introduction

In the last years, there has been a growing interest in investigating preferences regulating location-sharing behavior. The decision to share own location is a complex and dynamic phenomenon that depends on a number of factors such as the target of the disclosure and hence the interpersonal relationship between the discloser and the target of disclosure [6; 33]; the physical, the social and the emotional context [29; 6; 16; 31]; the motivation for sharing such information [3; 31] as well as personality and other individual traits of the discloser [15].

The user population usually investigated in literature is young adults and students that are likely to have peculiar values, privacy attitudes, lifestyles and needs [3; 17]. Hence, these studies mostly consider places related to student life (cafeteria, canteen, library, etc.). There is a pressing need to understand location privacy behaviors across a wider population [2]. In order to contribute on the discussion about this phenomenon, we focus on a different target group: parents with young children.

Indeed, parents display several critical aspects that may differentiate their attitudes and possible usage of location sharing services from students. First, the social context is far more complex because of the presence of children and the extra-work time of

parents is mostly spent with children. This means that parents' sociability is highly determined by children needs and this fact often turns leisure activities to a mix of leisure and family duties [8]. Second, the stress of juggling child rearing responsibilities with the demands of work impacts on the usage of time and makes time scheduling activities between parents a very complex activity [7]. Finally, parents' experience of public spaces is different from that of other target groups such as students mainly because of safety issues [35].

Parents and families are receiving growing attention in the HCI community and studies highlighted how social media are becoming essential for parents to keep in contact and ask/give advices and support to other parents. In a recent study, Gibson and Hanson [11] discussed how new mothers use Facebook to avoid social isolation and improve their confidence. The transition to parenthood is actually a gratifying although stressful experience and social connectedness is expected to heavily impact on the quality of life of both parents and children [9, 21]. While parents' online sociability is receiving a growing attention [11], few studies explored how offline interaction may be encouraged through digital technologies. Recently, Leonardi et al. [16] showed a positive attitude of parents toward location sharing services that may facilitate ad-hoc encounters between nearby parents and the exchange of information about places as trigger for further offline meetings.

In this paper, we report a comprehensive user study that involved 126 parents with young children aged 0 to 10. The age range was set to include infancy to middle childhood because in this phase parents' life is driven by children needs more than their own [36]. Parents' preferences of location sharing were collected through a Day Reconstruction Method (DRM) for 3 weeks. Participants were asked each evening to describe a place they have visited during the day, along with the social, emotional and physical context, their interest in socializing with other parents in that place and their willingness to disclose own location with different targets.

The main contributions of this paper are a number of insights on the intention to share the physical location through mobile devices for the previously underexplored user group of families with young children. In particular, the study highlights interesting opportunities for location-sharing applications showing situations in which parents may be interested in sharing own location:

1. The relative greater importance of the context (presence of other people, current mood, type of place) with respect to individual traits (e.g., personality, trust dispositions, and demographic characteristics);
2. The special roles played by the partner and the children as social contexts;
3. The different effects of positive and negative emotions on intention to share location with different targets: positive mood seems to encourage sharing location with specific people (partner, other family members, friends but also nearby parents) while negative mood seems to encourage it with everyone, i.e. publicly on the web.

Understanding parents' needs for socialization and their location sharing preferences is of paramount importance to eventually design appropriate services for this user group. Still, this paper focuses on the analysis of the conditions that influence the decision to share and it does not aim at discussing design issues.

2   Related works

Several researchers have shown the potential but also the risks associated with applications that exploit location for improving social contacts in the offline world [see for example 32; 30]. A survey by Lindqvist [18] shows that 30% of participants had met new people with the use of Foursquare and some of them have even used Foursquare for the purpose of dating or developing a romantic relationship. Toch [32] discussed how the so-called "nearby applications", which support ad-hoc encounters with strangers, introduce social opportunities but also new challenges related to physical risks, emotional harm and social embarrassment. The target group of parents with young children are likely to share the general attitude toward the use of "nearby applications" but the specific characteristics might be quite different because of their specific social needs.

Disclosing own location is an action that combines high risks with a number of benefits and studies have shown how different factors came into play to explain people preferences toward disclosing or not these sensitive information. Xie et al. [34] investigated how different contextual factors affect users sharing preferences. They found that emotion is a useful predictor for sharing behavior followed by companion and time: people tend to share much more with family and friends when they are in a positive mood. The role of emotional context is also highlighted by Consolvo [6] that reported participants were most willing to disclose their location when they were depressed or happy and that they disclosed least often when angry. Wiese et al. [33] studied the willingness to share in 21 ubiquitous scenarios by using observed and non-observed data and found that closeness with the person target of the location sharing is the strongest predictor. The characteristics of physical location also play an important role; Toch et al [32] found that users were more comfortable in sharing their location when they are at places visited by a large and diverse set of people. Again, the target group of families with young children may share the regulating role of emotions but the way it impacts on the decision may be influenced by their peculiar social pressures and social needs. A recent paper [23] included parental status as a control variable in their investigation on adoption of location-sharing social networks (LSSN) such as Foursquare. Authors found that the intention to use LSSN is explained mostly by a communication style personality trait they called "for your information" [23]. They also found that respondents who have children are more likely to be FYI communicators.

Other studies have identified cultural and gender differences concerning information disclosure behaviors. Lin [17] compared Chinese and American participants' attitudes and found that Chinese participants seem more conservative. They also reported cultural differences in disclosing location at "home" and at "work" and gender differences: Chinese female participants were more conservative than Chinese male while they did not find differences in sharing between US male and female but they found that US female participants show different attitudes with different recipients: a more open attitude toward close friends and friends on social network while they are more conservative with University community and advertisers.

Prior work has also investigated the role of an individual's stable psychological attributes - e.g. personality traits - to explain information disclosure behavior. Korzaan et al. [15] explored the role of the Big5 personality traits [12] and found that Agreeableness has a significant influence on individual concerns for information privacy. Junglas et al. [13] and Amichai-Hamburger and Vinitzky [1] also used the Big5 personality traits and found that Agreeableness, Conscientiousness, and Openness affect a person's concerns for privacy. More recently, Quercia et al. [26] found weak correlations among Openness to Experience and, to a lesser extent, Extraversion and the disclosure attitudes on Facebook. However, other studies targeting the influence of personality traits did not find significant correlations [28]. In 2010, Lo [19] suggested that Locus of Control could affect an individual's perception of risk when disclosing personal information: internals are more likely than externals to feel that they can control the risk of becoming privacy victims, hence they are more willing to disclose their personal information [19]. Although in this respect our target population might not differ from other groups, in our study, we analyzed the effect of personality traits because their effects are still much debated.

3   The study

The study was conducted within the Mobile Territorial Lab[1], a joint initiative created by Telecom Italia, Telefonica, MIT Media Lab and Fondazione Bruno Kessler. One of the goals of the Mobile Territorial Lab is to design and test new services in real-life scenarios. In this sense, participants are involved in co-creating and exploring breakthrough scenarios, innovative concepts and novel systems. The living lab is a permanent community of 150 families with young children located in the Trentino area, North East Italy. It has been running since November 2012. Participants were recruited using a snowball sampling approach where existing study subjects invite future subjects from their acquaintances. Participants receive some benefits (usage of a smartphone and some monthly credit for voice, sms and internet) in exchange for releasing their data usage and other information for studies focused on human-behavior analysis and human-computer interaction. The participants did not receive any further compensation for the present study.

3.1 Participants
The study involved 126 participants of the community. They were 77 mothers (61%) and 49 fathers (39%) with an age ranging from 28 to 50 years (mean=39.3, std=4.1). 91% of the participants lived with a partner and 88% are families with both parents working (dual-earner couples). The participants had an average of 1.79 children (std=0.67). They held a variety of occupations and education levels, ranging from high school diplomas to PhD degrees. All were savvy smartphone users.
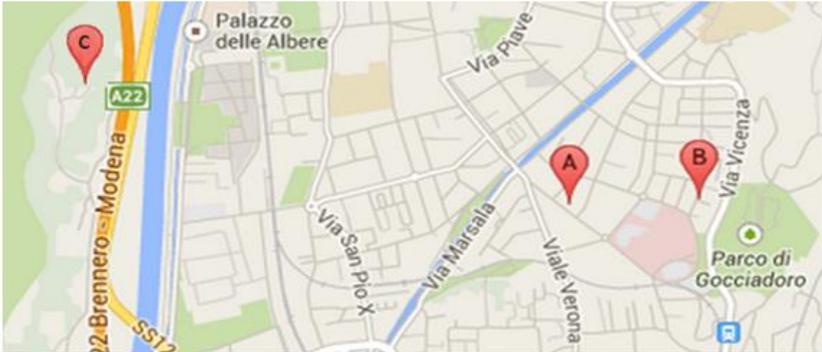
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[1] http://www.mobileterritoriallab.eu

3.2 Procedure

All the participants of the living lab were contacted to offer participation in this study by informing them on the purposes and the procedure. All the 126 people who volunteered were recruited.

The study lasted for 24 days in April 2014. We used the Day Reconstruction Method approach (DRM, [14]) to collect data about the sharing preferences of the participants. Every evening participants received an email and a notification on their smartphone containing a link to a personalized survey they could fill using a browser (see Figure 1). The survey contained a list of places in which the participant has remained during the day for more than 15 minutes, along with the arrival and exit time. The locations tracked by the positioning system of participants' smartphones were aggregated using the same algorithm used in [17] and [4]. They were presented both as a map and as a list.

Fig. 1. A snapshot of the personalized daily survey for the DRM that participants received on their smartphones.

Every day, participants were asked to choose the place that was the most relevant for them as parents; we decided to let participants choose just one place rather than ask them about any place to reduce the cognitive effort of filling the survey every night. Furthermore, we asked them to select the place most relevant for them as parents because we wanted to focus our study on decision making related to parenting and not with other roles that people may have during the day (professional, friends, etc.) Participants also had the possibility of entering a place not in the list, in case the location tracking of the smartphone did not work correctly during part of the day. Then participants had to fill a number of questions about the chosen place aimed at assessing their sharing preferences as well as some features of the context. The questionnaire can be read at http://bit.do/DRM_en

A pre-study questionnaire was administered exploring perceived social support and the sense of community. Other previously collected information related to individual traits was used (see next section).

Sharing preferences and contextual variables collected through DRM

Participants sharing preferences and socialization needs related to the specific place they chose each day through the DRM were investigated in terms of:

- *Intention to share the physical location:* participants were asked to imagine they had a way to share their location using the smartphone and we asked them their agreement with the statement: "In that moment, I would have shared my position with (group)". Precisely we asked about 5 different groups: (1) the partner ("In that moment, I would have shared my position with my partner"), (2) relatives ("grandparents, uncles, …"), (3) friends, (4) other parents who were nearby at that moment (1 Kilometer radius) or (5) everyone by making it publicly available on the web. These were 5 different 5-point Likert scales.
- *Need for socialization* (5-points Likert) as the degree of agreement with the statement: "I would have liked to meet other parents".

The context related to the chosen place was modelled in terms of three dimensions that emerged as important in literature (see above) and in our previous study (reference anonymized for review).
- *Type of place*: the participants were asked to describe the place (for example, playground and mall). The descriptions were then coded into 8 categories expressing functional values: home, work, house of other people (relatives or friends), recreational (such as playground, cinema, theme park, etc.), commercial (shops, malls, etc.), health (doctor, hospital, etc.), religion (church, etc.) and education (kindergarten, school and school-related activities).
- *Social context*: the participants were asked to report with whom they were ("I was alone", "with at least one of my children", "with my partner", "with relatives", "with friends"; "with other parents"). Multiple options were possible.
- *Mood*: they reported the magnitude of different moods as they were feeling them during the time spent in the place. We followed Kahneman [14] to model affective

experience: the dimension measured with 5-point Likert scale had the following items: Happy; Warm/Friendly; Enjoying myself; Frustrated/Annoyed; Depressed/Blue; Hassled/Pushed around; Angry/Hostile; Worried/Anxious; Tired.

All the previous information about the chosen place was mandatory and so was completely filled by each participant.

Individual characteristics

As already explained, we also asked participants to fill an initial questionnaire. Our goal was to investigate the importance of perceived social support in relation to location sharing so we used:

- The *Interpersonal Support Evaluation list (ISEL)* [5] to gather information about participants' social support, defined as the various resources provided by one's interpersonal ties. The questionnaire provides a measure of the overall perceived support and the measure of four separate functions of support: appraisal support, self-esteem support, belonging support, tangible support.
- The *Brief Sense of Community Scale (BSCS)* [25] to measure attitudes toward the community. The sense of community refers to the fundamental human phenomenon of collective experience and includes four different dimensions: needs fulfillment (a perception that members' needs will be met by the community), group membership (a feeling of belonging or a sense of interpersonal relatedness), influence (a sense that one matters in a community), and emotional connection (feeling of attachment).

Moreover, as additional individual traits, we also considered other measures that were available about each participant from the living lab: since they are considered stable traits, we did not administer them again for the study.

- The *Big Five personality traits (Big5)* [12] cover the traditional dimensions of Extraversion, Neuroticism, Agreeableness, Conscientiousness and Openness. We measured this scale by means of the BFMS [12] questionnaire, which is validated for the Italian language.
- *Locus of Control (LoC)* [19], a psychological construct measuring whether causal attribution for subject behavior or beliefs is made to oneself or to external events and circumstances. The LoC measures whether the outcomes of a set of beliefs are dependent upon what the subject does (internal orientation) or upon events outside of her/his control (external orientation).
- Finally, we collected information about the participants' *Dispositional Trust* [27]: in this perspective, trust is considered as a form of personality trait, defining interpersonal trust as a generalized expectancy that the words or promises of others can be relied on. In our study, we used Mayer and Davis's Trust Propensity Scale (TPS) [20].

4 Results

In total, 3024 evening questionnaires were sent to the 126 participants and 2504 have been filled (83%). The minimum number of filled survey per participant is 6 and the maximum is 24 with an average of 19.87 surveys per participant (standard deviation=4.82).

4.1 Descriptive statistics

The intention to share the location was higher toward the partner (mean=4.19; std=1.32), followed by relatives (mean=4.02; std=1.37), friends (mean=3.31; std=1.47), nearby parents (mean=2.62; std=1.46) and everyone (i.e. publicly on the web; mean=1.61; std=1.16); see Figure 2. The mean for the need of socialization was 2.99 (std=1.48).
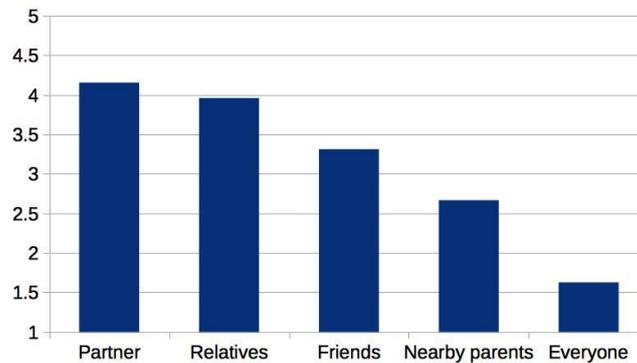
Fig. 2. Intentions to share with different target groups (means of 5-point Likert scale)

With regard to the social context, the participants reported they were with at least one of their kids (86%), with the partner (50%), with other family members (22%), with other parents (13%), with friends (13%), and very rarely alone (8%), see Figure 3. As already said, multiple conditions were possible.
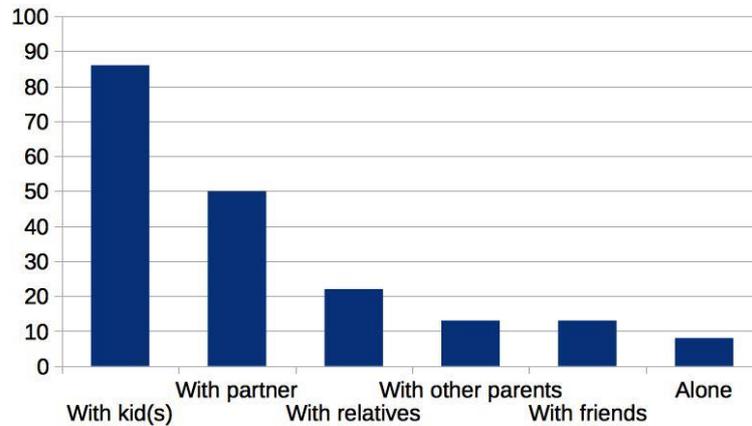
Fig. 3. Distribution of social context (in %).

For what concerns the places, two categories represent, not surprisingly, the majority: recreational places (34.3%) followed by the home (31.2%); then house of other people (14.0%) and commercial (6.4%), education (4.5%), work (3.9%),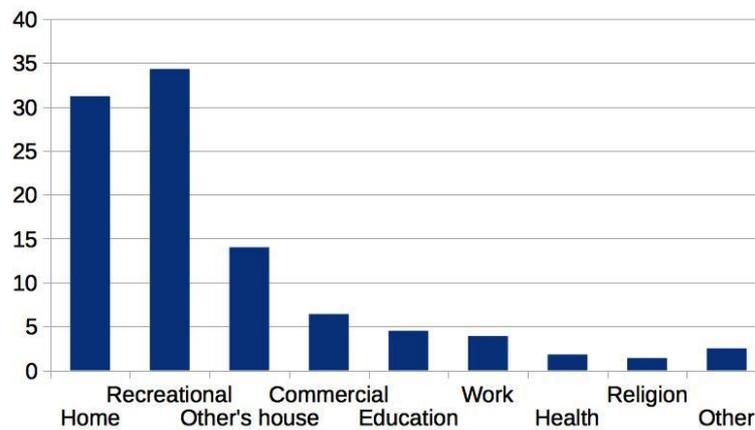 health (1.8%), religion (1.4%). The remaining 2.5% (63 places) was not identified under any of the previous categories and was labeled as other places, see Figure 4. It is important to note that we explicitly asked the participants to select a place that was particularly relevant for them as parents.

Fig. 4. Distribution of the types of places (in %).

In general, the places chosen by our participants were associated with high levels of positive emotions and low levels of negative emotions: happy (mean=4.12; std=0.92), friendly (mean=3.92; std=1.05), fun (mean=3.62; std=1.22), daunted (1.35;

std=0.74), frustrated (mean=1.39; std=0.80), angry (mean=1.27; std=0.64), worried (mean=1.48; std=0.9049), sad (mean=1.29; std=0.69), tired (mean=2.27; std=1.20), see Figure 5.
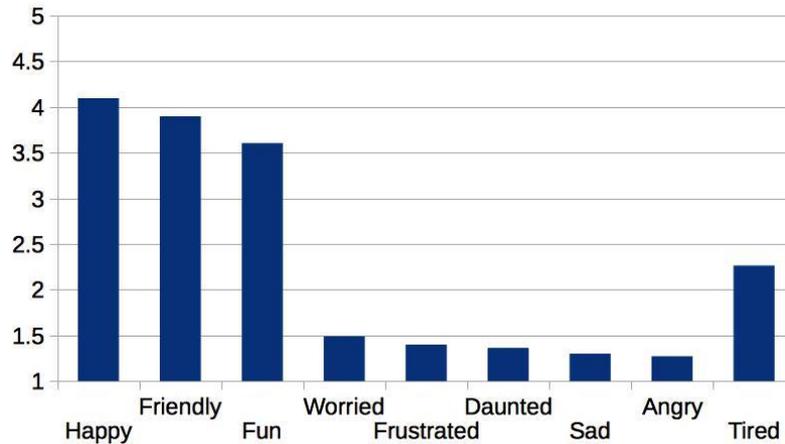

Fig. 5. Distribution of emotions (means of 5-point Likert scale)

Data analysis

In the following subsections, we analyze the associations between location sharing preferences (with partner, relatives, friends, nearby parents, and everyone) and need for socialization on one side, and individual traits, physical context, emotional context, and social context on the other side. We report results that are significant with a level of significance of p<.05.

Sharing preferences and individual traits

Gender. Contrary to other studies [17], the analysis of our data does not suggest any gender difference along the sharing preferences dimensions. An ANOVA run using gender as a factor on the need for socialization and the various location sharing preferences did not reveal any significant difference between males and females.

Personality and other individual traits. We computed the correlation among each of the means of the 6 sharing preferences and subjects' scores on the personality and other individual traits described above. For these analyses, we employed the non parametric Spearman's Rho method with a level of significance of p<.05.

Of the Big5 traits, only Consciousness produced significant results. It positively correlated with both the intention to share with the partner (0.199) and the intention to share with the relatives (0.197), while it negatively correlated with the intention to publicly share (-0.208).

For what concerns the other individual traits, the appraisal support and the self-esteem dimensions of ISEL revealed significant negative correlations with the intention to publicly share (-0.203 and -0.202, respectively).

The traits above denote individuals who can be defined as balanced: higher score on Consciousness suggest thorough and careful personalities while Self-esteem and Emotional Stability is usually associated with positive behavior. Our results suggest that conscientious, thorough and careful people focus their sharing behavior on family members, avoiding doing so with the wide public. People who are not comforted in their self esteem by their social network and/or do not feel enough support from it, in turn, have a greater tendency to share their location with everyone on the Web.

No significant associations were found with Locus of Control and Dispositional Trust.

Sharing preferences and physical context

The types of places indicated by subjects were coded from their descriptions in the daily surveys. The resulting categories are the following ones: home, work, house of other people (relatives or friends), recreational, commercial, health, religion and education.

The association between type of place and our six dependent variables were investigated by means of a series of linear mixed models to flexibly account for the repeated measure nature of our data (the id of the participant is the random effect). The variables are not normally distributed but linear mixed models are robust with this regard [10]. For each model, we used location=Home as basic category. Table 1 reports the significant effects we found, i.e. the raw coefficients of the linear mixed models (p<.05). Positive coefficients are reported in green and negative ones in red.

	WORK	HOUSE (others)	RECRE-ATIONAL	COMMER-CIAL	HEALTH	RELIGION	EDUCATION
NEED TO SOCIALIZE	-0.33	0.38	0.96	0.28		0.76	1.03
PARTNER		0.25	0.33	0.23			
RELATIVES		0.31	0.33				0.27
NEARBY PARENTS			0.77			0.66	0.72
FRIENDS		0.3	0.76				0.31
PUBLIC			0.16	-0.28			

(Row group label: INTENT TO SHARE LOCATION)

Table 1. Significant relations and their magnitude for the mixed models that relates sharing preferences and type of place (all the effects reported are significant for p<.05)

The need to socialize negatively associates with work as compared to home, suggesting that our subjects have less need to socialize for what concerns family aspects in the work environment than at home. All the other places show positive correlations but the health-related places, hinting at a greater need for socialization in public spac-

es than at home. It is worth noting than the quite high effect of educational places are likely due to the fact that the vast majority of such cases consist of situations in which parents are waiting for their children at school exit, among many other parents, and in fact the effect of sharing location with nearby parents is one of the highest (0.72) and the need for socialization with other parents is the highest (1.03).

Similar patterns, though restricted to fewer places, emerge for the sharing preferences: in particular, sharing with partners, relatives, parents and friends increase when at the houses of other people or in recreational places with respect to home. The intention to share with the wider public, in turn, is lower in a commercial place than at home.

Sharing preferences and emotional context

Linear mixed models were also used to investigate the associations between mood (Kahneman's dimensions of affective experience) and sharing preferences. Table 2 reports the significant effects found ($p<.05$).

| | | POSITIVE MOODS | | | NEGATIVE MOODS | | | | | |
		HAPPY	FRIENDLY	FUN	WORRIED	FRUS-TRATED	DAUNTED	SAD	ANGRY	TIRED
	NEED TO SOCIALIZE	0.34	0.43	0.24						-0.06
INTENT TO SHARE LOCATION	PARTNER	0.26	0.27	0.20	-0.14	-0.14	-0.12	-0.13		
	RELATIVES	0.35	0.45	0.27	-0.09	-0.07		0.10		
	NEARBY PARENTS	0.22	0.30	0.22	0.13	0.16	0.20	0.30	0.23	0.10
	FRIENDS	0.30	0.45	0.45			0.11	0.17	0.09	
	PUBLIC	0.09	0.08		0.31	0.34	0.38	0.36	0.44	0.17

Table 2. Significant relations and their magnitude for the mixed model that relates sharing preferences and emotions (all the effects reported are significant for $p<.05$)

Quite generally, positive mood tends to positively associate to (and presumably encourage) the need for socialization and all the sharing intentions (see the highlighted top-left rectangle in Table 2). The pattern for negative moods is less clear: it does not associate to the need to socialize; it negatively associate with sharing within the family circle; it positively associates with sharing with nearby parents, the general public and, at least for some components, it positively associates also with sharing with friends. However, even if all the reported relations are statistically significant, it might be more informative to focus on larger coefficients, for example, higher than 0.2, that is for which an increase of 1 in the corresponding emotion has an increase of 0.2 in the related willingness to share location and hence a stronger effect. If we limit to

those stronger relations, we observe that an increase in negative emotions has an increase in willingness to share the location publicly on the web, with everyone, while the effect for two positive emotions and tiredness is very limited (see the highlighted bottom-right group of cells in Table 2).

Sharing preferences and social context

As mentioned before, sociality is modeled by means of whom the person is with: on his/her own (alone), with children, with the partner, with relatives, with other parents and with friends. Participants could indicate, for the chosen place and time, one or more options.

The associations with our dependent variables were investigated through linear mixed models, each including all the independent variables (the dimensions above) treated as binary factors. The significant effects (p<.05) are reported in Table 3.

	ALONE	with KIDS	with PARTNER	with RELATIVES	with OTHER PARENTS	with FRIENDS
NEED TO SOCIALIZE		0.58	-0.26		0.77	
PARTNER				0.24	0.18	
RELATIVES		0.20		0.48		
NEARBY PARENTS		0.23	-0.23		0.51	
FRIENDS				0.24		0.44
PUBLIC						

(INTENT TO SHARE LOCATION spans the rows PARTNER, RELATIVES, NEARBY PARENTS, FRIENDS, PUBLIC)

Table 3. Significant relations and their magnitude for the mixed model that relates sharing preferences and social context (all the effects reported are significant for p<.05)

Being with the partner negatively associates with the need of socialization and with the intention to share the physical location with other parents. No other significant effects of this independent variable are found. In the end, being with the partner does neither encourage socialization nor sharing.

Instead, being with one' children and/other parents positively associates with both the need of socialization and the intention to share location with other parents. Being with relatives seems to have a similar but somehow smaller effect and it seems restricted to the family context only.

The relation between the intention to share location with friends and the social context is less clear: it positively correlates with being with friends and with relatives but the effect is not significant for the childcare-related activities (being with children, with partner and with other parents). It may suggest that our subjects clearly separate childcare from being with friends and while in the latter context they feel more ap-

propriate sharing their location while in the former they tend to focus on childcare social relations.

It is worth noting that publicly sharing location does not associate with any social context and that being alone does not associate with any sharing preference or need to socialize. As it turns out, location sharing preferences are associated with only truly social contexts.

5 Discussion

In this section, we summarize the main findings of our study and compare them with related works' results.

There is need to socialize with other parents. The mean of the expressed need to socialize related to the 2504 chosen places is 2.99 which, in the Likert scale 1-5, is precisely in the middle indicating a varied and open perspective on this basic issue, especially considering its standard deviation which is 1.48. However there are large and significant coefficients related to specific contexts, which indicate larger or smaller need to socialize in specific cases. With regard to the physical context, being in places related to education has a large and positive effect on the need to socialize: parents waiting for their children outside schools or kindergardens are more willing to socialize with other parents. A similar large effect occurs for recreational places such as playgrounds: while children play, parents could be more open to chat a bit with another parent. With regard to emotional context, unsurprisingly, parents report a higher need to socialize when they are happy, friendly and having fun. The social context also features interesting insights: the need to socialize with other parents is higher when the parent is with their kids or when he or she is already with other parents. On the contrary, when the parent is with the partner, the need to socialize with other parents is reduced indicating what can be a private family moment. These insights suggest that there are indeed situations in which parents experience a larger need to socialize with other parents and these are opportunities for services designed to enable and facilitate offline encounters.

Closer relationship, higher sharing. As expected, sharing is higher the closer the social relationship is: partner, relatives, friends, nearby parents, and finally everyone. This confirms [33] which found closeness being the stronger predictor for willingness to share location.

Demographic characteristics do not matter. Contrary to other studies [17], we did not find any statistically significant influence of gender on location sharing preferences.

Individual characteristics do not matter a lot. In general, personal traits do not influence too much the need for socialization and the sharing intentions. The only aspects that seem to matter are those related to psychological stability: Consciousness, Self-esteem and support from the group. More stable individual tends to share more with family and less with the web and vice-versa.

Previous studies on the influence played by individual traits (usually personality traits and LoC) on privacy dispositions and disclosure behaviors have provided con-

trasting evidence: some of them found small correlations [19; 26; 30], while Schrammel et al. found no correlations [28]. Page and colleagues [23] found that a specific individual characteristics, the FYI communication style, predicts the adoption of location-sharing social networks and also that parents are more likely to be FYI communicators.

Our results seem to shed some new lights on this aspect but further studies are needed to better understand whether the effect we found is typical of parents and parent-related sharing or more general.

The context does matter. A more relevant impact seems to be played by the context in which the decision to share is considered: the physical context as well as the social one.

About the physical context, it seems that at working place the need for socialization is lower. This, at least partially, confirms [18] which found that shared locations might be those seen as somehow interesting (it is worth remembering that our participants were instructed to select the place on the relevance as parents). Another confirmation of this argument comes from the fact that recreational places are always positively associated with the intention of sharing location and with the need of socialization. This is also in line with Toch et al [32] who found that users were more comfortable in sharing their location when they are at places visited by a large and diverse set of people. The houses of other people (other parents, relatives or friends) follow a similar pattern with the important exception that they are not shared with the wider public. This is, possibly, due to the fact that privacy concerns may arise.

For what concerns the social context, the presence of one's children or of other parents correlates with higher need for socialization. The social context has no significant effect on the willingness to share own location publicly with everyone; while being with children, relatives or other parents increase the sharing with different groups. In general, when people are with a particular member from a group (e.g., family or friends), people are more willing to disclose their location to other members in the same group. This result is in line with what was found by Xie [34].

If you are with your partner, keep it to yourself. The case in which the partner is in the social context is a special one, the socialization needs and the intentions to share physical location drop; this partially confirms the findings of Xie [34].

If you are with your children, say "we are here!" to your relatives and to other parents. Locations including children are shared only to members of the "inner" circle (relatives) or others members "thematically" connected (other parents). This confirms and qualifies [34] who found that "when people are accompanied by kids, they also become more prudent." And more selective, we might say, in choosing their sharing targets. An obvious exception to this rule is sharing with the partner: there is no need, for she/he knows.

If you are happy say it to your friends; if you are sad say it to the entire world. The emotional context also played an important role. Higher positive emotions are associated with higher need for socialization and higher intentions to share with close people (partner, relative, friends, but also nearby parents). On the other hand, there is a strong effect of negative emotions on the willingness to share location publicly on the web, with everyone. Even if on average sharing on the web was largely less popular

than sharing with the partner (1.61 and 4.19 respectively, on a 5-point scale), it seems that when parents are happy or having fun they want to disclose it more to their close circles. On the other hand, when they are angry or frustrated, sad or hassled or worried, they relatively tend to disclose their location more publicly on the web, to everyone. This, again, is in line with the results of Xie et al. [34] who found that people tend to share much more positive feelings with family and friends.

6   Limitations

The study presented in this paper has some limitations. In particular, it is based on declared intentions rather than actual behavior and it is based on a reconstruction method rather than on on-the-spot survey. Moreover, we asked participants to choose the place they considered most relevant for them as parents because we wanted to focus our analysis on location sharing of parents when their main role was parent and the context parent-related. This choice might have introduced biases, such as for example the relatively small presence of work as place and the large presence of recreational places. This might also explain the large values, on average, for positive emotions and small values for negative emotions. It is possible to read online the text of the survey in order to better ponder how the survey might have influenced the collected data. We presented only places in which the participant has remained for more than 15 minutes by using the same method used in [17] and [4] for aggregating GPS points. This procedure excluded uses of location sharing for coordinating meetups or showing others how far you are from reaching a destination. We did so because we were interested in sharing of location for purposes related to socialization with other people or parents.

We are aware that these limitations may have somehow affected the results. Still, we believe that the data and the findings, although in need to be confirmed by further studies, may shed new lights on the important research topic of location-based applications in general and may eventually guide to design of specific technologies to support families with young children.

7   Conclusions

The overall goal of our research was to investigate the dimensions that affect the intention to share the physical location while in family-related contexts. A diary study was run for 3 weeks involving 126 participants. The main outcomes of this paper are several insights for the previously underexplored user group of families with young children. In particular, our results suggest a relative greater importance of the context (physical, social and emotional) with respect to individual traits (e.g., personality, trust dispositions, and demographic characteristics) and some different effects of positive and negative emotions on intention to share with different targets: negative mood seems to discourage sharing privately with specific groups of people and to encourage sharing with everyone publicly. These results have been compared with those of similar studies on different populations.

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