

## TEXT 2 U: CONTACTING WIRELESS SUBSCRIBERS USING TEXT MESSAGING FOR MOBILE PHONE SURVEYS

Trent D. Buskirk, Ph.D. *Epidemiology and Statistics Core, Eastern Virginia Medical School*

Mario Callegaro, M.S. *Graduate program in Survey Research and Methodology, University of Nebraska, Lincoln*

Charlotte Steeh, Ph.D., *Georgia State University*

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### **1. Introduction to the U.S. Mobile Phone Context**

The increase in the use of mobile phones and the potential rise in the number of mobile phone only households or primarily mobile phone households (those for which landlines exist for the express purpose of internet/fax/data transmission/receipt) is slowly creating an opportunity and need to supplement traditional RDD telephone surveys with surveys of mobile phones. The number of wireless subscribers in the U.S. has been rising at an average rate of 9.7% a year since December of 1985 and as of July, 2004 the Cellular Telecommunication and Internet Association estimated a total of 167,236,200 mobile wireless telephone subscribers in the country. As the number of subscribers continues to rise and as the number of subscribers who become “wireless only” or “primarily wireless” also rises, contact/cooperation rates for traditional RDD surveys may become adversely affected since many companies exclude mobile phone numbers from their sampling frames.

With the continued development of wireless service in the U.S. comes the improvement in wireless telephone technology. In fact, 92% of the wireless subscribers in the U.S. (C.T.I.A., 2004) are now using a digital wireless phone. With these advanced phones come many new features including text messaging and wireless web that could be useful in surveying subscribers, besides making a cold call. While not all of these subscribers can make use of text messaging capabilities, many of them can and the number of text messaging users continues to rise. In fact, the number of text messaging users rose from 18 million in 2002 to 27 million in 2003 (UPOC and Frank N. Magid & Associates, 2003). A Telephia and Harris Interactive survey estimated that 20% of all U.S. mobile phone subscribers either sent or received a text message (TM) during the last quarter of 2002 (Telephia / Harris Interactive, 2002) compared to an estimated 12 percent in 2001. A similar estimate for the number of text message users in the last quarter of 2002 in the U.S. was found by SIBIS (SIBIS, 2003). Specifically, this study estimated that 56% of the U.S. population owned a mobile phone, and of those 24% were TM users. One possible explanation for the observed increase in the number of users of text messaging could be the result of the doubling in the proportion of young adults (18 to 24) who reported using text messaging from 2001 to 2002 (22% to 45) (SIBIS, 2003).

For users who cannot access text messaging on their mobile phones, or for those consumers who do not own a wireless phone, text messages can still be sent to a wireless subscriber using a Text Messaging Interface (TMI) from

specific wireless provider company websites. These TMI offer researchers information and may as well develop into a screening tool that identifies for nonworking/non-assigned numbers thus improving the efficiency of a survey process in light of current FCC restrictions prohibiting the use of autodialers for dialing wireless numbers and a lack of a wireless telephone directory (Steeh and Buskirk, 2004).

In this paper we will focus on two methods that can be implemented for contacting wireless subscribers in the United States that do not involve calling the subscriber directly, primarily, text messaging and secondly wireless internet service. In the next section we will highlight the text messaging landscape within the U.S. and illustrate some of the methods that are available from many of the larger domestic wireless providers. In section three we will describe the use of wireless internet capabilities for wireless phones and describe some potential uses for this technology for the survey researcher in the U.S. In section four we will describe our own text messaging study of over 800 Nextel wireless phone numbers. Finally, in the last section we will discuss some possibilities for the not so distant future for survey research of wireless subscribers within the U.S.

### **2. Text Messaging as a contact tool for Survey Research in the United States**

**2.1: Development of Text Messages in the U.S.:** Text messages had their origins in the U.S. with the development of digital technology, either digital cellular, broadband PCS (Sprint), or digital SMR (radio). In 1999 AT&T wireless, Sprint PCS, Omnipoint, and Nextel offered one-way text messaging (Federal Communication Commission, 1999), with the ability to receive, but not send, text messages. Two-way messages (i.e. receive and send capability) were not introduced in the United States until May, 2000 when VoiceStream (now T-Mobile) offered the service (Federal Communication Commission, 2001). At the end of 2001, AT&T wireless became the first carrier to offer cross-carrier network SMS capabilities (Federal Communication Commission, 2002b). The process of inter-carrier interoperability was completed by the first quarter of 2002 by the six nationwide operators and other mobile data providers (Federal Communication Commission, 2003).

Because of varying technologies among providers, TMs in the U.S. are limited to a maximum length ranging from 120 to 500 characters (Federal Communication Commission, 2003). Although most mobile phones in the U.S. were digital at the end of 2003 (Cellular Telecommunications & Internet Association, 2004), the ability to receive/send TMs was not uniformly available to all subscribers- a stark contrast to the

uniform availability for European subscribers. While for example, every Nextel phone is enabled to receive TMs, it generally costs users \$0.15 to receive and at least \$5.00 to enable the reply capability of their phone plus an additional \$0.10 per sent message. Variation in technologies across providers creates variation in the types of text messaging capabilities and options that are available to wireless subscribers in the U.S. Specifically, depending on the company, text messaging capabilities have to be activated, and most of the time there is a fee to receive (and send) TMs. **Table 1** was compiled using information from the operator web sites regarding text messaging capabilities and fees for the 11 companies with more than one million subscribers at the end of 2002 (the cumulative subscriber base for these 11 companies accounts for approximately 87% of U.S. mobile phone subscribers (Federal Communication Commission, 2003). The table highlights the fact that there are some differences among companies in both the number of characters per sent/received message as well as in the cost to send/receive a TM at the time this paper was written. For example, few operators offer the ability to receive free messages (AT&T Wireless, Us Cellular, and partially Cellular One). Nextel, T-Mobile and Verizon let all customers receive TMs no matter the plan, but for a fee. Every Nextel phone (new and old) has the built in capability to receive TMs (and users are charged on a per-message fee automatically and bundle fees are available as an option). Other companies require a special add-on to the contract in order to activate the option to receive TMs for a fee and these options cost at least \$4.99/month. The range of maximum characters per message for these 11 companies is from 140 (T-Mobile) to 500 characters (Nextel). Some smaller companies have a limit of 120 characters per sent/received message.

While there are many differences in the technologies across providers, continued development to synthesize these differences in terms of carrier interoperability may help explain the continued rise in the number of text messaging users (Federal Communication Commission, 2003).

**2.2: Sending text messages to Subscribers without using a phone:** It is not necessary to have a wireless phone in order to send a TM. As we mentioned previously, it is fairly straightforward and generally free to use a company’s website to send a TM provided you know the number and the provider. Generally, these websites will limit the number of characters per message in accordance with the company limit. The degree of flexibility in other options that are available to a consumer while using a company’s text messaging interface (TMI) will often be greater for those who subscribe to a plan from that particular company. For example, Cellular One customers can send up to 25 160-character TMs at a time using the online TMI while non-customers can send 12.

A company TMI assumes that you wish to send a TM to a subscriber from that company. If however, the provider is not known, other text messaging software or third-part websites (e.g. Smeverywhere.com) can be used to send TMs to wireless phone subscribers. Some of these interfaces will not break up messages into smaller SMS/TM that are within the provider limit, but rather, the subscriber will simply receive a truncated message. For other software/website interfaces, longer messages will be split into an appropriate number of smaller sized SMS/TMs and then delivered accordingly. In this case, messages should be at most 140 characters (or 120 characters- if a national probability sample from all providers is required) in order to reduce respondent burden in terms of expected expense.

All of the 11 major carriers we described in Table 1 offer the possibility to use their website to send TMs to their customers for free. Table 2 delineates the principal characteristics and options for each company, including the maximum number of characters possible per sent TM. As shown in the previous Table 1, there are some differences among the companies. For example few TMIs offer the option to track the status of the TM delivery and few allow receiving an email confirmation of such delivery.

**Table 1: Text Messages Capabilities and Fees for the Top Ten Mobile Companies in the U.S.**

Company	TM Capability	Cost to send/receive per message	Cheapest bundle text plan / month	Max # of chars
Verizon	Yes- Included in every plan 2 cents to receive	2 cents for receiving/10 cents sending	\$2.99/100 messages Send/Receive	160
Cingular	No, activate text messaging capability; Plan dependent	10 cents Sending/Receiving	\$2.99/100 messages Send/Receive	160
AT&T Wireless	Yes Free	Free receiving/10 cents sending	\$1.99 for sending 25 messages	160
Sprint PCS	No, activate text messaging capability	10 cents Sending/Receiving	\$5.00/ 100 messages Send/Receive	160
Nextel	Yes-Included in every plan	15 cents to receive or (10 cents to send/receive with two-way messaging)	\$5.00/300 messages	140 (500)
T-Mobile	Yes-Included in every plan	5 cents Sending/Receiving	\$2.99 /300 messages Send/Receive	140
Alltel	No, activate for \$6.95 per month	Free receiving	\$6.95 to send 300 messages	160
Us Cellular	Yes, included in every plan	10 cents sending	\$2.95/50 messages	150
Cellular one	50 incoming messages included with each plan and 5 cents thereafter	5 cents receiving, 10 cents sending	\$3.99/200 messages	160
Cricket	No, activate for \$4.99	Once activated, unlimited sending/receiving	N. A.	160
Qwest Wireless	No, activate for \$5.95	Once activated, unlimited sending/receiving	N. A.	160

The majority of providers do allow the use of email to send messages in the form of “number@company designated site.” For some TMIs it is possible to create a login and password and access a personal area (for customers only) where an address book can be stored together with a log of the messages sent. Generally the user can reply to that message if a phone number is entered by the sender, and in some cases the reply can be sent to an email address.

**2.3: Text Messaging Pathways using TMI:**

Once you have accessed the TMI to send a TM, one of several possible events should occur. Since the possible pathways for sending a TM from one phone to another would be a function of their interoperability, we will focus on possible events that may occur when a TM is sent from the carrier’s TMI to one of its subscribers. For an example of what happens when one sends a message using a mobile phone rather than a TMI, consider the service provided by Cellular One. In this case the subscriber must be in the “digital footprint” of service in order to send a message to either a T-Mobile, Verizon, Sprint, Cingular, Alltel and Dobson or U.S. Cellular subscriber. The phone unit will continue to attempt to deliver/send the TM for up to 72 hours compared to 24 hours for messages sent using the TMI, which does not require a digital footprint, only a Cellular One number. A study by Keynote System done in December 2003 in New York, Dallas, and Seattle, showed that out of 25,000 SMS sent between various carriers such as AT&T Wireless, Cingular, Nextel, Verizon, and T-Mobile, 5% were never received and 7.5% were not received within 120 seconds (Sterlin, 2003).

Once a TM is sent from the TMI, the message may end up being lost in the network. Although some providers will attempt to deliver the message for up to seven days, some messages may be lost in the network due to a working number that is out of area, a phone that is not turned on during the

delivery period. The message may not be delivered or returned if the recipient subscriber has a phone without text messaging capabilities or if the recipient has a phone with text capabilities but TMs can be outside the contract (i.e. the subscriber has not elected these options). Lastly, is it possible that a mobile phone was ported to a landline number due to the recent number portability option (FCC, 2003) , thus impeding the reception of the message. It may be possible for the TM to be delivered to a number ported to another wireless provider, but since the message has been sent under the assumption of a valid subscriber for the particular carrier, the message may actually be lost in the network or become undeliverable. Certainly, if the number has been ported from a wireless phone to a landline phone the TM will not be delivered (a special case of the phone that does not have text capabilities).

Once the message reaches the mobile phone, three outcomes are possible: the respondent reads it, the respondent does not read it voluntarily or inadvertently, even though s/he know how, or the respondent does not read it because s/he does not know how to read a message on his/her mobile phone. At the present time we do not have numbers to attach to each of these possibilities, but we hope to have clarified what may happen as a message attempts to reach its intended recipient.

**3. Wireless Web as a tool for Survey Research involving U.S. Wireless Subscribers**

In Europe, TMs have been used not only to invite people to participate in a survey, but also to poll subscribers directly via embedding questions within the body of the TM. In particular, “SMS Surveys” are precisely those surveys sent as TMs from research organizations. The body of the message contains a few short questions and respondents can reply to the message by including their response options. For a methodological

**Table 2: Basic Characteristics of Text Messaging Website Interface for Major Providers**

Company	Tracking / Delivery confirmation	Email to text message	Other	Max # of char <sup>1</sup>
Verizon	Yes/Yes	Yes	Receiver can reply to a cell phone number or email address	160
Cingular	No/No	Yes		160 <sup>2</sup>
AT&T wireless	No/No	Yes	User must agree to terms and conditions of the service Digital PCS phones have lower max. # of char. they can receive without truncation (i.e. 110)	160 110
Sprint PCS	Yes	No		160
Nextel	Yes/Yes	Yes	Subscribers with reply capabilities have a larger per message limit (i.e. 500 characters).	140 <sup>2</sup> 500
T-Mobile	No/No	Yes	User must agree to terms and conditions of the service No TMs to prepaid plans	140 <sup>2</sup>
Alltel	Yes/No	Yes	Website alerts if the receivers cannot receive the TM	160
Us Cellular	No/No	Yes	User must agree to terms and conditions of the service	150 <sup>2</sup>
Cellular one	No/No	Yes	Cellular One subscribers can use the web interface to send up to 25 160-char. messages at a time (non-subscribers are limited to 12 such messages at a time).	160
Cricket	No/No	No		143
Qwest Wireless	Yes/Yes	No	User must agree to terms and conditions of the service . It is possible to set priority: high, normal	175

<sup>1</sup> Max number of characters in the message, excluding the fields: from and subject.

<sup>2</sup> The field *from* is mandatory, so the resulting number of characters is the maximum minus the size of the *from* and in some cases the *subject* field[s].

experiment on the number of questions for SMS surveys see (Cooke, Nielsen, & Strong, 2003). Using this strategy (Widman & Vogelius, 2002) measured daily newspaper readership in Norway and (Down & Duke, 2003) measured bank customer satisfaction and attitudes for measles mumps rubella vaccination in UK.

Mobile telephones may also be used to access surveys on the World Wide Web. In one possible application, a user could be sent a text message specifying the web address of the survey. Eventually the website could be browsed on the screen of the mobile phone using the phone's internet capabilities. Within the U.S., such technology is still being optimized for mass consumption. The types of capabilities along with the level of services provided do vary by Wireless Provider as illustrated below in Table 3. We see the mobile phones with wireless web capabilities as a bridge between Internet surveys and traditional telephone surveys. More research will be needed in order to understand how people use and respond to mobile phone wireless web interfaces in the survey setting.

**4. Nextel Text Messaging Study**

Nextel subscribers have been identified as the target population for a study on the use of text messaging as a primary method of contacting wireless subscribers and inviting them to participate in a short 20 question survey regarding the use of cellular phones. A probability sample of 898 Nextel subscribers was selected using a Telecordia file sorted by working cell phone area-code, prefix and 1000-block combinations. The distribution of the sample of numbers by Census Region was 18.96% Midwestern, 22.10% Northeastern, 25.24% Western and 33.70% Southern.

This distribution was not identical to the distribution of all Nextel Numbers but well within the bounds of expectation considering the sampling variability one will encounter by using selecting a sample size of 898 from the total number of thousand-blocks allotted to Nextel [over 20,856].

An attempt was made over a period of four to six weeks to deliver up to four TMs inviting the selected sampling unit to participate in a survey. In the body of the message we included a toll-free (800) number that the subscriber could use to contact the survey research center to complete the survey or decline participation. The first such TM was not as detailed as the remaining three messages in that it did not include a schedule of the research center fielding returned calls. Attempts to send text messages were initiated on various times and days of the week, with the first such message sent out on a Saturday since calling is often free using weekend minutes. Because our main outcome of interest was the usefulness of text messaging as a means to make contact, we focused on the contact rate for the study, rather than the survey response rate. We expected a contact rate of approximately 5% using this protocol based on prior experience with cellular surveys (Steeh, 2004).

The Nextel website Text Messaging Interface (NTMI) was used to send each TM and this site provided an instant status of the TM, but variation in network resources made this status less reliable from one attempt to the next. In addition to the instant status, an email delivery confirmation was requested for every attempt and this confirmation (that resulted in the efforts of Nextel to deliver the message for a period up to 7 days) was deemed the final outcome of any particular text messaging attempt. Numbers with two undeliverable email confirmations

**Table 3: Mobile Phone Internet Capabilities By Company**

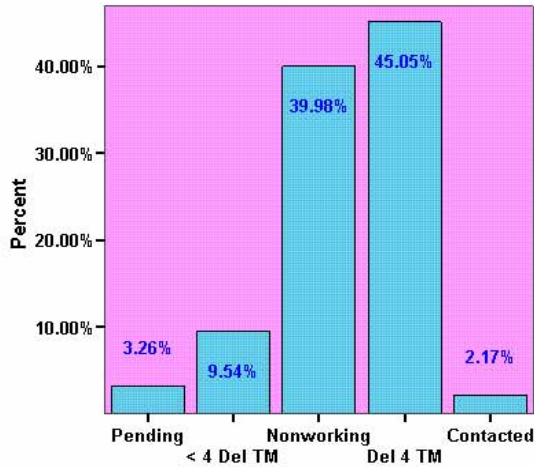
Company	Type of technology/ Name for customers	Capabilities <sup>1</sup>	Costs <sup>2</sup> Lowest monthly plan
Verizon	WAP /Mobile web by MSN called VzW	Reading Hotmail, send a instant message with MSN Messenger and browsing wap enabled websites	4.99 plus airtime (minutes deducted from the plan)
Cingular	WAP GPRS/WAP Cingular Media Wireless Internet	Reading email, browsing wap enabled websites	3.99 plus airtime or 6.99 for 1 MB (no airtime)
AT&T wireless	WAP GPRS/WAP / Mmode	Reading AOL, Yahoo!, Earthlink, Mindspring, NetZero, Prodigy or sprynet email account . Sending instant message using AOL instant messenger or Yahoo! Messenger Browsing wap enabled websites	2.99 plus 2¢ per Kb
Sprint PCS	WAP ? / PCS Vision	Accessing email Browsing up to 95 predetermined websites	Sprint PCS Vision packages for 15\$ including unlimited web access
Nextel	Java 2 Micro Edition Nextel Online Web	Accessing email, Sending instant message using AOL instant messenger. Browse up to 80 predetermined websites	3.50 Unlimited web access
T-Mobile	WAP GPRS/WAP T-zones mobile Web	Accessing email, sending instant message using AOL instant messenger, browsing wap enabled websites	4.99 unlimited web access
Alltel	WAP/Mobile Web Service Axxess	Accessing email, browsing wap enabled websites	5.95 plus airtime
Us Cellular	WAP / Easyedge	Accessing email, browsing wap enabled websites	1¢ per Kb or 5.95 per 2 MB
Cellular-One	WAP? / Hello 2 Web	Accessing email, browsing websites	7.99 including 250 airtime min
Cricket	Not possible	-	-
Qwest Wireless	? / BrowseNow	Accessing email. Only text browsing, no images	9.99 unlimited web access

<sup>1</sup>The microbrowser in the WAP-enabled phones can only access sites that are in WML (Wireless Markup Language) format. If you enter an HTML address not WAP compatible, you will receive an error message.

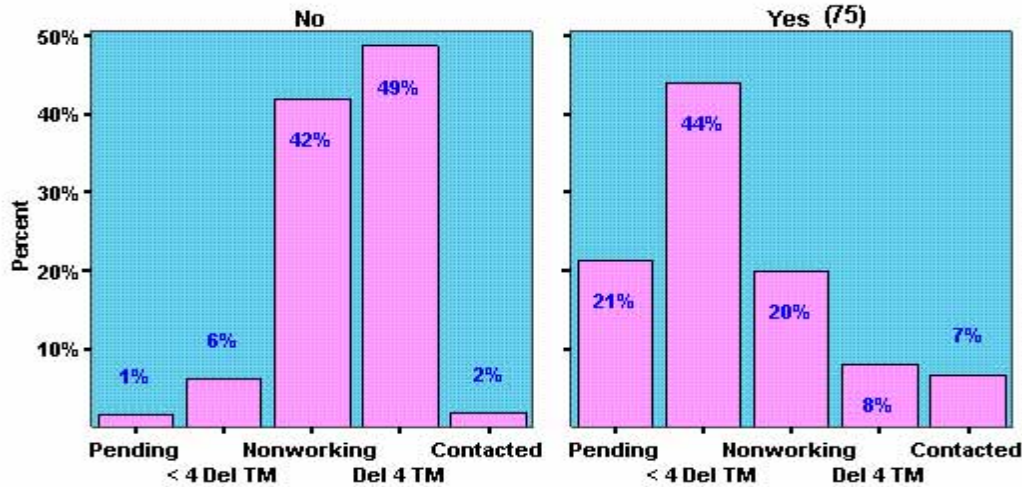
<sup>2</sup>Kilobyte estimate when browsing the web: check weather, 8 kb; check top news/read an article, 10 kb; send an email (10 5-character words) 4 Kb.

were deemed not working. In our study, 40% of the numbers were deemed “nonworking” and the overall “delivery hit rate” was computed to be 57.9% (at least one email confirming delivery). The overall contact rate for was 3.823% which was not significantly different from the hypothesized value of 5% (p-value=.2286). The overall final disposition of the Nextel sample is given below in Figure 1.

**Figure 1:** Distribution of the Final Disposition by Reply Capability Status at the onset of the study period (total sample size=828).



**Figure 2.** Distribution of the Final Disposition by RC Status at the Onset of the Study Period (Total Sample Size=828).



**Table 4.** Sample Characteristics for Mobile Phone Numbers that either had no RC, Retained RC or Who Added RC .

Grouping		Number of text messages sent	Number of email delivery confirms	Number of email undeliverable confirms	Number of pending messages	Number of sent confirms from Website
No RC (688)	Mean	3.367	2.132	0.888	0.350	0.163
	St. Dev.	1.246	1.951	0.978	1.218	0.521
Retained RC (68)	Mean	5.029	0.926	0.412	3.691	4.235
	St Dev.	1.795	1.201	0.815	2.627	2.468
Added RC (55)	Mean	3.927	2.018	0.745	1.164	1.364
	St Dev.	1.412	1.748	0.907	2.025	2.094
Total (828)	Mean	3.546	2.027	0.835	0.687	0.595
	St Dev.	1.391	1.909	0.969	1.719	1.532

An interesting characteristic of the sample was that 9.1% of numbers were reported by the TMI to have reply capabilities (i.e. two-way text messaging capabilities) (RC) at the time we initiated the text messaging. This proportion increased significantly to 15% at the end of the study (McNemar’s test z=6.096, p-value<.0001) even though 7 of the original reply capable numbers had lost this status.

Incidentally, the distribution of wireless numbers across census region was not significantly different for those numbers that had reply capability at either end of the study compared to those phones that did not (i.e. region was not associated with the advanced capability). The RC status of the phone number was an auxiliary variable that was available from the TMI and since this status is an elected option from Nextel, it should indicate some type of working status. The distribution of the final disposition varies significantly between those numbers that had reply capability before the study and those that did not ( $\chi^2(4)= 226.258$ , p-value<.0001); see Figure 2.

The proportion of numbers classified as pending is greater among those numbers with RC category compared to those without this capability. However, the distribution of the number of “Sent” messages given by the TMI at the time the TM was sent was not as positively skewed for reply capable numbers compared to those without this capability (not shown). The differences in these values by type of RC are displayed in Table 4. We note that the second through fourth columns form a numeric partition of the first column.

## 5. For the Future.

While one advantage of the text messaging/cell phone survey approach is that you reach the final sampling unit, sending only TMs and using the current results from company websites may result in classifying numbers incorrectly. Later email confirmation is essential. In addition, if numbers are reassigned over short time spans, it may be possible that the number of distinct subscribers who read the message exceeded the number of distinct wireless numbers we were using in our sample. We do not have data on how long a particular subscriber has been using the wireless number used to contact them. As companies respond to the number pooling regulations imposed by NANPA we may expect faster recycling of wireless numbers. Number portability will also have implications in tracking, composing and delivery of messages.

Nextel was selected as the primary source for wireless numbers primarily because text messaging is available to all their subscribers and because the advanced Nextel TMI provided email confirmations. Using other providers may make difficult the interpretation of non-deliverability since some companies (including Verizon and Cingular) provide ambiguous undeliverable messages for some subscribers who simply do not have the ability to receive TMs. Many wireless providers are currently in the process of developing and improving text messaging options for their subscribers. For example, in a recent phone conversation (January, 2004) with a representative of Verizon Wireless, it was revealed that Verizon just completed a round of upgrades to their processing algorithms for text messaging interfaces and delivery systems. We believe that as the capabilities of text messaging and TMI's advance, the generalizability of the usefulness of the results of this study may extend to a text messaging experience from not only Nextel but other companies as well. The future use of text messaging in the survey sampling context is sure to be influenced by legislation/regulations on SPAM, technological advancements and our understanding of the full spectrum of communication using mobile devices.

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