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Keeping in Touch by Technology: Maintaining Friendships after a Residential Move

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ABSTRACT
Many observers have praised new communication technologies for providing convenient and affordable tools for maintaining relationships at a distance. Yet the precise role of mediated communication in relationship maintenance has been difficult to isolate. In this paper, we treat residential moves as natural experiments that threaten existing social relationships and often force people to rely on mediated communication to maintain their old relationships. Results from a 3-wave survey of 900 residential movers describing 1892 relationships shows that email and the telephone play different roles in social relationships. Email helps maintain social relationships, in the sense that relationships decline when email drops after the move. However increases in email are not associated with increases in the depth of the relationship or exchanges of support. In contrast, phone calls help movers grow relationships and exchange social support.

Author Keywords
CMC, communication, social relationships, friendship, mobility

ACM Classification Keywords
H.4.3 Communications Applications

INTRODUCTION
Information and communication technologies, such as the Internet and cellular phones are tools that transformed the way we communicate with people. People can call, email and instant message friends and family who are next door, on the other side of town or in other cities or states with equal ease [35]. Although use of these telecommunication technologies (literally, communication at a distance) is an integral part of everyday life for a large proportion of Americans [21], its importance for social relationships remains a question of empirical interest [4].

Early debates on the role of internet use in social relationships tended towards extremes. While some scholars argued that Internet use led to declines in time spent with friends and family [22,25], others touted its benefits for both initiation and maintenance of relationships [6,23]. Many communication and relationship scholars have taken in-person interaction as the gold standard of communication relationships, arguing that face-to-face interaction is imperative for maintaining and growing them [3,13]. However, evidence suggests that both phone calls and text-based communication, such as email or instant messaging, can be successfully used for relational maintenance and exchanges of support [6,34].

Despite the extensive debate surrounding the role of communication technology use in social relationships, few scholars have been able to conduct longitudinal studies observing specific relationships over time [but see 12]. Social relationships are difficult to study because they need time to develop and, once developed, they tend to remain stable. Part of relational stability is that communication patterns become routine and disruptions are rare [9]. This stability poses a problem for studying the impact that additional communication modalities might have on relationship maintenance. Residential mobility represents a natural experiment, because it makes face-to-face interactions difficult and threatens the relationships. Indeed, many friendships die when friends move apart [29]. To maintain the relationship, friends must rely upon telecommunication technologies such as phone or email. This paper explores the role of communication technology use in maintenance of established social relationships after a residential move.

BACKGROUND
Social relationships are important because they imbue life with meaning, foster feelings of belonging [2] and provide a sense of being secure and supported [39]. Social relationships take a range of different forms, from kinship to friendships, co-workers and mere acquaintanceships. Friendships are voluntary relationships, largely free of structural constraints and based on equality [1]. Unlike kin

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ties, friendships do not rely on strong normative obligations to persist and are often sensitive to changes in social context and frequency of contact [9]. Thus friendships can be more easily disrupted by a residential move than kin relationships [36].

In this paper, we will focus on what happens to friendships after a residential move. Though there is no all-inclusive definition of friendship, scholars agree that friendships tend to be peer relationships with non-kin, and, unlike romantic relationships, are free of cultural expectations of exclusivity [1]. Friendship takes time and effort to develop through interaction, companionship and exchanges of social support [16,39].

Geographic mobility is one of the most common reasons for friendship to disintegrate [29]. However, there is evidence that friendships, once they survive the initial shock of changes in physical proximity, can endure the effects of distance for many years [19]. People are able to maintain a sense of intimacy with strong relationships that have an extensive history of interactions despite changes in geographical proximity and frequency of interaction. [18,28].

One of the major assumptions in theorizing about the effects of residential mobility on relationships is that long distance moves inevitably reduce the amount of both planned and spontaneous face-to-face social interaction necessary for relational maintenance [3,29]. Yet people have communicated over distances since the invention of writing and the letter genre. Recent advances in communication technologies have made long distance telecommunication easy and affordable for the majority of the population [21]. The cost and convenience of email, instant messaging, and most cell phone service is independent of the distance between the communicating parties. With these technologies movers have the potential to retain established close relationships regardless of how far they move apart.

Social relationships and especially friendships are enacted through communication. Research demonstrates that maintaining relationships requires significant investments of time and resources [1] and most are exchanged through communication episodes [9]. Many researchers have explored the role of mediated communication in human relationships [4,31], yet the precise role that different communication technologies play in the development and maintenance of social relationships has been difficult to isolate. While much social support is enacted through communication, not all communication is used to exchange support or intimate disclosure. For example, Duck and colleagues have found that much communication between friends is largely devoid of explicit emotional content and serves simply to reaffirm that a relationship exists rather than to exchange particular rewards during the interaction [16]. Thus communication via any modality can be a simple affirmation of relationship importance or an explicit instance of enacted support.

When people move away, their friendships are likely to undergo changes regardless of how close and intimate they may have been. Whereas some forms of companionship and enactments of support, such as getting advice or discussing emotional issues, can be executed via telecommunication technologies, others, such as going out to see a movie or sharing a meal, depend on physical proximity. Moreover, changes in physical proximity may motivate changes in frequency of communication, as movers who move away from their friends would have to rely almost exclusively on mediated communication to accomplish interactions that occurred through in-person meetings prior to the move. For example, in a qualitative study of recent movers Shklovski and Mainwaring [32] found that as face-to-face communication became rare due to the distance between movers and their pre-move friends, movers tended to move much of the interaction and enactment of support from face-to-face communication to other modalities, such as phone, e-mail or IM. Communication episodes via phone became less frequent but much lengthier, changing in content. This happened mainly because the purpose of phone calls had changed from co-ordination and planning to sharing details of daily life and exchanging emotional support. Thus we hypothesize:

Hypothesis 1: Frequent communication via any modality before the move predict stronger friendships that are more likely to endure the move

Hypothesis 2: Moving away from close friends will decrease the frequency of involvement in supportive activities but not the sense of intimacy in the relationship

Hypothesis 3: Changes in frequency of in-person interaction will be associated with changes in enacted support but not with changes of intimacy in the relationship

Hypothesis 4: Changes in frequency of phone calls or email will be associated with changes in intimacy of the relationship and in frequency of supportive activities.

METHODS

We conducted a 3-wave residential mobility survey between January of 2004 and December of 2005. The initial sample of about 6000 recent movers was obtained from the United States Postal Service's National Change of Address database (USPS NCOA). The sample was stratified, with 1/3 engaging in local moves of less than 50 miles and the remainder engaging in long-distance moves. Because the USPS makes the database available approximately two months after the change of address has gone into effect, we were not able to contact respondents until approximately 2-6 months after their move.

After three reminders, approximately 32% of the initial sample, or 1779 respondents, completed the first survey (Time1 - T1). The median move distance for the whole sample was 97 miles (197 miles for long-distance movers, 4 miles for local movers). Prior research suggests that long-distance movers tend to be more educated [30], and, thus

more likely to be using the Internet and other communication technologies. Eighty-five percent of the sample used the Internet (84% for local movers, 87% for long-distance movers), compared with the national average of 68% [20]. Over 80% of the respondents also reported owning and using cell phones.

Prior research suggests that it takes movers approximately 6-18 months to initially adjust to the move [14]. Nine months after the first survey, those who replied the first time were sent a second survey (Time2 - T2). Of the 1779 respondents in the first survey sample, 65% (1156 respondents) completed the second. Approximately 18-22 months after the initial survey, respondents who replied the first time were sent a third survey (Time 3 - T3). Of the 1779 respondents in the first survey sample, 56% (910 respondents) completed the third survey. Of these, 85% (771 respondents) responded to all three surveys. The lower than desirable response rate for the follow-up may have been due to the fact that people are likely to move again within a year after an initial move [14]. This made it difficult to track them for follow-ups.

Social Network Elicitation Component

The movers' survey used name generators to sample the respondents' social relationships. The purpose of the name generators was to elicit a wide variety of social ties. The generators ask respondents to identify three people outside respondents' immediate family whom they knew before the move in each of the following categories: (1) people with whom they socialized, (2) people with whom they discussed important issues, (3) people who provided useful information or referrals and (4) people whom they first met online.

Respondents completed the name generators either on a paper or web-based survey providing a maximum of three names for each generator. To guard against the well-know tendency of respondents to nominate names of people who are psychologically close or cognitively salient at the time [8], we asked respondents taking the paper version of the survey to select from their lists the individuals who were closest to the respondent in age. On a web-based survey, the program selected a person closest to the respondent in age automatically. On both versions, respondents then described their relationship with the selected person in depth. Since respondent age and relational partner age were confounded, by design, we included only respondent age into all models using the social relationship data.

Sub-sample selection

Respondents indicated their relationship to each social relation by distinguishing between romantic partners, close friends, friends, relatives, acquaintances and other. The category "other" often included landlords, bosses, clergy and business acquaintances. In the analyses reported in this paper, we included only close friends, friends and acquaintances (including the "other" category), to avoid potential idiosyncrasies associated with relatives or romantic partners. We also excluded relationships that were initiated online to avoid potential confounding with geographical distance from partner.

Of the 900 respondents at T1 who responded to the social network elicitation, 881 (98%) respondents nominated pre-move friends. Respondents reported an average of 2.2 pre-move friends, ranging from none to five friends and resulting in a total of 1872 dyads. At T2, 625 (62%) respondents answered questions about the same friends that they had nominated at T1.

Mortality Analyses

At T1, approximately 879 (49%) respondents skipped the social network elicitation component entirely either because the task was too onerous or, judging by ad hoc notes on the surveys themselves, because of privacy concerns. The majority of those that had provided relationship data did not provide complete data on all relationships. In order to assess the impact of dropouts between three data collections, we conducted two types of mortality analysis. The individual level analysis assessed the differences between responders and non-responders by comparing T1, T2 and T3. The dyadic-level analysis assessed the differential drop-out of relationships as opposed to individuals, comparing present and absent dyads at T1, T2 and T3.

Individual level analysis

For the individual level analysis we compared T1 responses for people who did and did not respond at either T2 orT3. Results indicate that people who responded at T2 or T3 were significantly older than non-respondents, less likely to own their residence, more educated, and less likely to use cell phones prior to the move. Respondents did not differ on other variables of interest.

Dyadic level analysis

For the dyadic level analysis we compared relationships that disappeared even though the respondent was providing other data at T2 or T3. This meant that respondents had either skipped the social network elicitation component completely at T2 or T3, skipped specific relationships deliberately or were unable to identify the person from the identifying information they had previously provided. For example, some respondents indicated that they could not recognize the friend in question when the identifying information was a set of initials or a very common first name without a last initial.

We compared these relationships on data obtained at T1. Relationships that were dropped were weaker at the initial time period. That is, respondents knew them for a shorter period of time. They also tended to feel less close to them, exchanged less support and interacted less frequently by phone and email. Thus the friends who remained in the sample were the stronger, more salient or more important ones. We identified a total of 2031 pre-move friendships at T1 and 410 (20%) of these dyads were dropped by T3. This

suggests potential problems with generalization of findings from analyses based on dyadic data because of the selection bias for relationships that were more likely to endure.

Logic of survey construction

Due to the nature of the USPS NCOA database, we were not able to contact our respondents before their initial move. To attain some base-line measures of routine behavior before the move, we asked a set of questions about respondents' behavior during the 6 months before the move.

Although self-report of behavior frequency is fraught with recall errors, use of major events and life transitions as cues can aid in recall of event occurrence and frequency [38]. The residential move tends to be a memorable and stressful event and can be used as a natural marker for comparison of life before the move to life after. Respondents reported the frequency with which they interacted with each relationship partner in person, by phone and via email before the move. In addition, they described the frequency of engaging in various types of supportive activities, such as receiving practical favors or help or discussing important personal matters. Note that all of the supportive activities have the potential to be exchanged over telecommunications technology. We used frequency rather than number of times or amount of time as response options to provide contextual clues for recall of behaviors, because it is easier to recall and estimate frequencies of irregular as well as regular behavior [24]. Thus we expected our respondents to be able to report frequency of routine behavior with reasonable accuracy.

The T2 and T3 questionnaires asked about frequency of communication, feelings of closeness and engagement in supportive activities at the time of each questionnaire, which were administered 9-12 months and 18-22 months after the move. This design allowed us to conduct prospective analyses, using changes in frequency of communication with friends to predict changes in feelings of closeness or engagement in supportive activities over time.

Variables of interest

Dependant variables

Psychological closeness: We used a single measure of closeness to estimate the level of intimacy in a relationship. Respondents indicated in response to the question "How close do you feel to him/her" for each friend. They indicated their response on a 5-point Likert scale, with endpoints "Not at all" and "Very."

Enacted support: We were interested in the frequency with which respondents engaged in exchanging support and companionship with their friends. The questions were based on the dimensions of support identified by Cohen and colleagues [11]. Respondents indicated how frequently they engaged in a series of supportive activities and active companionship with their friends on a 5-pt scale. These questions were: "How frequently do you do the following with <friend's name>: Receive practical favors or help; Engage in hobbies or spare time interests; Participate in leisure activities together; Discuss important personal matters; Receive emotional support; Receive useful advice or information;" The questions were designed to tap activities that do not depend on physical proximity. Exploratory factor analysis at each time period indicated that all questions loaded well on one factor, with only one eigenvalue greater than 1 (T1=4.29, T2=4.41, T3=4.59) explaining 73% of the variance. The questions were combined to create an enacted support scale with high internal consistency (Cronbach alpha T1=.92; T2=.92; T3=.93)

Independent variables

Geographical distance from friend: At each time period, respondents reported how far away they lived from each friend on a logarithm-like scale (1=within 5 min drive, 2=within 15 min drive, 3=within 30 min drive, 4=within 1-2 hr drive, 5=within 3-4 hr drive, 6=further away). At T1, respondents also indicated how far away they had lived from each friend before the move. These response options used "effort distance" rather than objective geographical distance from friend. This allowed us to assess individual perceptions of how far each friend was from the respondent in order to avoid local differences in perceptions of distance [17].

Moved away from friend: We used pre- and post-move geographical distance from each friend, reported at T1, in order to calculate whether respondents had moved from their friends. This dummy variable had a value of "1" when pre-move geographical distance was 30 minute drive away or less, and post-move geographical distance was 1-2 hr drive or more, and 0 otherwise.

Frequency of communication: Respondents reported the frequency with which they communicated with each friend (a) *in-person*, (b) *by phone*, (c) *by email* and (d) *by instant messaging* before the move at T1 and after the move at T2 and T3. Their answers were on a 7-point scale, ranging from "Never" to "Multiple times per day." Unfortunately, over 70% of our respondents indicated that they had never used instant messaging to communicate with their friends. Therefore, we used only in-person, phone and email communication modalities in subsequent analyses.

Change in frequency of communication: We were interested in whether changes in communication were associated with changes in outcomes. We created dummy variables indicating whether respondents had increased, decreased or didn't change the frequency of communication with their friend in-person, by phone or by email before and after the move. To calculate each indicator of change we subtracted frequency of communication pre-move from frequency of communication post-move. A shift of at least 2 points on a 7-point scale in either direction was considered a change. While a reduction from several times a day to once a day frequency of interaction could be unrelated with relational

changes, a change from daily to weekly communication frequency could indicate a substantial shift in relational maintenance behaviors.

Length of acquaintance: Respondents indicated how long they have known each friend at the time of the initial questionnaire on a 7-point logarithm-like scale ranging from "less than 3 months" to "more than three years."

Control variables

Moved again. We created a dummy variables indicating whether respondents had moved again between data collections, using a change in zip codes reported at each data collection as an indicator of a move.

Prior research into residential mobility has identified a number of demographic variables that predict how, where and when people move [14,30]. We used questions from the Census Bureau national population survey to assess movers' *sex*, *age*, *level of education*, *employment status*, *marital status* and *sex of the friend*.

ANALYSIS

In order to deal with a high rate of drop-outs over the course of two years of data collection and test changes in pre-move relationships, we created a dataset that included data collected at T1 about pre-move frequency of interactions, enactments of support and psychological closeness, and the average of scores obtained at T2 and T3 (one and two years after the move) about post-move frequency of interactions, enactments of support and psychological closeness with pre-move friends. This allowed us to maximize the number of friendships analyzed, while making post-move scores for people who had responded more than once more stable.

Model Selection

The longitudinal nature of this data set allowed us to test whether changes in frequency of communication, controlling for base-line frequency of communication prior to the move ($T_{pre\text{-}move}$) predict changes in feelings of closeness and engagement in supportive activities after the move ($T_{post\text{-}move}$). Because the residential move can significantly disrupts friendships, the analysis model must allow us to investigate whether pre-move relationship factors and changes in frequency of communication predict post-move outcomes. To test the influence of changes in communication, we conducted lagged regression model analyses described in Cohen et al. [10] and summarized here. The movers' dataset is a two-time-point dataset, which was analyzed across two time periods in each analysis $T_{pre\text{-}move} \rightarrow T_{post\text{-}move}$. When assessing change in variable Y between $T_{pre\text{-}move}$ and $T_{post\text{-}move}$ we created a variable that was the difference in outcome between $T_{pre\text{-}move}$ and $T_{post\text{-}move}$ measures: $\Delta Y = Y_{post\text{-}move} - Y_{pre\text{-}move}$. We then regressed ΔY on a set of predictors measured at $T_{pre\text{-}move}$ and included $Y_{pre\text{-}move}$ into the equation as another predictor. This procedure removes the potential influence of $Y_{pre\text{-}move}$ on the relationship between the predictors and ΔY, and controls for regression towards the mean and other statistical artifacts. This method also insures that estimates of effects of other predictors on ΔY are independent of $Y_{pre\text{-}move}$ and the correlations of the predictors and $Y_{pre\text{-}move}$. Because the lagged dependent variable is included in the model, the results can be interpreted as showing the effects of the predictors measured at $T_{pre\text{-}move}$ on the change in Y between $T_{pre\text{-}move}$ and $T_{post\text{-}move}$ times of data collection, controlling for the initial values of the dependent variable. We added control variables to all models to ensure results were not artifacts of other pre-existing differences.

Each respondent had nominated at least one friend and, often, more than one. Thus data on each dyadic relationship was not necessarily independent from other dyads. We used Hierarchical Linear Modeling (HLM) to control for non-independence of observations, nesting dyads within respondent [7].

	Time 1 (pre-move)			Average of T2 & T3 measures		
Variable (range)	**N**	**Mean**	**Std Dev**	**N**	**Mean**	**Std Dev**
Psych. closeness (0-4)	1872	2.77	1.09	1022	2.44	1.24
Enacted support (0-4)	1878	2.07	1.04	1025	1.43	1.06
In-person comm. (0-6)	1866	3.43	1.81	1007	1.76	1.51
Phone comm. (0-6)	1852	3.26	1.64	1007	2.24	1.49
Email comm. (0-6)	1839	1.71	1.91	1010	1.39	1.57
Length of acquaint. (0-7)	1850	5.25	1.26			
Dist. before move (0-5)	1649	1.82	1.64			
Dist. after move (0-5)	1722	3.00	1.77	1022	3.18	1.69
Moved away (yes=1)	1645	0.35	0.48			
Friend sex (male=1)	1765	0.46	0.50			
Age (yrs)	1873	40.91	15.3			
Sex (male=1)	1895	0.49	0.50			
Employed (yes=1)	1794	0.64	0.48			
Married (yes=1)	1254	0.49	0.50			
Education (1-12)	1851	7.90	1.93			

Table 1: Simple statistics

RESULTS

Fig. 1 illustrates changes over time for psychological closeness, enacted support and frequency of communication for pre-move friendships. Both psychological closeness and exchanges of support decline with the move. In addition, face-to-face and phone communication decline, while email communication, a less frequent mode of interaction, does not change significantly.

Predicting changes in closeness

The examination of the simple statistics presented in Fig. 1, suggested that there are larger decreases in enacted support than in psychological closeness after the move. However, multivariate hierarchical linear models (HLM) regressions presented in Table 2 suggest the opposite pattern. The intercept is significantly different from zero for

psychological closeness (β=-.23, p<0.05), indicating that pre-move friendships decrease in closeness after the move, controlling for distance of the move, initial levels of closeness, communication, duration of the acquaintance and other control variables.

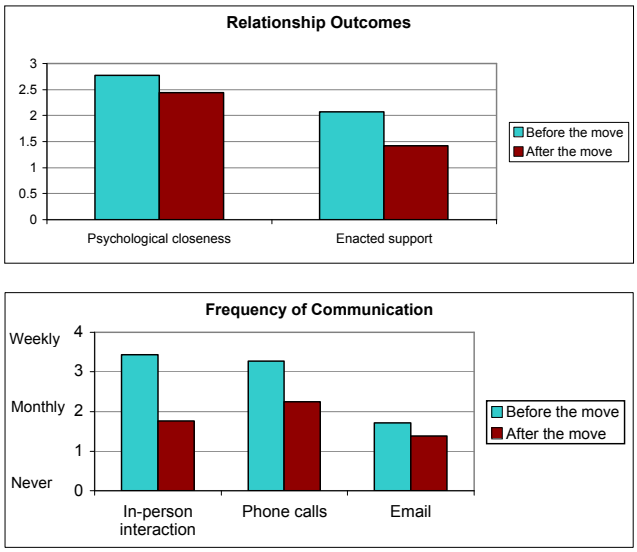

Figure 1: Changes over time for pre-move friendships

Hypothesis 1 posited that more frequent communication prior to the move would lead to friendships resistant to disruption due to the move. Our results provide support for this hypothesis. Developed friendships tended to decrease in closeness over time, regardless of the distance of the move. However, frequent interactions in-person, by phone or by email prior to the move were associated with smaller decreases in psychological closeness after the move. Note, that the effect for phone communication is substantially larger than the effect for either in-person or email communication (see Table 2). After the move, respondents felt approximately a third of a standard deviation closer to friends with whom they communicated daily rather than weekly by phone before the move. In contrast, they felt less than 10% of a standard deviation closer to friends with whom they had daily rather than weekly in-person or email communication before the move. Thus the phone appears to be the major vehicle for both relational maintenance and relational development and growth, an observation that is supported by numerous prior studies [e.g. 12,34].

An increase in geographical distance from friends was not associated with changes in psychological closeness, supporting Hypothesis 2, which posited that changes in proximity would not affect a sense of intimacy in a developed relationship. This means that in general, respondents after moving reported lower psychological closeness to their friends regardless of distance.

Hypothesis 3 posited that changes in frequency of in-person communication would not be associated with changes in a sense of intimacy in developed relationships. Indeed, results in Table 1 indicate that neither increases nor decreases in the frequency of in-person interactions with pre-move friends were associated with changes in psychological closeness. In other words, when friendships are well-developed, in-person interaction may not be essential to their maintenance [26].

Change in	Psychological Closeness		Enacted Support	
Predictors (pre-move)	**Std. β**	**Std Err.**	**Std. β**	**Std Err.**
Psychological closeness	-0.384	0.037**		
Enacted support			-0.645	0.032**
In-person com pre-move	0.089	0.045*	0.165	0.039**
Phone com pre-move	0.329	0.045**	0.385	0.038**
Email com pre-move	0.068	0.038	0.147	0.033**
Increase in in-person com	0.112	0.133	0.547	0.115**
Decrease in in-person com	-0.152	0.086	-0.431	0.074**
Increase in phone calls	0.549	0.140**	0.597	0.121**
Decreases in phone calls	-0.637	0.076**	-0.733	0.064**
Increase in email	0.097	0.103	0.088	0.090
Decrease in email	-0.391	0.089**	-0.388	0.077**
Length of acquaintance	0.091	0.033**	0.067	0.027*
Moved away (yes=1)	0.013	0.068	-0.220	0.060**
Friend sex (male=1)	0.000	0.067	-0.047	0.057
Sex (male=1)	-0.019	0.071	-0.105	0.063
Age	0.148	0.040**	0.025	0.036
Employed (yes=1)	0.237	0.108*	-0.005	0.097
Married (yes=1)	0.036	0.062	0.009	0.055
Education	0.078	0.034*	0.056	0.030
Intercept	-0.231	0.116*	-0.008	0.103

Table 2: Predicting changes in closeness and enacted support for pre-move friendships
Predicting change in psychological closeness: R-sq = 0.25;
Predicting change in enacted support: R-sq = 0.56;
* p<.05 ** p<.01

Changes in frequency of phone calls and decreases in frequency of email, however, were associated with changes in closeness. Increases in frequency of phone calls with friends were associated with increases in psychological closeness, suggesting that these relationships continued to develop and grow despite the move. Similar-sized decreases in the frequency of phone calling resulted in similar declines in the closeness of the relationship. In contrast, increases in email communication were *not* associated with increases in psychological closeness, while declines in email communication were associated with declines in psychological closeness. These results are partially consistent with Hypothesis 4, which posited that changes in frequency of phone calls and email would be associated with changes in psychological closeness. While phone calls seemed to contribute to relational growth, email communication may only serve to maintain it. Email may keep a relationship alive, while phone calls may help it to grow deeper.

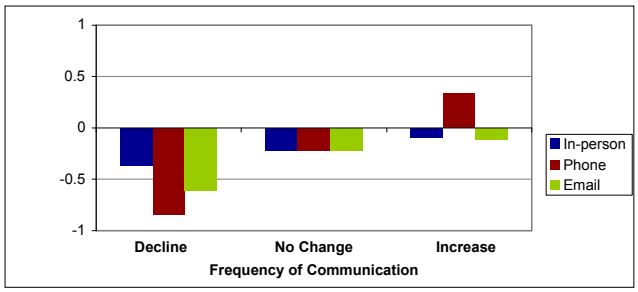

Figure 2: Changes in psychological closeness predicted by changes in communication frequency

Length of acquaintance – the tenure of the friendship – was associated with smaller decreases in closeness. This means that relationships in this sample are more likely to be long lasting, which drove efforts to preserve the relationship. Older, more educated and employed people also reported slower decreases in closeness in their friendships over time. Prior research suggests that older people tend to put more effort into maintaining existing relationships rather than initiating new ones, which could account for this result [26].

Not all relationships experienced changes in distance. In some cases, movers had nominated friends that were already distant prior to the move. In other cases movers did not move very far from or even moved closer to their friends. We added interactions between the *moved away* dummy variable and changes in frequency of communication, testing whether changes in communication had different effects for relationships that experienced a change in distance versus those that did not. Results suggest that there is value to frequency of interaction via email for relationship maintenance, especially in cases where friends move apart. Fig. 3 illustrates that the association of declines in frequency of email with decreases in psychological closeness was almost twice as large for people who had moved away from their friend than for those who did not. It is likely that in long distance relationships, declines in mediated communication are more noticeable and interpreted as meaningful because of the lack of other types of incidental interactions.

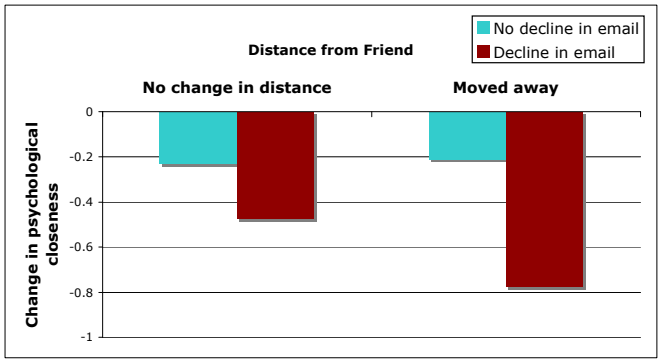

Figure 3: Predicting changes in psychological closeness from changes in proximity and decreases in email frequency

Predicting changes in enacted support

Unlike psychological closeness, frequency of supportive activities with friends did not decline over time, once prior enacted support, communication, and other factors were controlled (see intercept in Table 2). However, moving away from a friend was associated with substantial declines in enacted support, as proposed in Hypothesis 2. Fig. 4 illustrates that changes in frequency of in-person interactions and phone calls and decreases in frequency of email were associated with changes in enactments of support, supporting both Hypothesis 3 and Hypothesis 4. However, these associations are not uniform.

Increases in frequency of both phone calls and in-person interactions were associated with increases in enacted support and these effect sizes were approximately equal. In contrast, increases in email communication were not associated with enacted support. Decreases in in-person, phone and email communication were all associated with declines in enacted support, but the effect size for phone calls was nearly twice as large as the effect sizes for in-person interaction and email (see Fig. 4). Unlike psychological closeness, the frequency of supportive activities was connected to frequency of communication that that enabled such exchanges. Thus seeing friends and talking to them by phone more often could translate into more instances of enacted support, in accordance with Hypothesis 3. However, exchanging email with them did not lead to increases in support, suggesting that email may not be very useful for exchanges of support regardless of its frequency. It appears that enacted support is most sensitive to phone calls and in-person interaction, controlling for initial levels of closeness, communication, duration of the acquaintance and other control variables. Analogous to the case of psychological closeness, emailing may enable movers to maintain some forms of enacted support within a friendship, but not encourage further growth.

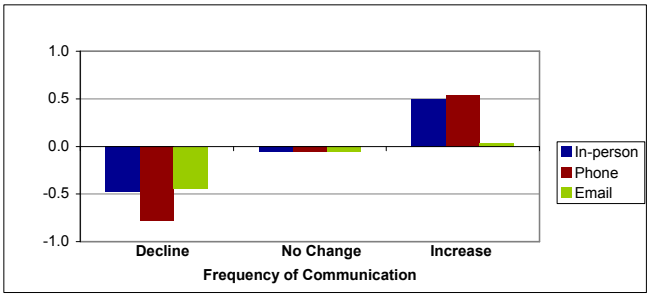

Figure 4: Changes in frequency of enacted support predicted by changes in frequency of communication

Length of acquaintance was also associated with slight increases in enacted support, suggesting that well-established pre-move friendships remain a source of support despite the move. Coefficients for interactions between *moving away* and changes in frequency of communication were not significantly different from zero.

DISCUSSION

We began this study with the goal of exploring the role of telecommunication technologies in the maintenance and growth of pre-existing friendships in the face of a residential move. We focused on the move as a natural disruption that puts friendships at risk and could force people to use mediated communication via phones and e-mail to maintain their friendships. Well-established friendships endured despite declines in in-person interaction seemingly without much adverse consequence. Though pre-move friendships were comparatively robust to the move *per se*, they were sensitive to changes in frequency of mediated communication such as phone and email. The data illustrate that psychological closeness depended less on in-person interaction than on mediated interaction via phone or email. In contrast, enacted support was dependant on all modes of communication.

Both the telephone, invented in 1876, and email, invented in the 1960s, are technology-enabled telecommunication. Phone communication appears to be more important for maintaining personal relationships, both in terms of psychological closeness and enacted support. It may be that the phone rather than in-person communication is the gold standard for relational maintenance. Prior research on communication in relationships had suggested that when relationships are mature, much of relational maintenance tends to move from in-person interaction to phone calls, especially when friends are far away from each other [26,35]. The phone is a powerful technology in friendships, responsible both for relational maintenance and relational growth regardless of distance.

Surprisingly, increases in frequency of email communication were not associated either with increases in psychological closeness or enacted support while decreases in emailing were associated with decreases in both. Using Orlikowski & Yates's concept of "communicative genres" we consider here the inherent differences between phone and email communication and the social meanings that people may attribute to these differences [27]. Though both phone and email are examples of mediated communication, the synchronicity of phone communication demands time commitment of both interlocutors simultaneously for a conversation to occur. The phone also allows both parties to rely on audible non-verbal cues to interpret the context of the conversation. The phone, then, is better suited for the "intimate conversation" genre – a type of communication that involves self-disclosure, leading to relationship growth. While email can support a rich variety of communicative genres [27], the time-investment required by written expression and the time delay in response may limit it's ability to support growth in relationships. As Boden and Molotch point out, in intimate interactions "timing is everything" and assessing sincerity of an email can be more difficult because of the lack of non-verbal cues and the time delay in the dialogic turns [5]. Email, like letters, can certainly be used for intimate and sincere communication, but the value of email may not be in its immediacy as much as in its persistence.

Of the communication modalities investigated in this study, email is closest to being both a form of communication and an artifact, albeit digital. Like letters and postcards, email can persist in digital form, continually reminding of the sender long after the communication has been received, interpreted and responded to. We suggest that the practice of "social reminding," first described by Whittaker and colleagues [40], can be applied to every day, non-work-related use of e-mail in a social context. After an email has been read and responded to, it can persist in the Inbox, serving as an unobtrusive reminder of the receivers' relationship with the sender. This form of reminding could keep a relationship salient without repeated communication acts.

In a study of use of postcards for relational maintenance, Dindia and colleagues [15] found that sending postcards did not have a positive effect on relational maintenance, while halting them had a strong negative effect. They theorized that postcards functioned as a 'hygienic factor' in friendships where the absence and not the presence of these social routines affected relationship maintenance. That is, since holiday greetings are routine and part of cultural norms of relationship maintenance in Western cultures, the act of sending them is expected and, therefore, goes virtually unnoticed. However, not sending them may be perceived as rudeness, in which one fails to conduct basic relational maintenance behaviors.

Though email exchanges are not yet as normative as postcards, the fact that they are comparatively cheap and easy to send could have relegated it to "the least one can do" in regards to relational maintenance. Thus if friends had established a routine prior to the move of occasionally exchanging emailing, disrupting these exchanges may be perceived as more symbolic of loss of relationship than the more expected declines in in-person interaction. Occasional email could be a relational maintenance behavior designed to perpetuate relational continuity in absence of other modes of communication [33]. Declines in email after a move, however, may be interpreted as a strong signal that this relationship lacks importance, causing the people involved to think of themselves as less psychologically close. It appears that email communication can be used to maintain relationships developed prior to the move, but not to help them grow closer and more supportive.

LIMITATIONS

Although this is a longitudinal dataset, we were not able to collect data from respondents before they moved, but relied on them to describe their pre-move behavior. In addition, due to the length of the questionnaire in the first questionnaire, we asked respondents to describe their pre-move behavior but did not ask them about their current communication and psychological closeness to pre-move friends, 4-6 months after the move. Thus we were not able to observe whether movers had adjusted their relational

behaviors immediately after the move. Prior research indicates that movers' social networks go through a period of turbulence as they settle into the new location over the course of the first 3-4 months after a move [37]. We were not able to observe this process.

The current study was designed as a self-report survey and thus carries with it the limitations of using self-report as a form of data-collection about frequency of behaviors. We did not actually observe any exchanges of support and relied on respondents to describe how frequently they communicated with their friends via each modality. As self-report, survey-based research, this analysis is inherently correlational and cannot demonstrate causality. The longitudinal nature of the study helps remedy some of these problems by collecting more than one set of data about behavior from each respondent and friend over time, thus making some of the reports about frequency of behavior more stable and controlling for individual differences between respondents and friends.

CONCLUSION

When people move away from their friends, their relationships are likely to change. Our results indicate that although established friendships may experience declines in supportive activities, feelings of closeness change less. It seems that for developed relationships exchanges of support depend on frequency of in-person interaction and, to some extent, physical proximity, while the sense of intimacy and closeness does not. In fact, in-person interaction may not be required for developed relationships to maintain a level of intimacy in spite of distance. In contrast, occasional email was imperative for maintaining pre-move levels of both closeness and enacted support especially for those that had moved far away from their friends. Although email did not appear to be effective at promoting relational growth, it was an important medium for perpetuating relational continuity.

The similarity of email to a post-card or a letter suggests that we can conceptualize it as both communication and exchange of a tangible good. While email has been around for over 40 years, our findings are likely to generalize to more recent innovations in communication. Text messaging on cell phones, comments on personal blogs and social network sites, photo-sharing sites and social network profiles all present a similar combination of communication and digital artifact. Just like post-cards or gifts, these digital traces of prior communication can encapsulate memories associated with the relationship and keep the promise of future communication alive. Yet unlike email, these types of digital interactions also have some ephemeral qualities, associated with the limitations of each medium. These promises, however, may best be fulfilled with an occasional phone call.

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