Appointment Reminder Systems and Patient Preferences:

Patient Technology Usage and Familiarity with Other Service Providers as Predictive

Variables

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Abstract

This study had two aims: to measure patient preferences for medical appointment reminder systems and to assess the predictive value of patient usage and familiarity with other service providers contacting them on responsiveness to appointment reminder systems. We used a cross-sectional design wherein patients' at an urban, primary care clinic ranked various reminder systems and indicated their usage of technology and familiarity with other service providers contacting them over text message and e-mail. Models were built to assess the impact of patient usage of text message and e-mail and patient familiarity with other service providers contacting them over text-message and e-mail on effectiveness of and responsiveness to appointment reminder systems. We find that patient usage of text message or e-mail and familiarity with other service providers contacting them are the best predictors of perceived effectiveness and responsiveness to text message and e-mail reminders. When these variables are accounted for, age and other demographic variables do not predict responsiveness to reminder systems.

Introduction

Patient nonattendance (commonly known as "no-shows") at scheduled medical appointments represents a serious problem for many healthcare providers. An earlier national study in the U.S. revealed that over one third of surveyed practices had a no-show rate of over 21% (1). More recently, multiple studies have reported high no-show rates ranging from 23% to 34% in outpatient clinics (2-4). Patient no-shows represent a significant problem that follows from unreliable schedules: the administration is inconvenienced and clinicians' time, which could have been used to serve other patients, is wasted. Both of these problems reduce the efficiency of care delivery (5-7).

Though some of the no-show appointment slots can be compensated by walk-in patients, complete financial recovery from a high no-show rate is most likely impossible. For instance, in one of the few national level studies, nonattendance at outpatient clinics cost the UK National Health Service an estimated ₤790 million per year (8). Further, missed appointments are particularly problematic for patients with chronic conditions who can more effectively manage their health if they keep their medical appointments. For example, patients with frequent missed appointments were less likely to utilize preventive health services and thus had poorer control of their blood pressure and diabetes (6, 9, 10).

To reduce the patient no-show rate and alleviate the concomitant negative impact, health care organizations have tried a variety of strategies. One particularly useful intervention seems to be adopting an appointment reminder system, i.e., remind patients a few days prior to their appointments via phone call, email, SMS (short message service) or letter (11, 12). Many studies have focused on the effectiveness of reminder systems, and most of them compared one or two modalities of reminder systems (e.g., phone call and SMS) to non-intervention control (2, 4, 13-

15)[1]. A recent systematic review of this literature concludes that, although no-shows cannot be eliminated completely, nearly all these reminder systems reduced patient no-show rates (16). Specifically, this review finds that the weighted mean relative reduction in no-show rate was 34% of the baseline no-show rate.

Many of the above intervention studies assume a "one-size-fits-all" approach. That is, by implementing phone or SMS reminder systems, all patients receive their reminders in the same fashion. However, research suggests that the effectiveness of a reminder system is dependent on the patient population, the modality of reminder, and service type (11). Even within a single modality of reminder system – SMS reminders – Guy et al. (12) report a significant variation in effectiveness: the odds ratio of the attendance rate in the SMS group compared with controls ranges from 0.91 to 3.03. Such a variation in the effectiveness of reminder systems implies that there is no "one-size-fits-all" reminder system and reminders need to be tailored to individual patients or at least to specific patient groups to make it more effective.

One strategy for constructing more nuanced reminder systems is to assess patients' preferences. Indeed, classic research in psychology suggests that people's preferences and attitudes impact their behavior (17-19). Accordingly, once patients have expressed a preference for text message or phone call reminder systems, they will be more likely to respond to text message or phone call reminders, respectively. Thus, by reminding patients in the way they prefer, they are more likely to attend the scheduled appointment, or at least cancel the appointment. However, research measuring patient preferences for reminder systems is very limited. What little research there is has found that preferences for different reminder systems depends on patient populations (20), that younger patients prefer to have voicemails sent to their

cell phone as opposed to work and home phone (21), and that younger patients exhibit more favorable attitudes towards SMS reminders (22).

In practice, this previous research has yielded perhaps an overly simplistic understanding of how patient demographics impact preferences for different reminder systems. For instance, this research suggests that younger patients tend to be more technology "savvy" and hence are more likely to prefer SMS reminders. This also seems to agree with our common wisdom. However, one important effect that has been overlooked when studying patient preferences for reminder systems is the role of expertise, specifically, how patients' usage of text message or e-mails in their everyday lives impacts their willingness to use and respond to text message or e-mail reminders in the context of health care. This is especially puzzling as classic research in marketing suggests that consumer learning and expertise are important topics in understanding choice and behavior (19, 23, 24). This research would suggest that the more people become adept at interacting with a product feature (e.g., SMS), the more favorable their attitudes are towards using that product feature and the more likely they are to alter their behaviors so that they can use the product feature.

One way in which consumers can gain familiarity with product features, like SMS, is for other service providers to contact them over that medium of communication. Many service providers, such as banks and credit card companies, send consumers reminder messages about their accounts. For example, many banks allow consumers to enroll in a text message reminder system where people are reminded of their account balances and notified of any account shortfalls. Similarly, many phone companies allow consumer to customize their account so they will receive e-mail and text message reminders when their bill is due or paid (25). Conceivably, then, consumers who use these reminders from other service providers will be more likely to

utilize text or e-mail reminders from health care providers. Thus, consumers' preferences for reminder systems in health-care settings might be impacted by their preferences for reminder systems from other service providers. Despite the fact that other service providers send messages and reminders almost every day via a variety of channels, no research to date has explored how individuals' familiarity with other service providers contacting them can affect patient preference for medical appointment scheduling reminders. In particular, lack of such information may lead to use of less effective reminder systems due to limited understanding of patients' "true" preferences and usage of SMS or E-mail product features.

The purpose of this study was to investigate patient preferences for different modalities of reminder systems, including home phone call, cell phone call, SMS message, e-mail, and direct mail systems. We examined the impact of patient experience with other service providers on their preferred choice of medical appointment reminder systems. The study was conducted in a primary care setting, where appointment scheduling is most widely used and patient no-shows are most commonly observed, and more importantly, where patient preferences for appointment reminders have seldom been explored and remain largely unknown.

Method

Design

We used a cross-sectional survey design to assess patient preferences for five different reminder systems, to measure patients' usage of - and familiarity with other service providers contacting them over - text message and e-mail, and to assess reported responsiveness to different reminders systems.

Settings and Participants

Data were collected on 161 adult patients from a primary care clinic in New York City. The clinic serves a diverse patient population in a low income area. Forty-one providers operate at the clinic to serve about 26,000 patients per year. A convenience sample of patients from this clinic was recruited for this study. Patients were eligible to participate if they spoke English or Spanish languages and if they were over the age of 18. Overall, 240 patients were eligible to participate and, 161 of them agreed to participate, yielding a response rate of 67%.

Survey Instrument

A self-report survey instrument was created in English, which later was translated into Spanish to be used with the Spanish-speaking patient population at the clinic. A native Spanish speaker conducted the translation and a second native speaker verified the accuracy of the translation. The instrument was designed to collect data about patients' preferences for different reminder systems, patients' usage of text message and e-mail, and patients' familiarity with other service providers.

Patients first ranked their preference for five different reminder systems from "most preferred" to "least preferred". The reminder systems included: 1) home telephone call, 2) cell phone call, 3) text message, 4) written reminder, and 5) e-mail reminder. Next, patients indicated if they have active home, cell, and e-mail accounts (yes/no responses), what charge they incurred from receiving text messages (monthly data plan or per text fee), how many text messages and e-mails they send and receive a day, and how effective they think phone call, text, and e-mail reminders are (7 point scales from "not at all effective" to "very effective").

In the second portion of the instrument, patients indicated their familiarity with other service providers (e.g., banks, credit card companies, and airlines)[2]. Specifically, patients indicated (7 point scales from "not at all likely/familiar/typical" to "very likely/familiar/typical")

1) how likely they are to read messages sent by other service providers over text message, 2) how familiar they are with responding to text messages from other service providers, and 3) how typical it is for other service providers to contact them over e-mail.

The third portion of the survey mainly assessed patients' responsiveness to different appointment reminder systems. On a 7-point scale (from "not at all likely/important/typical" to "very likely/important/typical,") patients indicated 1) how likely they would be to reschedule their appointment over text message or e-mail, 2) how important it would be for them to reschedule their appointment, and 3) how typical it is for other health care providers to use text messages to reach them over text message and e-mail.

Demographic characteristics of the patients including their age, sex, and race/ethnicity were collected. Also, information about the language spoken at home, if they are a first time patient at the clinic, length of time as a patient at the clinic, and their health insurance was collected.

Data Collection

Data collection took place from December, 2011 to February, 2012. We obtained approval to conduct the survey from the Medical Director of the clinic. Two research assistants approached patients in the waiting room and informed them of the study. Specifically, patients were told that a study was being conducted to improve the clinic's appointment reminder system, that no personally identifying information (e.g., names, social security numbers) would be obtained from them, that all responses would be reported in aggregate form, and that they could discontinue at any time if they felt uncomfortable completing the survey and their responses would be discarded. To ensure patients had enough time to complete the survey, the research assistant asked patients roughly how much time they had until their scheduled appointment and

only recruited patients who expected a 10 minute wait time or longer at the clinic. Surveys were only passed out to patients who agreed to participate. Once patients agreed to complete the survey, the research assistant moved to a separate area to avoid disturbing the participant as the survey was self-directed. If patients had any questions, they were asked to raise their hand so the research assistant would know to assist them. All surveys were completed in full and no patients volunteered to remove their responses.

Ethical Considerations

The study was approved by the Institutional Review Board at a large, Eastern University Medical Center Campus. Patients were thanked for their participation and given a small token gift (a pen) for their participation. Verbal consent was obtained.

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Data Analysis

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Data were entered into SPSS Version 17 software (IBM Corporation, Armonk NY) for analysis. We computed descriptive statistics including means and frequencies for the demographic characteristics as well as for patients' usage of technology.

We employed a Friedman Nonparametric Test to assess patients' ranked preferences and a Wilcoxon Signed Ranks test to assess significant differences between ranks. Models were built to assess the impact of patient usage of text message and e-mail and patient familiarity with other service providers contacting them over text-message and e-mail on effectiveness of and responsiveness to appointment reminder systems. We constructed a dummy variable for whether or not patients sent text message or e-mails on a daily basis. We employed a series of Analyses of Covariance (ANCOVA's) where patient familiarity with other service providers and patient usage of text or e-mail were fixed factors. We had two key dependent variables: perceived *effectiveness* of reminder systems and *responsiveness* to reminder systems. Since we had

multiple scale items measuring responsiveness to reminder systems that were highly related (α = .90 for text message, α = .83 for e-mail reminders), we collapsed these items into two indices of responsiveness to text message and e-mail reminders.

Based on previous research indicating that age impacted patients' responsiveness to reminder systems (21, 22), we included age as a covariate. When analyses yielded significant interactions, we categorized patients into those who are very familiar versus less familiar with other service providers contacting them over text message or e-mail (based on a median split as familiarity with other service providers is a continuous variable) to further explore key differences in perceived effectiveness of and responsiveness to reminder systems as a function of familiarity with other service providers. In all of our analyses, $P < .05$ was considered statistically significant and $.10 < P < .05$ was considered marginally significant.

Results

Demographics

Table 1 provides information on patient demographics. The average age of patients was 39 years and 78% of the sample was female. The patient population was predominantly Hispanic (71.4%) and a majority utilized Medicaid (69.6%) or Medicare (17.4%) to pay for their health care services.

"Technological Savvyness"

Table 2 summarizes the descriptive data on patients' usage of technology. There was large variation in the technology patients currently used. About 31% of the patients did not have an active home telephone line, 12.4% of patients did not have an active cell phone, and 35.4% of them did not have an active e-mail account. Of the patients who did have active cell phone lines, there was large variation in the number of text messages patients sent as well as in how patients

paid for their text message service. Specifically, 69% of patients with active cell phone lines could send text messages and, of this population, 60% paid monthly data plan fees and 40% paid fees per text (Mean fee = $0.07). Patients, on average, sent 15 texts per day. Of the patients who did have active e-mail accounts, 88% were likely to check their e-mail per day. Patients, on average, sent 2.66 e-mails a day.

Ranking of Preferences for Reminder Systems

Our analysis revealed the following rank order for reminder systems (in order of most preferred to least preferred): 1) cell phone, 2) home phone, 3) text message, 4) direct mail and e-mail (tie). Although many patients indicated they would like to be contacted over their home telephone, a significant number of patients do not have an active home telephone line (31%).

Our analysis further revealed significant differences in ranked preferences for the following relationships (preferred choice – least preferred): home phone – text message (Z = 4.48, $p < .001$), home phone – direct mail/e-mail (Z = 6.48, $p < .001$), cell phone –text message (Z = 6.07, $p < .001$), cell phone – direct mail/email (Z = 6.95, $p < .001$), and text message – direct mail/email (Z = 3.99, $p < .001$). There was no significant difference in ranked preference for cell phone and home phone reminders (Z = .94, $p =.34$) nor was there a significant difference in ranked preference for e-mail and direct mail (Z = .72, *ns*).

The Impact of Other Service Providers Contacting Patients Via Text on Attitudes to Text Message Reminders

The Analysis of Covariance (ANCOVA) yielded a significant main effect for participants *usage* of text messages, $F(1,115) = 9.11$, $p < .01$, a main effect for patients' *familiarity* with other service providers contacting them over text message, $F(12,115) = 3.51$, $p < .001$, and the predicted *familiarity* x *usage* interaction, $F(8,115) = 2.95$, $p < .01$. For ease of depicting this

interaction, we conducted a median split to separate patients who are more or less familiar other service providers contacting them via text (See Figure 1). This analysis revealed that among patients who were more familiar with other service providers contacting them, patients who sent text messages on a daily basis viewed text message reminders to be more effective than patients who did not send text messages on a daily basis, $t(64) = 6.36$, $p < .001$. Among patients who were less familiar with other service providers contacting them, patients who sent text messages on a daily basis also viewed text message reminders to be more effective than those who did not send text messages on a daily basis, $t(95) = 8.23$, $p < .001$. Notably, once we accounted for patients usage of text messages and familiarity with other service providers contacting them via text message, age was no longer a significant predictor of perceived effectiveness of reminder systems, $F(1,115) = .66$, $p = .42$.

The Impact of Other Service Providers Contacting Patients Via Text on Responsiveness to Text Message Reminders

The ANCOVA of responsiveness to text message reminder systems revealed a marginal main effect for patients' *usage* of text messages, $F(1,129) = 2.80$, $p < .10$, a main effect for patients' *familiarity* with other service providers contacting them over text message, $F(1,129) = 20.47$, $p < .001$, and the predicted *familiarity* x *usage* interaction, $F(1,129) = 2.66$, $p < .10$. To explore the nature of this interaction, we divided patients into those who were more or less familiar with other service providers contacting them over text message, based on a median split (See Figure 1). Among patients who were less familiar with other service providers contacting them over text messages, those who sent text messages every day indicated higher levels of responsiveness to text message reminders than those who do not send text messages every day, $t(78) = 2.55$, $p < .01$. Among patients who were more familiar with other service providers

contacting them over text message, those who sent text messages every day indicated higher

levels of responsiveness to text message reminders than those who do not send text messages

every day, $t(63) = 5.65$, $p < .001$. As before, age was not a significant predictor of responsiveness

to text message reminders, $F(1,129) = .01$, $p = .92$.

The Impact of Other Service Providers Contacting Patients via E-mail on Attitudes to E-Mail

Reminders

The Analysis of Covariance (ANCOVA) yielded a marginal main effect for patients

usage of e-mails, $F(1,138) = 3.46$, $p < .07$, a significant main effect for patients' *familiarity* with

other service providers contacting them over e-mail, $F(6,138) = 5.95$, $p < .001$, and the predicted

familiarity x *usage* interaction, $F(6,138) = 2.99$, $p < .01$. For ease of depicting this interaction,

we conducted a median split to separate patients who were more or less familiar with being

contacted from other service providers over text message (See Figure 2). Among patients who

were more familiar with other service providers contacting them over e-mail, those who sent e-

mail messages on a daily basis viewed e-mail reminders from their health care provider as more

effective than patients who did not send e-mails on a daily basis, $t(90) = 3.70$, $p < .001$. Notably,

age was no longer a significant predictor of perceived effectiveness of reminder systems,

$F(1,138) = .21$, $p = .65$.

The Impact of Other Service Providers Contacting Patients via E-mail on Responsiveness to E-

Mail Reminders

The ANCOVA of responsiveness to e-mail reminder systems revealed a main effect for

patients' *usage* of e-mail, $F(1,145) = 10.01$, $p < .01$ and a main effect for patients' *familiarity*

with other service providers contacting them over e-mail, $F(1,145) = 31.69$, $p < .001$ (See Figure

2). To further explore the nature of these effects, we divided patients into those who were more

or less familiar with other service providers contacting them over e-mail, based on a median split. Among patients who were less familiar with other service providers contacting them over e-mail, those who sent e-mail messages every day indicated higher levels of responsiveness to e-mail reminders than those who did not send e-mails every day, $t(76) = 2.73$, $p < .02$. Among patients who were more familiar with other service providers contacting them over e-mail, those who sent e-mails every day indicated higher levels of responsiveness to e-mail reminders than those who did not send e-mails every day, $t(79) = 4.40$, $p < .001$(See Figure 5). Notably, age was not a significant predictor of responsiveness to e-mail reminders, $F(1,145) = .01$, $p = .95$. [3]

Discussion

This cross-sectional study is among the first to explore patients' relative preference for different appointment reminder systems in primary care settings. Our results suggest that appointment reminder systems can be improved if patient preference is taken into account. For instance, we find that a direct mail reminder, though still used by many clinics including the one where we conducted the survey, is the least preferred communication medium by the patients. This is not unexpected in the current era of technology and is also consistent with recent findings in other developed countries (22). Cell phone and home phone, in contrast, are the most preferred choices of reminders; however, one third of the surveyed patients did not have an active phone line and one eighth did not have cell phones. This might be typical for other clinics as well serving low-income patient populations. To make reminder systems more effective, health care providers need to identify what technology patients have access to (26). Clinics in low-income areas face another challenge to reach their patients and this inability to reach patients affects continuity of care and may increase the gap in health disparities.

One important finding in our study is that patient usage of technology and familiarity with other service providers are the best predictors of their perceived effectiveness and responsiveness to the appointment reminders via the same technology. This finding is consistent across two different communication mediums, text messages and e-mails. Interestingly, usage and familiarity seem to amplify the effect of each other. That is, the more frequently a patient uses a certain communication medium *and* the more familiar this patient is with other business providers approaching him/her via the same medium, the more effective and responsive this patient would be if he/she is reminded via this medium.

Previous research finds that age is a significant predictor of attitudes towards text message reminder systems. This research may lead to misconceptions that elderly patient populations will not be responsive to more technologically grounded reminder systems. Consequently, healthcare organizational may design appointment reminder systems that are less technologically grounded for their elderly patients (i.e., they might send direct mail reminders to elderly patients). We find no such effect of age after controlling for patient usage and familiarity with other service providers contacting them over a certain communication medium. Thus, our study suggests that if a healthcare organization does not account for patients' usage of technology and familiarity with other service providers in designing their appointment reminder system, they may not be effective and can lose opportunities to maintain continuity of care, particularly for elderly patients.

This study has some limitations. We only collected data from one clinic serving low-income populations located in a large urban metropolitan area; our findings might not be applicable to other settings. We recruited a convenience sample of patients waiting in the clinic. However, we intentionally conducted surveys across different times of day and different days of

week to avoid time effects. Thus, it seems unlikely that our sample would significantly deviate from a random sample. Our survey data are self-reported, which might contain bias. But since none of the survey questions solicits answers against social desirability (27), we believe the self-reported bias, if any, will be small.

Conclusion

In conclusion, this study investigated patient preferences over different appointment reminder systems in primary care settings. We found that patient preferences are diversified. Their perceived effectiveness and responsiveness to high-tech reminders such as SMS or emails *cannot* be predicted by age, a conventional predictor commonly associated with individual's technological savvyness; patient experience and expertise of using such technologies with other service providers are the best predictors.

The rise of patient-centered care and personalized medicine calls for "no-one-fits-all" approach for treating patients (28-31); the same mantra should apply for "reaching" patients. Marketers are sophisticated at reaching clients through a variety of communication mediums including text message and e-mail. Such strategies are certainly possible in healthcare organizations too, especially in those clinics using advanced electronic scheduling systems, with which it would be fairly easy and inexpensive to add a text message component to their reminder systems. To ensure effective use of high-tech reminder systems, health organizations need to have policies in place to collect data and verify processes to ensure that patients' contact information is correct thus allowing them to receive reminders (4, 26). Future research is required to address how to "personalize" reminder systems to maximize effectiveness as well as the cost-effectiveness of such a personalized reminder strategy.

Endnotes

[1] Researchers have also compared SMS interventions relative to control (no intervention; see, e.g., (32). Due to space concerns, we do not discuss this burgeoning literature on SMS for health behaviors further since the basic premise that technological interventions improve health behaviors is similar to the premise that technological interventions reduce no-show rates.

[2] For ease of exposition, we refer to patient familiarity with other services providers throughout the rest of the manuscript since the terms familiarity and expertise are often used synonymously in classic marketing literature (22).

[3] In addition to the reported analyses, we conducted further analyses controlling for age, sex, ethnicity, race, and insurance payment plan. These analyses all yielded a similar pattern of results as described in the results section. Since we only had justification to include age as a covariate based on prior research, we do omit these analyses.

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Table 1: Patient Demographics

Variable	% (N=161)
Age (yrs)	
Mean (SD)	39.00 (15.77)
Range	18-87
Sex	
Male	22%
Female	78%
Race	
Caucasian	4.3%
Hispanic	71.4%
African American	16.8%
Other	7.5%
Insurance Type	
Commercial	9.3%
Medicaid	69.6%
Medicare	17.4%
Self-Pay	3.1%
Other	0.6%

Table 2: Patients' Usage of Technology

Variable	(N = 161)
Home Phone Lines	
Active	69%
Not Active	31%
Cell Phone Lines	
Active	87.6%
Cannot Send Texts	31%
Can Send Texts	69%
Mean Texts (SD)	15 (54.50)
Pay Monthly Data Plan[1]	60%
Pay Per Text[1]	40%
Mean Fee (SD)	$0.07 ($0.45)
Not Active	12.4%
E-Mail Accounts	
Active	64.6%
Mean E-mails/day (SD)	2.66 (5.00)
Not Active	35.4%

Figure 1: Effectiveness and Responsiveness Ratings of Text Message Reminder Systems as a

Function of Familiarity with Other Service Providers Sending Text Messages (Median Split) and

Whether or not Patients Send Texts on a Daily Basis
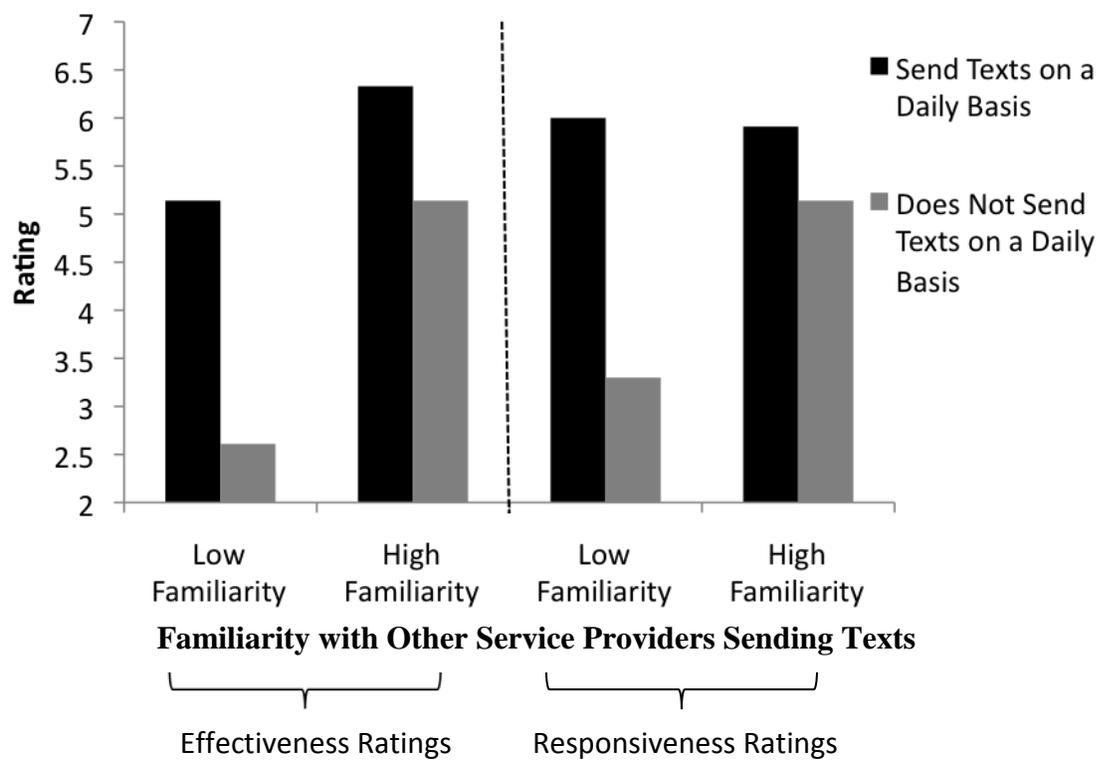
Figure 2: Effectiveness and Responsiveness Ratings of E-mail Reminders as a Function of

Familiarity with Other Service Providers Sending E-mails (Median Split) and Whether or not

Patients Send Emails on a Daily Basis

Familiarity with Other Service Providers Sending Emails

Effectiveness Ratings   Responsiveness Ratings