Detecting Life Changes: Increasing Opportunities to Benefit from People-Nearby Applications

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Abstract
Prior research suggests that individuals are motivated to use People-Nearby Applications (PNAs) to meet new people offline and that these individuals receive benefits such as social and cultural capital from their offline connections. It is unclear, however, what the impetus behind these motivations are and whether individuals are motivated to use PNAs for other reasons. To explore these questions, we analyzed a dataset of 14 active PNA users' semi-structured interviews and found that participants' first experiences using PNAs were associated with significant life events such as moving to a new area or ending a relationship. We conducted an online survey (N=142) to explore these findings further and investigate whether they generalized across a broader set of active PNA users. We confirm our past findings and contribute ways in which future technologies can detect specific life changes to increase the opportunities for individuals to benefit from PNAs.

Author Keywords
People-Nearby Applications; Social-Matching Systems; Life Change; Semi-structured Interviews; Survey

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H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous

Introduction

Social-matching systems recommend people to people [18], leading to opportune encounters [14] and to the development of social and cultural capital [10]. We explore opportunities to increase the benefits of using social-matching applications. In particular, we focus on People-Nearby Applications (PNAs), a type of social-matching system utilizing location information for people to meet other people nearby.

PNAs are social-matching systems that utilize users' physical location information to facilitate connections between strangers [19, 20]. PNAs are typically designed as mobile smartphone applications that allow users to meet nearby strangers offline with GPS and proximity information.

Prior research finds that meeting new people is an important motivation for using PNAs [1]. However, it is unclear what the impetus is behind these motivations. In our prior work [10], we identified six types of motivations for PNA usage, some of which confirmed past research. We found that people were motivated: to talk to new people, for curiosity, for dating, for making new friends [19], to study the user experience of PNAs, and for casual sexual encounters [20]. However, past research does not uncover the stimulus behind these motivations and it is unclear whether individuals' motivations stemmed from specific events or whether this occurred naturally.

Mayer and colleagues suggest making social-matching context-aware to make opportune encounters [13, 14, 15], and propose a framework involving three types of context: relational context, personal context, and social context [14]. They also provide a model for predicting match interests based on users' current contexts [13]. We extend this work by exploring the driving factors motivating people to meet others via PNAs.

To further understand the impetus behind, we conducted a qualitative analysis on a dataset of 14 semi-structured interviews with active PNA users. From the analysis, we found that significant life events, such as attending a new school, moving to a new area, or ending a relationship, motivated users to meet new people and thus use PNAs.

Based on these qualitative findings, we wanted to further understand: *What life events, if any, stimulate people to actively use PNAs?* To answer this question, we deployed an online survey of active PNA users to understand their experiences using PNAs and whether they were motivated to use PNAs because of life events. From our first analysis, we identified the types of life events that drove people to use PNAs. For example, emerging life events included divorce/breakup, change in schools, and change in residence. Based on our findings, we discuss how HCI and ubiquitous computing (Ubicomp) technologies can be used to detect these life changes to increase the potential for PNAs to benefit active users. We make the following contributions in this late-breaking work:

- We provide a list of life changes that stimulate people to actively use PNAs.
- We provide design guidelines for PNA researchers and practitioners to follow for detecting these life events and thereby expanding opportunities for individuals to benefit from using PNAs.

Study 1: Semi-structured Interview

This paper is part of a larger research project that explores how PNAs benefit users. In our prior work [10], we collected a dataset of semi-structured interviews regarding how active PNA users used specific applications and users' motivations for using PNAs. This dataset contains audio transcribed semi-structured interviews of 14 *active* PNA users

(7 females; 7 students; M=26.6 years old), or those who had used any PNA in the last 30 days. Each participant received $15 as compensation. We e-mailed approximately 600 university students, we posted recruitment flyers on multiple websites (e.g., Craigslist, FB, MeetUp.com), and posted physical flyers in the city. Our participants had diverse cultural backgrounds; half were born in the U.S. (7); the other seven were from India (3), Taiwan (2), Nigeria (1), and China (1).

Our interviewees used a total of eleven distinct PNAs including Tinder (12), Bumble (2), WeChat (1), Meow-Chat (1), Badoo (1), Grindr (1), MeetMe (1), OkCupid (1), Plenty of Fish (1), Scruff (1), and GROWLr (1).

Analysis

We took an open coding approach [17] to analyzing the dataset. Two researchers independently highlighted concepts related to participants' active uses from the transcriptions line by line. The two researchers discussed coding conflicts until an agreement was reached [17]. For the purpose of this study, we explicitly coded to understand events that led up to participants PNA use.

Results

An emerging topic from the analysis was that participants' active PNA uses followed life changes, such as the end of relationships, moving to new areas, or starting new school. Eight participants mentioned life changes before their use of PNAs and suggested a relationship between the two. Four of the eight mentioned life changes associated with school (beginning and ending); three were triggered by job changes; and one reported an end of a relationship. In addition to the aforementioned life changes, two other participants used PNAs and met locals when traveling. For example, one participant, Allen (pseudonym), who was a white male in his late twenties, moved from New York to a town close to our university to start his own business. However, after moving to his new place, his social network was limited to his colleagues and roommates. The change of the new job and the new area limited his social network and thus triggered him to start using PNAs.

"*I moved here from New York in the beginning of last year, and I really only knew the two people I moved in with, so I've been kind of using the PNAs as a way to make new friends outside of just work, and occasionally an attempt at relationship.*" (Allen).

Another example was Lily, whose first use of PNAs was associated with the end of her graduate school life. Lily was an Asian female pursuing a master's degree in London. Realizing that her life in London was coming to the end, Lily started using PNAs as a final opportunity to extend her social network and minimize stress after finishing her dissertation.

"*I started using Tinder when writing my dissertation, which made me quite stressful and isolated from my friends. I also realized that because my degree is just only one year... I didn't have too much time to meet people in London.*" (Lily).

These findings suggested that life changes were a driving factor for PNA use. To confirm these results and to understand whether other life events may be associated with motivations to use PNAs, we asked the research question: "What life events, if any, stimulate people to actively use PNAs?" Our second study explores the answer to this research question.

Study 2: Online Survey

We designed an online survey to further understand and confirm our findings across a broader set of active *and* inactive PNA users (those no longer using PNAs) and non-

PNA users (or those who had heard of PNAs but never used them). Our goal was to ensure that we compared a similar PNA-user group to those participants we interviewed in our first study. Therefore, we focused our analysis on active PNA users.

The survey first sought to categorize the PNA-user type. For example, if a participant had used any PNAs in the last 30 days, they were categorized as an active PNA user. We also asked each active PNA user to select the PNAs they used from a predefined list. We created this list based on the applications mentioned by participants in our first study; however, we allowed participants to enter additional PNAs they used. The survey also asked active PNA users to specify the applications they use, the frequency with which they checked for updates, the number of people they met online and offline through PNAs, and which life changes, if any, they encountered within 12 months of the survey.

For life changes, we introduced the Social Readjustment Rating Scale (SRRS) [9], which is a scale used to evaluate how significant life changes cause stress. SRRS is widely used in mental stress and related research domains such as domestic violence [5], identity development [2], and suicide risk [4]. SRRS includes 43 life changes, such as death of a family member or unemployment, and has a score for each life change to indicate the impact level that the change may cause. For example, death of a family member has a stress score of 63 while trouble with in-laws causes a stress score of 47.

We summed the stress scores of all the events that each of our participants had experienced. We analyzed stress score data across the three user types and did not identify significant differences between active users and the other two groups.

We asked all participants if they had encountered any of the 43 life changes in the last twelve months; we also asked active users to specify their level of agreement to whether the events motivated their use of PNAs. We did not pose this question to inactive users. Active participants indicated their level of agreement on a 7-point Likert scale (in which 1 is strongly disagree and 7 is strongly agree).

We collected participants' demographic profile data such as age, race, employment status. We focused on participants who were older than 18 years old because we used the SRRS for adults and not teenagers [9]. We added two questions in different sections of the survey to test participants' attention and removed those who incorrectly answered the questions for validity. We sent the online website survey link via campus and personal email lists and social network sites such as Facebook and Twitter.

Results

In total, 417 people opened the survey and 155 people finished it. After filtering out invalid data, we had 142 valid samples (77 females). Of the 142 valid samples, 63 were active PNA users who we focus on for the sake of this study (M = 31.7 years old).Most participants consider themselves White (42), followed by Asian (11), African American (9), Native American (1), Pacific Islander (1), and Other (1). Note that participants could report belonging to more than one race.

Reflecting on our Study 1 results, Tinder was the most popular PNA among survey respondents (39). This was followed by Plenty of fish (22) and OKCupid (21). Other PNAs used included Coffee Meets Bagel, Grommer and several PNA-based gay applications. Twenty-two (N=22) participants checked their PNAs several times a day, 15 participants checked several times an hour. The rest of the participants checked their PNAs once an hour to several times a

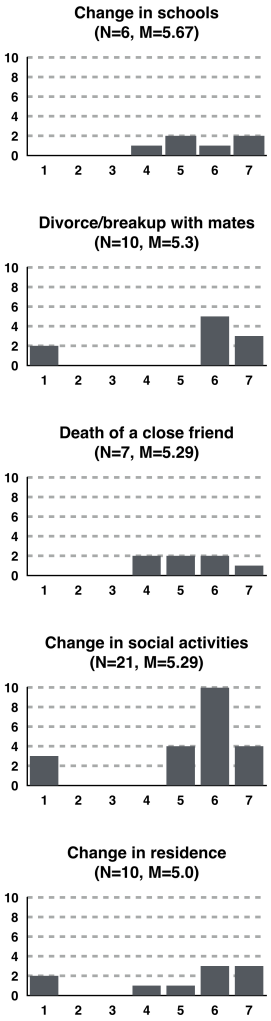

Figure 1: The distributions of the five reported life changes. The X-axis is the level of agreement how participants feel the life event motivate PNA uses (in 7-Likert scale). The Y-axis is the number of corresponding participants.

month. All participants matched with at least one other person using the applications. Twenty-three (N=23) people met with more than 20 people online, while 40 participants met 10 or fewer people offline.

To answer our research question "What life events, if any, stimulate people to actively use PNAs?", we examined the number of active users that encountered each life change, and the level to which they agreed that these life changes motivated their PNA use. In Figure 1, we report the five life changes receiving an agreement score among multiple participants equal to or greater than 5.0, which corresponds to "somewhat agree".

Change in schools (M = 5.67), divorce or breakup (M = 5.3), and change in residence (M = 5.0) were key life changes found in our results. Change in residence and change in schools or school status echo our Study 1 findings. Given that PNAs are often associated as dating applications [1] and finding romantic partners is a motivation for people to use PNAs [10, 19, 20], it is likely that those experiencing breakups may have turned to PNAs to find new romantic partners [1].

Death of a close friend (M = 5.29) was not mentioned in our first study but emerged from our second study. Similar to divorce and breakup, death of a close friend significantly impacts one's social life. In contrast, death of a family member (spouse excluded) was less relevant to PNA use (N = 6, M = 3.67).

Besides the five life changes in Figure 1, *children leaving home* and *marital separation* received a mean of 7.0 (i.e., "strongly agree"). However, only one participant had experienced either of these events.

Discussion

Life Changes as an Impetus for PNA Use

The results of our first study suggest that initial PNA usage corresponds with significant life events (e.g., moving to a new place, ending a relationship). In our second study, we identified types of life changes that motivated people to actively use PNAs.

What is interesting is that changes in schools and residence received high ratings. For Study 1, this result is expected given that recruitment occurred primarily on a university campus. This also echoes the fact that being new to a place may isolate people from their existing networks. PNAs can help to introduce individuals to local people and culture. These connections could lead to the development of social and cultural capital within new environments [10].

The difference between death of a close friend and death of a family member is also worth discussing. Death of a family member (life change score = 63) imposes a larger impact than death of a close friend (life change score = 37) [9]. Therefore, people who encounter death of family members may need more social and emotional support from strong ties and not weak ties [3].

Lastly, although change in social activities received high ratings (N = 21, M = 5.29), it is difficult to interpret the result because "change in social activities" is broad and needs better classification. Nevertheless, Ubicomp technologies can still detect changes in social activities from various digital sources, e.g., calendar, e-mail, or location information and improve the opportunities to benefit PNA users.

Change in employment was an event that emerged in Study 1. However, in our Study 2 results, job changes (N = 14, M = 3.21) and change in responsibility at work (N = 16, M = 2.88) were not highly rated. It is unclear, though, how the

participants in Study 2 interpreted the items related to job changes in the survey. Losing a job and being promoted are both job changes. People who lose a job could use social-matching services to foster weak ties for new employment opportunities [11], while people who are promoted to new jobs may not. Understanding whether and how PNA use is associated with employment is an open question.

Implications for the Field

Study 1 participants first experienced PNAs during significant life events such as moving to a new area, at the end of a relationship, and after transitioning to a new profession. Context-aware social-matching systems detect users' current context to provide opportune encounters [13, 14]. Our findings extend this work and suggest life events as a broader context for detection. This could increase opportunities to improve the matches suggested by social-matching systems.

For example, in both Study 1 and Study 2, change in physical location is associated with PNA first use. Location history for a given temporal context could be used to identify a new move. In fact, a recent study found that incorporating location history in PNAs facilitates users' trust-building [12]. Would adding the temporal factor into location-based services support users within low-trust communities to build trust and foster their social capital [7, 8]?

Life changes, like breakups or the death of a close friend, are often met with serious pain, and individuals may experience depression. Previous literature investigates ways to detect behavior changes that are often associated with depression [6] and even ways of predicting depression. Can we use the results of these predictions to initiate serendipitous introductions to other PNA users [7, 16]? Future HCI and Ubicomp research could investigate the limits of doing so without violating users' privacy or other boundaries.

Limitations and Future Work

Using the SRRS, a scale used in other research domains, was convenient and beneficial for our study; however, it also poses limitations. Although the SRRS is widely used in various research domains, it hasn't been updated since its creation (i.e., fifty years ago). Some of the life changes listed need better clarification. For example, "change in social activities" is rated high in the results of our survey, but is ambiguous. Furthermore, the SRRS may need adjustment to fit the context of our study. The 43 types of life changes cover many types of events a person may experience in his or her lifetime; however, the high number of possible events led to sparse results across participants. Redefining or segmenting the life events in the SRRS may be necessary.

Our survey also includes non-active users, who had used PNAs but stopped using them at some point. Why these inactive users began using PNAs, why they stopped, and the timeframe in which this occurred is unknown and beyond the scope of this work. However, we plan to understand these factors going forward and to provide deeper insights to the motivations of using PNAs. We aim to increase opportunities for individuals to benefit (e.g., reduce isolation, receive social support, receive social and cultural capital) from PNA use.

Conclusion

To conclude, our findings suggest that PNA usage corresponded with significant life events (e.g., moving to a new place, ending a relationship). We contribute opportunities for HCI and Ubicomp researchers and practitioners to detect significant changes in people's lives and encourage serendipitous connections based on these changes, which could benefit PNA users.

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