APPENDIX K

2023 National Survey of College Graduates Text Message Experiment Report (DRAFT)

Note: The U.S. Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data used to produce this product (Data Management System (DMS) number: P-7533594, Disclosure Review Board (DRB) approval number: CBDRB-FY25-POP001-0003).

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Executive Summary

The purpose of the 2023 National Survey of College Graduates (NSCG) text message experiment was to measure the impact of sending text message reminders on response and follow-up workload. This experiment had two conditions: a control group that did not receive text messages and a treatment group that received text messages.

Results showed that receiving text messages did not result in earlier response, or a higher final response rate. Additionally, there was no incremental change in response following each text. The demographic makeup of respondents showed that texting did not have an effect for any demographics of interest, even for the younger generation.

We found that the texting operation had a relatively low impact on follow-up workload. We saw a low undeliverable rate and a low opt-out rate; this low opt-out rate is encouraging because it suggests that even after multiple text messages, we were not doing any harm by sending text messages. Using the cost data available for this analysis, there was evidence of a modest cost savings from mailing fewer Week 18 paper questionnaires to the text message experiment group. Though the text message reminders showed no difference in response for this experiment, texting could be a less expensive potential replacement for the costly Week 18 mailing.

We note that the first text message was not sent until three months of data collection had elapsed, because the original goal was to use texting to replace CATI calls. If there is interest in broadening the goals of text messaging, more experimentation of texting earlier in the cycle would be beneficial. For instance, texting before the first paper questionnaire was sent could yield response earlier, thus reducing the universe for a costly paper questionnaire mailing.

For future research, we could experiment with the timing of when text messages are sent as well as the content of the message. We found that only a small percentage of cases logged into the web instrument the same day a text was sent, after 5pm. Additionally, variations on the wording of a text message could be tested, as well as how frequently to send them. For future cycles, we recommend sending text message reminders before the first paper questionnaire is sent to elicit response before a costly mailing.

1. Introduction

The purpose of the 2023 National Survey of College Graduates (NSCG) text message experiment was to determine if sending text message reminders could replace Computer Assisted Telephone Interview (CATI) calls. However, CATI calls were inadvertently suspended for both experimental groups, so we could not determine whether text messages could replace CATI calls. We focused our analysis to measure the impact of sending text message reminders on response and follow-up workload throughout the period of data collection in which texts were sent. This report documents the results of the 2023 text message experiment and recommendations for data collection procedures for future cycles[1].

The NSCG is a repeated cross-sectional survey, conducted every two years, designed to provide data on the number and characteristics of individuals with a college degree living in the United States. The U.S. Census Bureau implements the survey on behalf of the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF).

The 2023 NSCG sample consisted of approximately 161,000 new and returning cases that had previously responded to the American Community Survey (ACS). Data collection spanned 26 weeks and used a multi-mode approach of self-administered web or paper questionnaires and Computer-Assisted Telephone Interviewing.

Currently, the NSCG contacts the sample cases by mail, phone, and email (when available). With declining response rates, particularly among the younger population, the NSCG is seeking new ways to reach sample cases. Though email is widely used by most adults, unrecognized or unwanted emails are easy to filter and delete without reading. While the younger generation still uses email, their preferred communication mode is text messaging (June, 2021). Research within the last decade shows messaging can help increase response rates when combined with other contact modes, such as email (Kanticar & Marlar, 2017; De Bruijne & Wijnant, 2014; Mavletova & Couper 2014). Research also suggests that younger and non-white individuals are more likely to consent to receive text messages, potentially addressing a hard-to-reach demographic (McGeeney & Yan, 2016). Additionally, the Census Bureau's Household Pulse Survey found text messages have been more successful than email at eliciting response (Fields, Childs & Eggleston, 2021).

[1] The U.S. Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data used to produce this product (Data Management System (DMS) number: P-7533594, Disclosure Review Board (DRB) approval number: CBDRB-FY25-POP001-0003).

The current Census Bureau policy only permits text messages to be sent to individuals who have previously opted-in to receive them[2]. Therefore, a checkbox to opt into receiving text messages in future cycles was included at the end of the 2021 NSCG survey. Approximately 35 percent of respondents opted in to receive text messages in 2021 for the 2023 cycle (Bottini, Satisky & Heimel, 2022).

This 2023 text message experiment was intended to determine whether texting has promise in increasing response, both overall and for younger sample cases. If it does, texting could become a regular part of data collection, coupled with continued experimentation to find optimal text timing and wording, in conjunction with other data collection modes.

2. Methodology

This section details the experimental and operational design, research questions, and methods that were used to answer them. The main goal was to measure the impact of text message reminders on response rates and follow-up workload.

2.1 Experimental Design

This experiment had two conditions: a control group that did not receive text messages and a treatment group that received text messages. The experiment was limited to returning sample members who opted in to receive text messages in 2021, did not respond by CATI in 2021, and did not report a CATI preference in 2021.[3]

Of the 29,500 eligible sample cases, the majority were used in the text message group, to maximize the number of cases receiving texts. A systematic random sample of approximately 27,500 cases were selected for the text message group and 2,000 cases were selected for the control group. Table 1 below summarizes the experimental study groups with their respective sample sizes.

Table 1: Sample sizes for the text message experiment

Text Message	Estimated Sample Size	Experimental Group
Sent	27,500	Treatment
Not Sent	2,000	Control

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment

[2] We used a third party to send out text messages and current laws require a prior relationship to exist with the recipient before they can be texted.

[3] The cases that responded to NSCG by CATI in 2021 were scheduled to be called earlier in 2023 data collection than cases that hadn't responded by CATI. Since the original goal of this experiment was to see if we could use texts to replace phone calls, we wanted to structure the data collection as consistently as possible for all cases.

The assigned sample sizes allow us to detect a minimum detectable difference (MDD) of approximately four percentage points for comparisons of response rates. The MDD calculations assume a 50 percent response rate in each group and use an alpha value of 0.10. Given the sample size of the control group, meaningful differences will not always be identified as statistically significant. We will consider and discuss meaningful differences as well as statistically significant differences. Appendix B provides the MDD equation and definitions.

2.2 Operational Design

Sample members received five mailouts and (if eligible) three email message reminders before the Week 12 mailout and accompanying email reminder, which directly preceded the first text message. Table 2 shows all the contacts during the timeframe when text messages were outgoing.

At the beginning of data collection, four text messages were planned: one weekly from the 13th to 16th week of data collection. Due to low response rates and the convenient nature of the text messages, a fifth text message was sent in the 20th week.

The control and treatment groups did not receive telephone reminders over the time when the first four text messages were sent. However, the CATI operation started sending telephone reminders in September; nonresponding cases became eligible for CATI calls on September 11th. The cases that received the fifth text message on October 10th likely received telephone contacts between September 11th and October 10th, as well as the scheduled email and mail reminders.

Table 2: Data collection contacts during text message period

Event	Date (2023)	Universe
Week 12 mailout	August 10	Control and Treatment
Week 12.5 email reminder	August 15	Control and Treatment
Week 13 text message sent	August 17	Treatment
Week 14 text message sent	August 24	Treatment
Week 14.5 email reminder	August 29	Neither Group
Week 15 text message sent	August 31	Treatment
Week 16 text message sent	September 7	Treatment
Week 16 mailout	September 7	Control and Treatment
Week 16.5 CATI Nonresponse Follow-up	September 11	Control and Treatment
Week 18 mailout*	September 21 – 25	Control and Treatment

Event	Date (2023)	Universe
Week 18.5 email reminder	September 26	Control and Treatment
Week 20 mailout	October 5	Control and Treatment
Week 20.5 text message sent	October 10	Treatment
Week 20.5 email reminder	October 10	Control and Treatment[+]
Week 23 mailout	October 24	Control and Treatment

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment

* Due to a machine issue at the National Processing Center, this mailout took multiple days.

[+] The treatment group received this email reminder only if they opted out from receiving text messages. If they did not opt out, they were sent a text message.

The first four text messages contained the exact same content, using fills for User Id and Password.

> Reminder to complete the National Survey of College Graduates at https://respond.census.gov/nscg . Your User ID to complete the survey is [USER_ID] and password is [PASSWORD]. Call 1-888-262-5935 for help. Reply STOP to cancel. Message rates may apply.

However, the fifth text message was edited so that the telephone assistance line appeared before the survey response URL. It was hypothesized that emphasizing the telephone number could appeal to respondents who were hesitant to click a link.

> Reminder to complete the National Survey of College Graduates. To complete, call 1-888-262-5935 or go online at https://respond.census.gov/nscg . Your User ID to complete the survey is [USER_ID] and password is [PASSWORD]. Reply STOP to cancel.

Qualtrics, the online survey software, was used to send the text messages. Before each scheduled text message, a file of recipients was uploaded to the Qualtrics website; the file contained the recipient's name, cell phone number, User ID and Password, plus a control number that is used internally for case management.

Each text message was scheduled to send at 5pm Eastern Time. This scheduled time was determined so that texts were not sent too early or too late for all sampled cases in different time zones. Qualtrics sends text segments[4] at a rate of three per second. Given the number of recipients and number of segments, the entire process took over an hour to complete (the full length of time is unknown). Qualtrics does not record the exact time when each text message was sent.

[4] A text segment is generally 160 characters.

2.3 Research Questions

When planning the analysis for this experiment, we were interested in the following research questions to measure the effect of sending text message reminders:

1. What was the impact on response?
    a. Were overall response rates higher when text messages were sent?
    b. How did the timing of response and final mode distributions compare between the treatment and control groups?
    c. Was the demographic makeup of respondents different between the treatment and control groups?
2. What were the operational follow-up workload impacts throughout the text message period?
    a. After each text message, what proportion of sample cases opted out of receiving additional text messages?[5]
    b. Did the cases that opted out of receiving text messages ultimately respond to the NSCG?
    c. What proportion of texts were undeliverable?
    d. Did text messages lead to lower data collection costs, by reducing the number of follow-up CATI calls and mailings to nonrespondents?
    e. After each text message, what proportion of cases logged into the web survey instrument that day?

2.4 Data Analysis

The following section outlines the methods that were used to answer each research question. We used experimental base weights where appropriate to make inferences about the NSCG target population. Chi-square tests and t-tests were used when answering research question 1 and significance was determined with an alpha value of 0.10. For response rates, our research question aimed to determine whether sending text message reminders resulted in higher response rates, so we conducted one-sided t-tests to compare the experimental groups. All other t-tests used two-sided p-values. For testing significant differences in demographic distributions, we used a Bonferroni-adjusted alpha level to account for multiple comparisons if the demographic group yielded a significant Chi-square test p-value.

The small sample size of the control group led to some cases having very large weights. To mitigate the imbalance of weights, we report weighted and unweighted results for Research Question 1. Analysis of the components in research question 2 were unweighted[6].

[5] Sample cases could opt out of receiving additional text messages by replying STOP to the text reminder.

We verified and tested the output using double programming, a verification process in which multiple staff develop program code independently to produce results. This practice helps ensure the quality of deliverables.[7]

2.4.1 Impact on Response

To determine if the text message reminders led to higher response rates, we calculated the final weighted response rate using Equation 1 in Appendix A. Additionally, we calculated unweighted response rates using Equation 2 in Appendix A. The difference between the two response rate formulas is that the unweighted response rate does not take into account unknown eligibility or ineligibles[8]. These cases are considered nonrespondents.

We also looked to determine whether the group that received text messages responded earlier than the group that did not. As a baseline, we calculated response rates for each experimental group before the week 12 mailout, just before the texts were sent. Next, we calculated the response rates before the week 16 mailout, after the first four texts were sent. Finally, we calculated the response rates before week 21, after the fifth text message reminder was sent. All three time points were compared between the experimental groups to determine whether text messages led to earlier response. Additionally, we compared the final response mode distributions between the treatment and control groups.

We also conducted a difference-in-differences analysis to compare changes in response rates over time between the treatment and control group. We used the response rates before week 12, week 16, week 21, and the final response rates, and computed the difference-in-differences as follows:

1. Calculated the after-before difference in response rates for the treatment group ($T_A - T_B$).
2. Calculated the after-before difference in response rates for the control group ($C_A - C_B$).
3. Calculated the difference between the difference in response rates for the treatment group ($T_A - T_B$) and the difference for the control group ($C_A - C_B$).
4. This is the difference-in-differences: (DD) = ($T_A - T_B$) - ($C_A - C_B$).

To determine if a text message reminder impacted the demographic makeup of respondents differently for certain subpopulations, we compared the demographic distributions of

[6] Analysis of research question 2 was limited to sample cases that received at least one text. Limiting the universe required the creation of new weights that would total the entire population, which we did not have.

[7] For disclosure purposes, the SAS code used for programming and verifying results will be saved on the M drive under the DSMD Survey Methodology area folder.

[8] Equation 1 requires use of all replicate weights, so Equation 2 was used to calculate unweighted response rates and standard errors.

respondents between the control and treatment groups. As younger generations are more likely than older generations to rank text messaging as their most used communication method (Pogue, 2015), we were interested to see if the text message reminders resulted in different response rates by generation; age of the respondent was grouped into three categories (see Appendix C for all demographic variables). We performed chi-square tests on the distributions of all sample members, regardless of response status, to determine if there were any differences between experimental groups before data collection started. Next, we performed the same chi-square tests on the distributions of respondents. Significant differences in the demographic makeup of respondents were only considered if no significant differences were found between the distributions of all sample members. If the chi-square test found a significant difference in the distribution of respondents for a demographic characteristic, then the proportion of respondents in each subcategory were compared between the experimental groups using pairwise t-tests with a Bonferroni-adjusted alpha level for multiple comparisons.

2.4.2 Operational Follow-up Workload

To determine the impact of sending text messages on the follow-up workload, we focused on treatment cases that were sent at least one text message. Of those cases, we used data from Qualtrics to understand how many people opted-out of receiving subsequent text messages and how many texts were not successfully delivered. We also determined whether cases that opted out of receiving texts ultimately responded.

From a cost-savings perspective, we were interested in how many fewer CATI calls and mailings were administered to treatment cases compared to control cases. To determine if sending text messages led to lower data collection costs, we calculated average cost estimates using data provided by the Associate Director for Demographic Programs (ADDP) NSCG team and the National Processing Center (NPC). Specifically, we calculated the average number of mailings and phone calls in each treatment group and multiplied those by the cost of a mailing and call, respectively, and took the difference. This provided a measure of average cost savings.

Finally, we used the web survey paradata to provide the proportion of cases that logged into the web survey instrument after the text message reminder was sent on that day.[9] These analyses will help with operational improvements for sending text messages in future cycles.

[9] We only considered cases that logged into the web instrument after 5pm on the same day a text message was sent. We recognize that text messages could still have an effect if cases logged into the web instrument the morning after a text message was received, but for the purpose of this analysis, we only considered cases that logged into the web instrument on the same day a text message was sent.

3. Risks and Limitations

- Small sample sizes may limit the ability to identify statistically significant differences; therefore, we will consider and discuss meaningful differences as well.
- In the initial experimental design, text messages were meant to replace phone calls in the treatment group. Specifically, cases in the control group were supposed to receive CATI calls during the text messaging timeframe and cases in the treatment group were not. However, CATI was inadvertently suspended for both experimental groups, meaning no CATI calls were made between weeks 12 and 16. This also resulted in the control group receiving fewer overall contacts than the treatment group.
- Some aspects of text messages, such as the message content or the time of delivery, were not able to be tested as part of this experiment. Thus, this experiment is not a full assessment of the utility or possible future success of text messages in NSCG data collection.
- Cost estimates were based on the data that were available and do not consider other fixed costs such as labor, programming, developing, management, etc. Cost estimates are to be used for generalizations.

4. Results

In this section, we present the results of the experimental groups for the text message study.

4.1 Impact on Response

To measure the impact on response, we calculated the response rates before the texting period started, after the fourth text message, after the fifth text message, and the final response rates, along with the final mode distributions. We then conducted a difference-in-differences analysis to compare changes in response rates over time between the treatment and control group. Finally, we looked at whether text message reminders impacted the demographic makeup of respondents differently for certain subpopulations.

4.1.1 Response Rates and Final Mode Distributions

First, we calculated the response rates before weeks 12, 16, and 21 for both experimental groups. Our research question aimed to determine whether sending text message reminders resulted in higher response rates, so we conducted one-sided t-tests to compare the experimental groups. Table 3 shows that the group that received texts had a response rate of 66.7 percent at week 12, the week before texts were sent. This response rate was significantly higher compared to the group that did not receive texts. So, the group that received texts

already had a significantly higher response rate before the text message period began and continued to yield significantly higher response rates throughout data collection, including the final response rate. The weighted response rates, standard errors, and t-test p-values for the experimental groups are in Table 3 below.

Table 3: Weighted Response Rates

	Text Sent Response Rate (SE)	No Text Response Rate (SE)	p-value
Week 12	66.7 (0.6)	61.4 (2.8)	0.0296*
Week 16	72.7 (0.6)	67.1 (2.8)	0.0245*
Week 21	77.1 (0.6)	72.7 (2.6)	0.0466*
Final	79.6 (0.5)	75.2 (2.5)	0.0418*

Source: U.S. Census Bureau 2023 National Survey of College Graduates Text Message Experiment
*Statistically significant at the alpha = 0.10 level; t-tests are one-sided.

While the text message group showed significantly higher weighted response rates, we also calculated the unweighted response rates to account for the extremely high weights that existed in the group that did not receive texts. Looking at the unweighted response rates before weeks 12, 16, and 21, as well as the unweighted final response rates, we did not find any significant differences between the experimental groups. The graph of the unweighted collection rates also supports this finding. The unweighted response rates, standard errors, and t-test p-values for the experimental groups are in Table 4 below and the graph with the unweighted collection rates over the data collection period can be found in Appendix A.

Table 4: Unweighted Response Rates

	Text Sent Response Rate (SE)	No Text Response Rate (SE)	p-value
Week 12	64.8 (0.3)	65.1 (1.1)	0.3898
Week 16	71.4 (0.3)	70.2 (1.0)	0.1228
Week 21	76.2 (0.3)	75.7 (1.0)	0.3230
Final	78.9 (0.2)	78.5 (0.2)	0.3492

Source: U.S. Census Bureau 2023 National Survey of College Graduates Text Message Experiment
Note: t-tests are one-sided.

We also compared the final response mode distributions between the treatment and control groups. The weighted final mode distributions produced a significant chi-square test statistic; however, the unweighted final mode distributions showed no differences between the

experimental groups. The weighted and unweighted final response mode distributions are in Tables 5 and 6 below.

Table 5: Weighted Final Response Mode Distributions

Experimental Group	Mode	Frequency	Percent (SE)
Text Sent	Mobile	1,100	6.3 (0.4)
	CATI	400	2.0 (0.2)
	Web	20,000	91.7 (0.4)
No Text	Mobile	80	6.6 (1.4)
	CATI	30	5.5 (2.6)
	Web	1,500	87.9 (2.8)

Source: U.S. Census Bureau 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.0437

Table 6: Unweighted Final Response Mode Distributions

Experimental Group	Mode	Frequency	Percent (SE)
Text Sent	Mobile	1,100	5.0 (0.1)
	CATI	400	1.9 (0.1)
	Web	20,000	93.1 (0.2)
No Text	Mobile	80	5.0 (0.6)
	CATI	30	1.9 (0.3)
	Web	1,500	93.0 (0.6)

Source: U.S. Census Bureau 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.9922

4.1.2 Difference in Differences

We conducted a difference-in-differences analysis to compare changes in the weighted response rates over time between the treatment and control group. The difference-in-differences value was tested against zero. Table 7 below shows the difference-in-differences do not indicate that the text message reminders increased response rates throughout the texting period any more than the standard data collection activities. We also calculated the difference-in-differences between the week 12 response rates and the final response rates to examine the change in response rates from before the text messages were sent out to the end of data collection and found no significant difference (p-value = 0.6610).

Table 7: Difference-in-Differences of Response Rates

Experimental Group	Week 12 RR	Week 16 RR	Difference	Difference-in-Differences	p-value
Text Sent	66.7 (0.6)	72.7 (0.6)	6.0	0.3 (1.1)	0.7613
No Text	61.4 (2.8)	67.1 (2.8)	5.7		
Experimental Group	**Week 16 RR**	**Week 21 RR**	**Difference**	**Difference-in-Differences**	**p-value**
Text Sent	72.7 (0.6)	77.1 (0.6)	4.3	-1.3 (1.9)	0.4998
No Text	67.1 (2.8)	72.7 (2.6)	5.6		
Experimental Group	**Week 21 RR**	**Final RR**	**Difference**	**Difference-in-Differences**	**p-value**
Text Sent	77.1 (0.6)	79.6 (0.5)	2.5	<0.1 (0.9)	0.9550
No Text	72.7 (2.6)	75.2 (2.5)	2.5		

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Note: Estimates may not sum due to rounding; t-tests are two-sided.

4.1.3 Demographic Characteristics

Next, we looked at whether text message reminders impacted the demographic makeup of respondents differently for certain subpopulations. First, we performed weighted chi-square tests on the demographic distributions of all sample members, regardless of response status, to determine if any differences existed between the experimental groups before data collection started. We found no significant differences between the experimental groups before data collection started for almost all demographic variables; however, there was a meaningful difference of approximately four percentage points between the experimental groups for males and females. The group that received texts had a higher percentage of males than the group that did not receive texts, and the group that did not receive texts had a higher percentage of females than the group that did receive texts.

We performed the same weighted chi-square tests on the demographic distributions of respondents. After adjusting for multiple comparisons, only sex was significantly different between the experimental groups. We're reluctant to conclude this as true significant difference as there was already a meaningful difference of four percentage points between the experimental groups for males and females before any treatments were administered. Although age group and race showed no significant differences after applying the Bonferonni-adjusted alpha level, there were some meaningful differences larger than 4 percentage points between the experimental groups for these two variables. The text message group had a higher

percent of respondents aged 40-54 and 55-75 compared to the control group and the control group had a higher percent of black respondents compared to the text message group. Tables of all weighted demographic respondent distributions can be found in Appendix D.

When looking at the unweighted demographic distributions of respondents, there is further evidence of no statistically significant differences between the demographic makeup of respondents. Tables of all unweighted demographic respondent distributions can be found in Appendix E.

We were very interested to see if the text message reminders resulted in different response distributions by generation. Tables 8 and 9 below provide the weighted and unweighted distributions of respondents by age group categories for the two experimental groups. Although the weighted chi-square test indicated there was a significant difference between age groups for the experimental groups, after the Bonferroni-adjusted alpha level of 0.03, there were no comparisons that indicated a significant difference. Additionally, it does not appear the text message reminders helped increase response for the youngest age group in this experiment.

Table 8: Weighted Respondent Distributions for Age Group

	Text Sent		No Text		
Age Group	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**	**p-value**
17-39	9,300	29.4 (0.7)	650	28.2 (2.2)	0.6329
40-54	5,400	30.1 (0.7)	450	35.7 (2.7)	0.0478
55-75	6,900	40.5 (0.7)	500	36.1 (2.5)	0.0831
Total	21,500	100.0	1,600	100.0	

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.0884; t-tests are two-sided

Table 9: Unweighted Respondent Distributions for Age Group

	Text Sent		No Text		
Age Group	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**	**p-value**
17-39	9,300	43.2 (0.3)	650	42.0 (1.2)	0.3412
40-54	5,400	24.8 (0.3)	450	27.1 (1.1)	0.0456
55-75	6,900	31.9 (0.3)	500	30.8 (1.2)	0.3664

Total	21,500	100.0	1,600	100.0	

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.1218; t-tests are two-sided

4.2 Operational Follow-up Workload

In this section, we present results from Research Question 2. To determine the impact of sending text messages on the operational follow-up workload, we focused this analysis on treatment cases that were sent at least one text message. The analysis of cost includes both experimental groups, to determine if text messages lead to lower data collection costs, by reducing the number of follow-up CATI calls and mailings to nonrespondents.

4.2.1 Opt-Outs and Undeliverable Rate

We used the output from Qualtrics and found that few respondents opted out after receiving a text and there was a relatively stable undeliverable rate. Qualtrics assigns a status for each text message: 'Message Sent', 'Message Failed', or 'Message Soft Bounce'. For this analysis, we combined 'Message Failed' and 'Message Soft Bounce' for the undeliverable rate. Table 10 provides the percent that opted out and the percent undelivered after each text message.

Table 10: Opt-out Rates and Undeliverable Rates

Date Text Message Sent	Number of Texts Sent	Number Opted Out	Percent Opted Out	Number Undelivered	Percent Undelivered
8/17/2023	8,500	200	2.1%	400	5.0%
8/24/2023	7,700	100	1.5%	300	4.0%
8/31/2023	7,300	100	1.5%	400	5.4%
9/7/2023	7,000	100	1.6%	300	4.3%
10/10/2023	5,700	60	1.1%	250	4.3%

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment

Additionally, we investigated whether cases that opted out of receiving text messages ultimately responded to the NSCG. Table 11 shows that out of the sample cases who opted out after receiving the text messages, approximately 21.7 percent ultimately responded to the survey, while out of the sample cases who never opted out, approximately 37.6 percent responded. After testing this difference against zero, this was a significant difference. Cases that did opt out of receiving text messages responded at a lower rate.

Table 11: Proportion of Respondents that Did and Did Not Opt-Out

Opted Out	Sample Size	Number of Respondents	Percent (SE)	p-value
Yes	600	150	21.7 (1.7)	<0.0001*
No	7,900	3,000	37.6 (0.5)	

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
*Statistically significant at the alpha = 0.1 level; t-test is two sided.

4.2.2 Web Instrument Logins

We used the web survey paradata to calculate the proportion of cases that logged into the web instrument after the text message was sent on that day and found that only a small percentage of cases did so.

Table 12: Proportion of Cases That Logged into the Web Instrument

Date of Text	Number of Texts Sent	Number of Web Logins after 5pm	Percent
8/17/2023	8,500	250	2.7
8/24/2023	7,700	90	1.1
8/31/2023	7,300	70	0.9
9/7/2023	7,000	60	0.9
10/10/2023	5,700	50	0.9

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment

4.2.3 Cost

Finally, we calculated the average cost savings per case using the average number of phone calls and the average number of mailings for each group. We limited this analysis to cases that had not responded by the time the first text was sent out on August 17th.

Table 13 shows that the average CATI cost per case was $13.83 for the text message group and $14.59 for the control group. The control group, the group that did not receive texts, needed a higher average number of calls per case and thus cost $0.75 more per case to conduct CATI operations.

Table 13: Average Cost of CATI Call Per Case

Experimental Group	Sample Size	Average Number of Phone Calls	Average Cost Per Case	Difference Between Average Cost Per Case
Text Sent	8,900	2.69	$13.83	$0.75
No Text	650	2.84	$14.59	

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Note: A CATI call attempt cost $5.14 per call

For the estimated cost of mailings, we did not include any mailings that were sent before the texting period began. The old cohort received the week 18 mailing and the week 23 mailing, which cost $7.40 and $0.78 per mailing, respectively. The week 18 mailing included a paper questionnaire while the week 23 mailing only included a letter. Table 14 shows that for the week 18 mailing, the group that did not receive texts cost $0.49 more per case. For the week 23 mailing, the group that did not receive texts cost $0.02 more per case. If we were to estimate the total cost of administering each mailing to all sample cases that hadn't responded by the start of the text messaging period, there is an estimated cost savings for the group that received the texts of $4,651.03 for the week 18 mailing, and an estimated cost savings of $200.47 for the week 23 mailing.

Table 14: Average Cost of Mailing and Estimated Total Cost of Mailings for Weeks 18 and 23

	Week 18		Week 23	
	Text Sent	**No Text**	**Text Sent**	**No Text**
Sample Size	8,900	650	8,900	650
Number of Mailings	6,400	500	5,800	450
Average Cost Per Case	$5.32	$5.81	$0.51	$0.53
Difference Between Average Cost	$0.49		$0.02	
Estimated Total Cost of Mailing	$50,616.05	$55,267.07	$4,807.79	$5,008.25
Difference Between Total Cost of Mailing	$4,651.03		$200.47	

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Note: The week 18 mailing cost $7.40 per mailing. The week 23 mailing cost $0.78 per mailing.

It appears there could be a cost savings with sending text message reminders, especially in later mailings of the paper questionnaire. When we transition into the Data Ingest for the Collection Enterprise (DICE) system in the future, costs could change significantly. The DICE Web Standards Team is updating the Design Guidelines for U.S. Census Bureau Text Message Notifications annually, but modifications will be incorporated into the system as needed (DICE Web Standards Team, 2024). We are monitoring how the policy will influence future text message efforts.

5. Conclusions

Due to the effect the large weights had on the weighted final response rates, we draw conclusions based on the unweighted response rate results. The unweighted results showed that the group that received text messages did not result in earlier response, or a higher final response rate. Additionally, there was no incremental change in response following each text. The unweighted demographic makeup of respondents showed that texting did not have an effect for any groups of interest, including the younger generation.

We found that the texting operation had a relatively low impact on follow-up workload. We saw a low undeliverable rate and a low opt-out rate; this low opt-out rate is encouraging because it suggests that even after multiple text messages, we were not frustrating people or doing any harm. In fact, some cases still responded after opting out, suggesting they did not want to receive additional text messages, but were not put off by the operation. Using the cost data available for this analysis, there was evidence of a modest cost savings from mailing fewer Week 18 paper questionnaires to the text message experiment group, despite the low impact of text messaging on the follow-up workload.

We note that the first text message was not sent until three months of data collection had elapsed because the original goal was to use texting to replace CATI calls. If there is interest in broadening the goals of text messaging, especially now that CATI operations might not be part of future NSCG data collection, more experimentation of texting would be beneficial. For instance, texting before the first paper questionnaire was sent could reduce the universe of a costly paper questionnaire mailing.

For future research, we could experiment with the timing of when text messages are sent, or the content of the message. We found that only a small percentage of cases logged into the web instrument the same day a text was sent, after 5pm. Recent research showed that texts sent earlier in the day can lead to higher response (Nichols, Feuer, Olmsted-Hawala & Gliozzi, 2024). Additionally, variations on the wording of a text message could be tested, as well as how frequently to send them.

6. References

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Appendix A: Response Rates

We calculated the overall weighted response rates[10] using Equation 1:

Equation 1: Weighted Response Rate

$$\text{Response Rate} = \frac{ER}{(ER+ENR)+e(UE)}$$ where,

ER: Eligible Respondent
ENR: Eligible Nonrespondent
e: Estimated proportion of cases with unknown eligibility (UE) expected to be eligible.

The proportion of cases with unknown eligibility expected to be eligible (*e*) will be estimated using the following equation:

$$e = \frac{ER+ENR}{ER+ENR+IE}$$

where, IE (Ineligible cases) are cases that were eligible for the initial NSCG mailing but, after responding, were deemed ineligible for the survey.

This weighted response rate used eligible respondents in the numerator (final disposition codes between 50 and 54 in Error: Reference source not found). The denominator also included eligible respondents as well as eligible nonrespondents (final disposition greater than or equal to 94 in Error: Reference source not found) and an estimate of the proportion of unknown eligibility cases expected to be eligible (cases classified with unknown eligibility are final disposition codes between 80 and 89 in Error: Reference source not found). This proportion was estimated using the sum of respondents and nonrespondents divided by the sum of all sampled persons (including those deemed ineligible with final disposition codes between 60 and 79 in Error: Reference source not found) then multiplied by the sum of unknown eligibility.

We calculated the unweighted response rates using Equation 2:

Equation 2: Unweighted Response Rate

[10] We used experimental base weights from the appropriate weight file.

Response Rate = $\frac{ER}{Total\,Sample}$

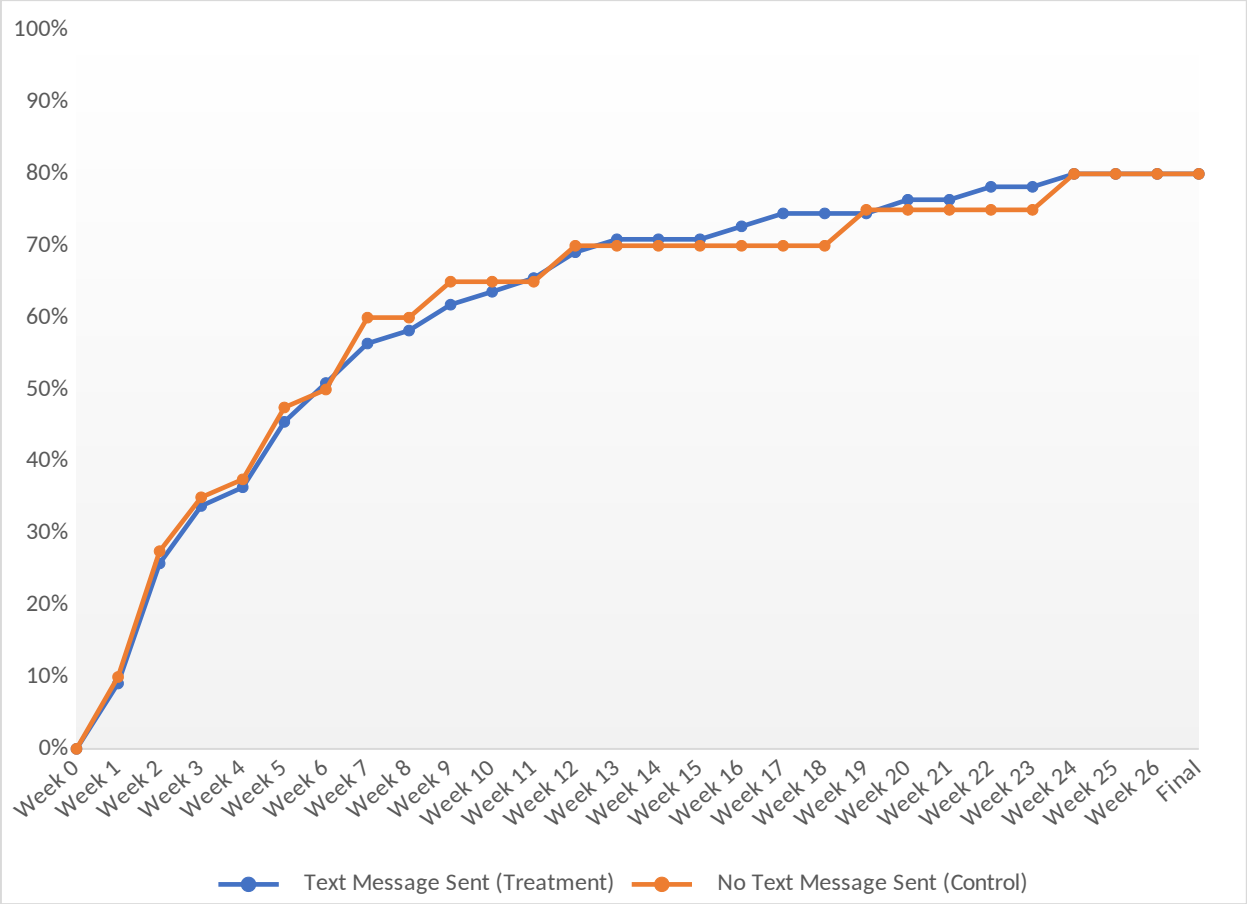
The unweighted response rate does not take into account unknown eligibility or ineligibles. These cases are considered nonrespondents.

Table 15: Disposition Codes for Eligible and Ineligible Respondents

Status	Disposition Code	Description
Eligible Respondents	50	Eligible complete – mail
	51	Eligible complete – CATI
	52	Eligible complete – web
	54	Eligible complete – TQA incoming call interview via CATI
Ineligibles	60	Emigrant – mail
	61	Emigrant – CATI
	62	Emigrant – web
	64	Emigrant – incomplete (TQA / locating / correspondence)
	65	Temporarily institutionalized
	67	Terminally ill / permanently institutionalized
	68	Over 75 years old
	69	Deceased
	70	Degree ineligible – no baccalaureate or higher degree earned
	71	Frame ineligible – earliest degree earned after ACS interview year
	78	Duplicate
	79	Other confirmed ineligible
Unknown Eligibility	80	Unable to locate
	81	SPV failure – wrong sampled person (FINAL)
	82	Language / hearing barrier
	83	Noncontact – eligibility unknown
	84	Temporarily ill / absent and unable to confirm eligibility
	85	Final refusal and unable to confirm eligibility
	86	Congressional refusal and unable to confirm eligibility
	87	Unable to confirm eligibility and/or confirm reached correct SP
	89	Other nonresponse and unable to confirm eligibility
Eligible Nonrespondents	94	Eligible and temporarily ill / absent
	95	Eligible and final refusal -- CATI
	96	Eligible and congressional refusal
	97	Eligible and missing critical complete items
	99	Other confirmed eligible nonresponse

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment

Figure 1.Unweighted Cumulative Completion Rates



Appendix B: Minimum Detectable Differences Equation and Definitions

To calculate the minimum detectable difference between two response rates with fixed sample sizes, we used the formula from Snedecor and Cochran (1989) for determining the sample size when comparing two proportions.

$$\delta \geq \left(\left(Z_{\alpha^*/2} + Z_{\beta} \right)^2 \left(\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2} \right) D \right)^{1/2}$$

where:

- δ = minimum detectible difference
- α^* = alpha level adjusted for multiple comparisons
- $Z_{\alpha^*/2}$ = critical value for set alpha level assuming a two-sided test
- Z_{β} = critical value for set beta level
- p_1 = proportion for group 1
- p_2 = proportion for group 2
- D = design effect due to unequal weighting
- n_1 = sample size for a single treatment group or control
- n_2 = sample size for a second treatment group or control

The alpha level of 0.10 will be used in the calculations. The beta level was included in the formula to inflate the sample size to decrease the probability of committing a type II error. The beta level was set to 0.10.

Appendix C: Demographic Variables

Table 16: Demographic Variables			
Variable	**Range**	**Type**	**Description**
Age group	1-3	Categorical, ordinal	1=17 to 39 2=40 to 54 3=55-75
Race	1-4	Categorical, nominal	1=White 4=AIAN or NHPI 2=Black 3=Asian
Highest Degree	1-3	Categorical, ordinal	1= Bachelor's or professional degree 2= Master's degree 3= Doctorate degree
Science and engineering status	1,2	Categorical, binary	1 = S&E degree or S&E occupation 2 = no S&E degrees nor S&E occupation
Citizen status at birth flag	1,2	Categorical, binary	1=U.S. citizen at birth 2=Not a U.S. citizen at birth
Disability status	1,2	Categorical, binary	1 = at least moderate difficulty in at least one functional activity area 2 = no more than slight difficulty in any functional activity area
Hispanic origin flag	1,2	Categorical, binary	1= Hispanic 2= Not Hispanic
Broad occupation group	18 categ.	Categorical, nominal	11 = mathematical scientists 12 = computer and information scientists 20 = life scientists 30 = physical scientists 40 = social scientists, except psychologists 41 = psychologists 50 = engineers 61 = S&E-related health occupations 62 = S&E-related non-health occupations 71 = postsecondary teacher in an S&E field 72 = postsecondary teacher in a non-S&E field 73 = secondary teacher in an S&E field 74 = secondary teacher in a non-S&E field 81 = non-S&E high interest occupation, S&E FOD 82 = non-S&E low interest occupation, non-S&E FOD 83 = non-S&E occupation, non-S&E FOD

Table 16: Demographic Variables			
Variable	**Range**	**Type**	**Description**
			91 = not working, S&E FOD or S&E previous occupation 92 = not working, non-S&E FOD and non-S&E previous occupation or never worked
Young graduate oversample group eligibility indicator	1,2	Categorical, binary	1 = S&E case that has earned a bachelor's or master's degree in the last five years 2 = non-S&E case or S&E case that has not earned a bachelor's or master's degree in the last five years
Sex	1,2	Categorical, binary	1=Male 2=Female
Work status	1,2,3	Categorical, nominal	1=Employed 2=Unemployed 3=Not in the labor force

Appendix D: Weighted Demographic Respondent Distributions[11]

Table 17: Weighted Respondent Distributions for Race

	Text Sent		No Text		
Race	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**	**p-value**
White	15,000	80.2 (0.5)	1,100	76.5 (2.8)	0.1960
Black	1,800	8.4 (0.4)	150	13.2 (2.9)	0.0966
Asian	4,000	9.0 (0.3)	300	8.2 (1.1)	0.5146
AIAN/NHPI	650	2.4 (0.3)	50	2.1 (0.8)	0.6868
Total	21,500	100.0	1,600	100.0	

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment

Chi-square p-value = 0.0848

Note: Bonferroni-adjusted alpha level = 0.025 for multiple comparisons

Table 18: Weighted Respondent Distributions for Sex

	Text Sent		No Text		
Sex	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**	**p-value**
Male	12,500	48.6 (0.6)	900	41.9 (2.8)	0.0191*
Female	9,300	51.4 (0.6)	700	58.1 (2.8)	0.0191*
Total	21,500	100.0	1,600	100.0	

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment

Chi-square p-value = 0.0176

*Statistically significant at the Bonferroni-adjusted alpha = 0.05 level

Table 19: Weighted Respondent Distributions for Citizenship Status

[11] Due to rounding rules for reporting data, distributions may not always add to reported total.

	Text Sent		No Text	
Citizenship Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Born in the U.S., Puerto Rico, etc. or born abroad of a U.S. Citizen parent	16,000	86.7 (0.4)	1,200	85.2 (2.3)
Naturalized or not a U.S. Citizen	5,400	13.3 (0.4)	400	14.8 (2.3)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.5068

Table 20: Weighted Respondent Distributions for Disability Status

	Text Sent		No Text	
Disability Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
At least moderate difficulty in one functional activity area	1,400	5.7 (0.3)	100	4.7 (1.0)
No more than a slight difficulty in any functional activity area	20,000	94.3 (0.3)	1,500	95.3 (1.0)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.3570

Table 21: Weighted Respondent Distributions for Highest Degree

	Text Sent		No Text	
Highest Degree	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Bachelor's or professional degree	11,000	65.0 (0.6)	800	65.8 (2.3)
Master's degree	8,200	30.1 (0.6)	600	29.1 (2.2)
Doctorate degree	2,600	4.9 (0.2)	200	5.0 (0.8)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.8890

Table 22: Weighted Respondent Distributions for Hispanic Origin

	Text Sent		No Text	
Hispanic Origin	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Hispanic	2,500	9.4 (0.4)	200	9.4 (1.6)
Not Hispanic	19,000	90.6 (0.4)	1,400	90.6 (1.6)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.9648

Table 23: Weighted Respondent Distributions for Broad Occupation Category

	Text Sent		No Text	
Occupation Category	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Mathematical scientists	400	0.5 (0.1)	30	0.5 (0.2)
Computer and information sciences	2,000	6.0 (0.3)	150	4.5 (0.6)
Life scientists	950	1.3 (0.1)	70	1.2 (0.3)
Physical scientists	600	0.7 (0.1)	30	0.4 (0.1)
Social scientists, except psychologists	450	0.6 (0.1)	30	0.3 (0.1)
Psychologists	250	0.4 (<0.1)	<15	D
Engineers	2,200	2.4 (0.1)	150	3.0 (0.5)
S&E-related health occupations	1,300	8.6 (0.4)	90	11.2 (2.9)
S&E-related non-health occupations	1,300	3.4 (0.2)	100	3.1 (0.6)
Postsecondary teacher in an S&E field	750	1.3 (0.1)	60	1.0 (0.2)
Postsecondary teacher in a non-S&E field	350	0.9 (0.1)	30	0.9 (0.3)

	Text Sent		No Text	
Occupation Category	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Secondary teacher in an S&E field	600	1.4 (0.1)	50	1.8 (0.6)
Secondary teacher in a non-S&E field	250	1.5 (0.2)	<15	D
Non-S&E high interest occupation, S&E FOD	3,500	12.5 (0.4)	250	12.5 (1.4)
Non-S&E low interest occupation, non-S&E FOD	1,400	6.6 (0.4)	100	4.5 (0.8)
Non-S&E occupation, non-S&E FOD	1,900	28.0 (0.7)	150	27.0 (2.5)
Not working, S&E FOD or S&E previous occupation	2,800	13.3 (0.4)	200	13.9 (1.5)
Not working, non-S&E FOD and non-S&E previous occupation or never worked	650	10.7 (0.5)	40	12.9 (2.3)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.2758

Table 24: Weighted Respondent Distributions for Oversample Indicator

	Text Sent		No Text	
Oversample Indicator	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
S&E case that has earned a bachelor's or master's degree in the last five years	1,500	5.7 (0.3)	100	7.1 (2.8)
Non-S&E case, or S&E case that has not earned a bachelor's or master's degree in the last five years	20,000	94.3 (0.3)	1,500	92.9 (2.8)

Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.5854

Table 25: Weighted Respondent Distributions for Science & Engineering Status

	Text Sent		No Text	
S&E Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
S&E degree or occupation	18,500	58.7 (0.7)	1,400	57.8 (3.0)
No S&E degrees or S&E occupation	3,000	41.3 (0.7)	200	42.2 (3.0)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.7807

Table 26: Weighted Respondent Distributions for Work Status

	Text Sent		No Text	
Work Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Employed	19,000	80.6 (0.6)	1,400	80.5 (2.2)
Unemployed	400	3.1 (0.3)	40	2.3 (0.8)
Not in the labor force	2,000	16.3 (0.5)	150	17.2 (2.1)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.6611

Appendix E: Unweighted Demographic Respondent Distributions

Table 27: Unweighted Respondent Distributions for Race

	Text Sent		No Text	
Race	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
White	15,000	70.2 (0.3)	1,100	70.6 (1.2)
Black	1,800	8.3 (0.2)	150	8.3 (0.7)
Asian	4,000	18.6 (0.3)	300	17.8 (1.0)
AIAN/NHPI	650	3.0 (0.1)	50	3.4 (0.4)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.6858

Table 28: Unweighted Respondent Distributions for Sex

	Text Sent		No Text	
Sex	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Male	12,500	56.8 (0.3)	900	56.6 (1.3)
Female	9,300	43.2 (0.3)	700	43.4 (1.3)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.8757

Table 29: Unweighted Respondent Distributions for Citizenship Status

	Text Sent		No Text	
Citizenship Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Born in the U.S., Puerto Rico, etc. or born abroad of a U.S. Citizen parent	16,000	75.1 (0.3)	1,200	74.6 (1.1)
Naturalized or not a U.S. Citizen	5,400	24.9 (0.3)	400	25.4 (1.1)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.7088

Table 30: Unweighted Respondent Distributions for Disability Status

	Text Sent		No Text	
Disability Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
At least moderate difficulty in one functional activity area	1,400	6.4 (0.2)	100	6.6 (0.6)
No more than a slight difficulty in any functional activity area	20,000	93.6 (0.2)	1,500	93.4 (0.6)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.7320

Table 31: Unweighted Respondent Distributions for Highest Degree

	Text Sent		No Text	
Highest Degree	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Bachelor's or professional degree	11,000	50.2 (0.3)	800	50.5 (1.3)
Master's degree	8,200	37.9 (0.3)	600	37.9 (1.2)
Doctorate degree	2,600	12.0 (0.2)	200	11.6 (0.8)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.9067

Table 32: Unweighted Respondent Distributions for Hispanic Origin

	Text Sent		No Text	
Hispanic Origin	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Hispanic	2,500	11.4 (0.2)	200	11.2 (0.8)
Not Hispanic	19,000	88.6 (0.2)	1,400	88.8 (0.8)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.8371

Table 33: Unweighted Respondent Distributions for Broad Occupation Category

	Text Sent		No Text	
Occupation Category	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Mathematical scientists	400	1.8 (0.1)	30	1.7 (0.3)
Computer and information sciences	2,000	9.2 (0.2)	150	9.2 (0.7)
Life scientists	950	4.4 (0.1)	70	4.5 (0.5)
Physical scientists	600	2.7 (0.1)	30	2.2 (0.4)

	Text Sent		No Text	
Occupation Category	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Social scientists, except psychologists	450	2.1 (0.1)	30	2.0 (0.4)
Psychologists	250	1.1 (0.1)	<15	D
Engineers	2,200	10.4 (0.2)	150	10.9 (0.8)
S&E-related health occupations	1,300	5.9 (0.2)	90	5.7 (0.6)
S&E-related non-health occupations	1,300	6.2 (0.2)	100	6.6 (0.6)
Postsecondary teacher in an S&E field	750	3.4 (0.1)	60	3.7 (0.5)
Postsecondary teacher in a non-S&E field	350	1.5 (0.1)	30	1.7 (0.3)
Secondary teacher in an S&E field	600	2.7 (0.1)	50	2.9 (0.4)
Secondary teacher in a non-S&E field	250	1.1 (0.1)	<15	D
Non-S&E high interest occupation, S&E FOD	3,500	16.4 (0.3)	250	16.8 (0.9)
Non-S&E low interest occupation, non-S&E FOD	1,400	6.6 (0.2)	100	6.1 (0.6)
Non-S&E occupation, non-S&E FOD	1,900	8.8 (0.2)	150	8.4 (0.7)
Not working, S&E FOD or S&E previous occupation	2,800	12.9 (0.2)	200	13.2 (0.9)
Not working, non-S&E FOD and non-S&E previous occupation or never worked	650	2.9 (0.1)	40	2.8 (0.4)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.9542

Table 34: Unweighted Respondent Distributions for Oversample Indicator

	Text Sent		No Text	
Oversample Indicator	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
S&E case that has earned a bachelor's or master's degree in the last five years	1,500	7.1 (0.2)	100	6.6 (0.6)
Non-S&E case, or S&E case that has not earned a bachelor's or master's degree in the last five years	20,000	92.9 (0.2)	1,500	93.4 (0.6)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.4437

Table 35: Unweighted Respondent Distributions for Science & Engineering Status

	Text Sent		No Text	
S&E Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
S&E degree or occupation	18,500	86.3 (0.2)	1,400	86.5 (0.9)
No S&E degrees or S&E occupation	3,000	13.7 (0.2)	200	13.5 (0.9)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.8777

Table 36: Unweighted Respondent Distributions for Work Status

	Text Sent		No Text	
Work Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Employed	19,000	89.0 (0.2)	1,400	89.5 (0.8)

	Text Sent		No Text	
Work Status	**Frequency**	**Percent (SE)**	**Frequency**	**Percent (SE)**
Unemployed	400	1.9 (0.1)	40	2.3 (0.4)
Not in the labor force	2,000	9.1 (0.2)	150	8.2 (0.7)
Total	21,500	100.0	1,600	100.0

Source: U.S. Census Bureau, 2023 National Survey of College Graduates Text Message Experiment
Chi-square p-value = 0.3403