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MEMORANDUM FOR ACS Research and Evaluation Workgroup

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Subject: 2021 ACS Initial Mailing Pressure Seal Test

Attached is the final American Community Survey (ACS) Research and Evaluation report entitled, 2021 ACS Initial Mailing Pressure Seal Test. This report evaluates the effect of using a pressure seal letter for the first mailing in the ACS mail contact materials instead of an initial mail package. It also evaluates the effect of notifying households that a paper questionnaire will be mailed at a later date.

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2021 ACS Initial Mailing Pressure Seal Test

FINAL REPORT

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EXECUTIVE SUMMARY

From March 2020 to April 2021, the mail contact strategy for the American Community Survey (ACS) was disrupted by the coronavirus (COVID-19) pandemic. To mitigate the interruption in operations and staffing constraints, the ACS program decided to reduce the number of mailings (from five to two and then later three) and change the types of mailings sent to households. The initial mail package was changed to a pressure seal letter for some panels, and a subsample of nonresponding housing units were not sent a paper questionnaire package.

There were some concerns about how effective the pressure seal letter would be compared to the typical initial mail package, but the panels that used the pressure seal letter had a nominally higher number of returns compared to the panels which used the initial mail package. This comparison, however, was confounded by the 2020 Census communications and changes to the ACS mail contact strategy.

Therefore, we created the Initial Mailing Pressure Seal (IMPS) Test to determine the effectiveness of using a pressure seal letter in the first mailing during typical ACS contact strategy conditions. The IMPS Test had five treatments: one control and four experimental. The control and Treatment 1 had initial mail packages for the first mailing, and Treatments 2-4 had pressure seal letters. We also tested the effect of removing or de-emphasizing the paper questionnaire reference; Treatments 1 and 3 had the reference removed, Treatment 2 had the standard questionnaire reference, and Treatment 4 had a de-emphasized reference.

When combining treatments, the pooled pressure seal letter treatments had higher return rates than the pooled initial mail package treatments for total self-response and internet returns prior to the paper questionnaire mailing. Similarly, the pooled treatments without a paper questionnaire reference had higher return rates than the pooled treatments with a questionnaire reference for total self-response and internet returns prior to the paper questionnaire mailing.

When compared to Treatment 4 (the de-emphasized paper questionnaire reference), Treatment 3 had higher internet and self-response return rates prior to the paper questionnaire mailing. There were no differences in return rates between Treatment 4 and Treatment 2. There were no statistically significant differences between the final response rates of any of the experimental treatments and the control; however, Treatments 1, 3, and 4 (the treatments where the paper questionnaire reference was either removed or de-emphasized) had higher internet response.

Based on preliminary results, the ACS program decided in August 2021 to change the first mailing to a pressure seal letter and use a de-emphasized paper questionnaire reference starting in the January 2022 panel. This decision is projected to cut annual costs to the ACS program by \$6.8 million.

We also tested the effect of removing the signature of the Census Bureau director from the initial mailing letter. Due to the timing of the printing of ACS production materials and the retiring of the Census Bureau director, the initial mail package for ACS production had the director’s signature but the initial mailings for this test did not. We compared self-response return rates from the control treatment to those from production, and did not find any differences in total self-response.

1. INTRODUCTION

Beginning in March 2020, the U.S. Census Bureau’s National Processing Center (NPC) operations were impacted by the coronavirus (COVID-19) pandemic. The NPC did not send any American Community Survey (ACS) mailings from mid-March through June 2020.¹

In late June, staffing levels at the NPC were sufficient to resume ACS mailings. However, because of the interruption in operations and continued staffing constraints, it was necessary to reduce the number of ACS mailings. In addition to the staffing shortages, there was a shortage of pre-assembled mail packages for the remainder of the calendar year.² From July 2020 to September 2020, a subsample of the nonresponding housing units were sent a paper questionnaire package and the remaining were sent a pressure seal reminder letter. In addition, the Census Bureau decided to use two types of initial mailings – an initial mail package (used in the normal mailout strategy) or a pressure seal letter. A given panel would use one or the other (not both). We created the new pressure seal letter by combining content from the initial mail package and reminder letter and by modifying that content to fit the new format and mailout strategy. For example, because not all nonrespondents would get a paper questionnaire package, the paper questionnaire reference was not included on the pressure seal letter used in 2020. In January, February, and March of 2021 the pressure seal letter did mention the paper questionnaire because it was sent to all nonresponding housing units. We returned to a five-mailing contact strategy (using the initial mail package for the first mailing) in April of 2021.

Initially, there were some concerns about how effective the pressure seal letter would be compared to the typical initial mail package. Intuitively, it seems that a larger initial mail package would be more noticeable than a pressure seal letter. Thus, we anticipated a decrease in response with the smaller mailing. Previous testing showed no significant difference in the self-response rates when comparing a pressure seal letter to a letter in a business envelope for reminders (Risley et al., 2017) but testing did not replace the initial mail package with a pressure seal letter.

Surprisingly, data from the panels that used the pressure seal letter showed a nominally higher number of returns compared to the panels which used the initial mail package. However, there are several factors that confound this comparison. Differences observed between panels may have been due to the difference in the mail type, but could also be a consequence of mailings sent for the 2020 Census or other 2020 Census communications or differences in respondent behavior due to the pandemic. Additionally, comparisons were limited due to wording differences in the mailings (e.g., the 2020 pressure seal letter did not reference a paper

¹ The April, May, and June 2020 panels did not receive any mail contacts. The March panel were sent some but not all mail materials.

² Pre-assembled mail packages include the initial mail package and the paper questionnaire package.

questionnaire, but the 2020 initial mail packages did).³ Also, it was unclear if the pressure seal letter would perform well once the ACS mailing strategy returned to five mailings.

Therefore, we created the Initial Mailing Pressure Seal (IMPS) Test to determine the effectiveness of using a pressure seal letter in the first mailing during normal ACS contact strategy conditions. The purpose of this test was to determine if using a pressure seal letter for the initial mailing resulted in higher (or at least not statistically lower) response rates in a situation where we could control for some of the possible confounding factors such as wording differences, the reduced number of mailings, and the effect of 2020 Census communications. If the response rates using the pressure seal letter were not significantly lower than response rates using the initial mail package, then it would be cost effective to change the ACS contact strategy because a pressure seal letter is cheaper than an initial mail package.

2. BACKGROUND

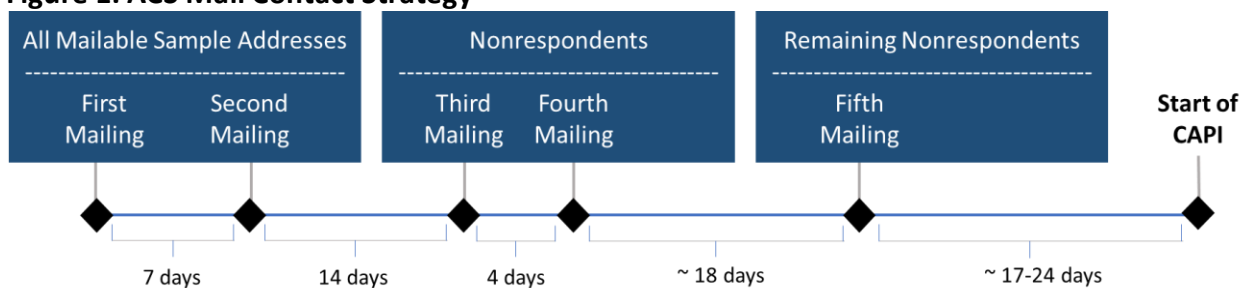
This section presents information on:

1. the typical ACS data collection strategy
2. the 2020 ACS data collection strategy before the COVID-19 pandemic
3. the 2020 ACS data collection strategy during the COVID-19 pandemic

2.1 Typical ACS Data Collection Strategy

The typical ACS data collection strategy begins with the self-response phase, in which we send up to five mailings encouraging recipients to respond via the internet or mail. Figure 1 outlines the normal ACS mail contact strategy.

Figure 1. ACS Mail Contact Strategy



The first two mailings are sent to all mailable addresses in the monthly sample. In this strategy, the first mailing is a package that includes a letter, a multilingual brochure, and a card with instructions on how to respond via the internet. The letter contains an invitation to participate in the ACS online and more information in a *frequently asked questions* (FAQs) format on the

³ Because the initial mail package materials are pre-printed, it was not feasible to remove the paper questionnaire reference.

back of the letter. The letter also provides the Telephone Questionnaire Assistance (TQA) phone number if anyone at the address has any questions. A week later, the same addresses are sent a second mailing (reminder letter as a pressure seal letter).

Responding addresses are removed from the address file after the second mailing and are not sent any follow-up mailings. The remaining addresses make up a new mailing universe that are sent the third and fourth mailings.⁴ The third mailing is a package that includes a letter, a paper questionnaire, and a business reply envelope. Four days later, these addresses are sent a fourth mailing (reminder postcard) which encourages them to respond. After the fourth mailing, responding addresses are again removed from the address file to create a new mailing universe of nonrespondents. The remaining sample addresses are sent the fifth mailing (a more urgent final reminder letter with a due date in a pressure seal letter).

Two to three weeks later, responding addresses are removed, and undeliverable and undeliverable addresses (from the initial sample) are added back to create the universe of addresses eligible for the Computer-Assisted Personal Interview (CAPI) nonresponse followup operation.⁵ Of this universe, a subsample is chosen to be included in the CAPI operation. Field representatives attempt to call to interview those selected for CAPI by phone. If they cannot reach them by phone, or do not have a phone number, they visit the addresses to conduct in-person interviews. Additional information can be found in the ACS Design and Methodology Report (U.S. Census Bureau, 2022).

2.2 2020 ACS Data Collection Strategy Before the COVID-19 Pandemic

The data collection strategy for 2020 was not expected to change in terms of the number and types of mailings. However, the language of some of the materials was changed to address potential respondent confusion between the ACS and the 2020 Census.

Table 1 outlines the changes that were made to help distinguish the ACS from the 2020 Census. There were no changes made to the first mailing instruction card and multilingual brochure, third mailing questionnaire and return envelope, the fourth mailing, or the interior of the fifth mailing. Some of the language distinguishing the 2020 Census from the ACS was used in mailings created during the pandemic, as described in Section 2.3.

⁴ Addresses deemed “undeliverable as addressed” (UAA) by the United States Postal Service (USPS) are also removed from the address files for subsequent mailings.

⁵ CAPI interviews start at the beginning of the month following the fifth mailing.

Table 1. Differences Between the Normal ACS Materials and ACS Materials During the 2020 Census

Mailing	Mail Material	What Was Changed	Specific Wording Differences
First Mailing	Envelope	Form number is different to help with processing	
	Letter	2020 Census text (front of letter)	Added text: “The American Community Survey is not the 2020 Census. This survey asks questions about topics not on the 2020 Census, such as veteran status, transportation, and internet access.”
		2020 Census FAQs included (back of letter)	Added two additional FAQs about the 2020 Census
Second Mailing	Exterior of Pressure Seal Letter	Mentions the ACS on the exterior	Added text: U.S. Census Bureau American Community Survey
	Interior of Pressure Seal Letter	2020 Census text included	Added text: “Some households, including yours, will receive both the American Community Survey and the 2020 Census this year.”
Third Mailing	Envelope	Form number is different to help with processing	
	Letter	2020 Census text (front of letter)	Added text: “This year, the Census Bureau is also conducting the 2020 Census. The American Community Survey is different from the 2020 Census.”
		2020 Census FAQs included (back of letter)	Also changed “Your response to this survey is required by law” to “Your response to the American Community Survey is required by law”. Added two additional FAQs about the 2020 Census
Fifth Mailing	Exterior of Pressure Seal Letter	Mentions the ACS on the exterior	Added text: U.S. Census Bureau American Community Survey

2.3 2020 ACS Data Collection Strategy During the COVID-19 Pandemic

Due to the temporary shutdown of operations at the NPC between mid-March and June, the housing units in the March 2020 panel were sent some ACS mailings (the first three mailings in Table 1) and the April, May, and June 2020 panels were not sent any ACS mailings. Once NPC operations resumed, the mailing contact strategy for July 2020 through the beginning of 2021 was changed from five mailings to two or three mailings due to continued staffing constraints. July through September panels were sent two mailings, while the October panel and subsequent months received three mailings. We were able to return to five mailings in April of 2021.

In addition to the reduction in the number of mailings, the type of mailing sent to each panel varied due to supply and staffing shortages. Depending on the panel, the first mailing was either an initial mail package or a pressure seal letter. We combined content from the first and second 2020 ACS mailing materials to create the new initial pressure seal letter. We modified some of the content to fit a pressure seal letter, such as moving the Census Bureau address to the upper right corner and condensing the FAQs that appear on the initial mail package letter. The condensed FAQs were moved to the bottom of the pressure seal letter and are in small font. We also modified the benefits listed in the second paragraph to address potential new concerns due to the pandemic. In addition, we dropped the reference to a paper questionnaire for the 2020 panels that used the pressure seal letter.⁶ See Appendix A for images of the pressure seal letter used as the first mailing in the 2020 panels.

Since the paper questionnaire was sent to all addresses in 2021, unlike in 2020, we designed a new initial pressure seal letter to use starting January 2021 that included a reference to the paper questionnaire. The 2021 initial pressure seal letter also removed the 2020 specialized language that distinguishes the 2020 Census from the ACS. See Appendix B for images of the pressure seal letter used as the first mailing from January 2021 through March 2021 and how it differs from the one used in August 2020 and October 2020.

The second mailing varied within panel (July to September), with nonrespondents receiving either a paper questionnaire package or a reminder pressure seal letter. Table 2 outlines the mailing contact strategy from the July 2020 panel through the March 2021 panel.

⁶ For the July, August, and September panels, it was not true for every housing unit that a paper questionnaire would be sent. Due to staff shortages at NPC from the COVID-19 pandemic, around 60 percent of nonrespondents were sent a paper questionnaire. The remaining 40 percent were sent a pressure seal letter reminding them to respond online. See Table 2.

Table 2. Mail Contact Strategy July 2020 to March 2021

Panel	First Mailing	Second Mailing	Third Mailing
Jul 2020	Initial Mail Package	Paper Questionnaire Package or Pressure Seal Letter	None
Aug 2020	Pressure Seal Letter	Paper Questionnaire Package or Pressure Seal Letter	None
Sep 2020	Initial Mail Package	Paper Questionnaire Package or Pressure Seal Letter	None
Oct 2020	Pressure Seal Letter	Paper Questionnaire Package	Pressure Seal Letter
Nov 2020	Initial Mail Package	Paper Questionnaire Package	Pressure Seal Letter
Dec 2020	Initial Mail Package	Paper Questionnaire Package	Pressure Seal Letter
Jan 2021	Pressure Seal Letter	Paper Questionnaire Package	Pressure Seal Letter
Feb 2021	Pressure Seal Letter	Paper Questionnaire Package	Pressure Seal Letter
Mar 2021	Pressure Seal Letter	Paper Questionnaire Package	Pressure Seal Letter

We returned to a five-mailing contact strategy in the April 2021 panel. This strategy matched the original, or pre-pandemic, strategy as discussed in Section 2.1 (see Figure 1).

Throughout the pandemic, we monitored self-response returns by panel to examine the effect of the modified mailing strategy on ACS returns. We made graphs of the early returns (prior to the paper questionnaire package) for the July 2020 through April 2021 panels.⁷ Although no statistical testing was conducted comparing panels, we did find that the panels that used a pressure seal letter in the first mailing had nominally higher returns than panels that were sent an initial mail package. As expected, there was also a very noticeable bump in returns in the April panel after the second mailing was sent (the only panel to have two mailings sent prior to the paper questionnaire package mailing).

3. LITERATURE REVIEW

In 2014, the Census Bureau collaborated with Reingold, Inc. to research ways to improve the ACS mail materials. Focus groups and interviews were conducted in which participants were asked to rank ACS mail packages as to how likely they were to notice and open the packages. Pressure seal letters were ranked as one of the most effective. Participants saw these letters as more official (government-like) and considered them more confidential (Reingold, 2014).

Statistics Canada used pressure seal letters for the 2016 Canadian Census and also found that pressure seal letters were considered more official than a traditional envelope in the eyes of the public (Graziadei, 2016).

⁷ We cannot show the graphs because the daily returns are sensitive and for Census Bureau internal use only.

Statistics Canada found the following benefits of using pressure seal letters:

- The letters offered the ability to include personal or confidential information (e.g., login information).⁸
- The use of pressure seal letters reduced both costs and paper waste due to the elimination of a separate envelope.
- The printer had the capacity to produce 1.6 million pressure seal letters a day, increasing the efficiency of mail assembly.

In 2017, the Census Bureau conducted a field test to see if replacing some of the ACS mail materials (reminder letters and postcards – mailings 2, 4, and 5) with pressure seal letters would affect response rates. The results of that test showed that replacing the reminder letter (second mailing) with a pressure seal letter would not negatively impact self-response and would be a cost-saving change (Risley et al., 2017). That test did not, however, test replacing the initial mail package with a pressure seal letter.

4. METHODOLOGY

This section discusses the sample design, experimental design, and research questions and metrics of the 2021 IMPS Test.

4.1 Sample Design

The 2021 IMPS Test was conducted using the May 2021 ACS production sample. The monthly ACS production sample consists of approximately 290,000 housing unit addresses and is divided into 24 nationally representative groups (referred to as methods panel groups) of approximately 12,000 addresses each. There were five treatments (one control and four experimental) for this test. Each of the treatments in this test used two randomly assigned methods panel groups (approximately 24,000 mailing addresses per treatment). All remaining methods panel groups received production ACS materials. The control treatment received only slightly modified production materials (see Section 2.3), but was sorted and mailed separately from production.⁹

⁸ As opposed to a postcard.

⁹ Previous research indicates that in ACS experiments, postal procedures alone could cause a difference in response rates at a given point in time between smaller experimental treatments and larger control treatments, with response for the small treatments having a negative bias (Heimel, 2016). Thus, the treatments were structured to be of similar size, and the control was sorted and mailed separately from the rest of production cases so that the control and treatments had similar mail-delivery timing.

4.2 Experimental Design

For this test, the addresses in two of the treatments were sent an initial mail package in the first mailing and the addresses in the other three treatments were sent a pressure seal letter.

In addition to testing for the effect of using a pressure seal letter versus an initial mail package, we tested the effect of removing or de-emphasizing the paper questionnaire reference. The pressure seal letter used in the 2020 panels did not include a sentence mentioning the paper questionnaire because, due to staff shortages at NPC, not every address received the paper questionnaire package as the third mailing (see Table 2). We were interested in what kind of effect removing or de-emphasizing this reference might have.

We also tested the effect of removing the signature of the Census Bureau director from the initial mailing letter. In early 2021, the director of the Census Bureau retired. Some of the ACS production materials were printed in advance due to the time required for assembly. Therefore, the initial mail package and paper questionnaire package letters for regular production still had the director's signature on them at the time of this test. We were interested in what kind of effect removing the director's signature would have on response, and so we did not include signatures on any of the initial mailings for the five treatments. The paper questionnaire package letters had signatures, but was the same for all treatments.

Modified Control – Initial Mail Package

As mentioned in Section 2.1, the initial mail package includes a letter inviting residents of the sampled address to participate in the ACS online and stating that a paper questionnaire will be sent in a few weeks to those unable to respond online. Along with the letter, the package also contains a multilingual brochure and an instruction card. The instruction card contains the User ID, which is used when responding online. The modified control treatment closely mirrored that of production, but without a signature from the director. See Appendix C for images of all contents for the Modified Control Treatment.

Treatment 1 – Initial Mail Package without a Paper Questionnaire Reference

Treatment 1 used an initial mail package with a letter that excludes the reference to a paper questionnaire. The only difference between the contents of this treatment and the Modified Control Treatment was the removal of the paper questionnaire sentence in the letter.¹⁰ It is possible that the self-response increase we saw previously with the pressure seal letter was due to recipients being unaware of the paper response option. See Appendix D for images of the Treatment 1 letter.

¹⁰ Treatment 1 used the same envelope and contained the same multilingual brochure and instruction card as the control treatment (see Appendix C for images).

Treatment 2 – Pressure Seal Letter with a Paper Questionnaire Reference

Treatment 2 used a pressure seal letter that includes a User ID and a bolded reference to the paper questionnaire. The wording of this pressure seal letter mirrored the wording in the modified control initial mail package letter as closely as possible. However, the User ID was included in the letter. We decided not to test a pressure seal letter without the User ID included because we would never implement a pressure seal letter in production that did not include a User ID.¹¹ Additionally, FAQs that appear on the back of the initial mail package letter were condensed and included in small font on the pressure seal letter. As with all other treatments, the director’s signature was not included on the letter. See Appendix D for images of the Treatment 2 pressure seal letter.

Treatment 3 – Pressure Seal Letter without a Paper Questionnaire Reference

Treatment 3 used a pressure seal letter with the reference to a paper questionnaire removed. The only difference between the wording of this treatment and Treatment 2 was the removal of the paper questionnaire reference. Treatment 3 was the closest match to the pressure seal letter that was sent out in 2020 (see Appendix A). See Appendix D for images of the Treatment 3 pressure seal letter.

Treatment 4 – Pressure Seal Letter with a De-emphasized Paper Questionnaire Reference

Treatment 4 used a pressure seal letter that includes a reference to the paper questionnaire that is de-emphasized (un-bolded and in the middle of the paragraph). Besides the paragraph containing the paper questionnaire reference, the rest of the wording of this treatment was the same as Treatment 2 and Treatment 3. See Appendix D for images of the Treatment 4 pressure seal letter.

We conducted this test after the ACS mailing strategy returned to the five-mailing contact strategy. Having all five mailings accounts for how changes in the first mailing interact with subsequent mailings, especially the second mailing, which was not sent in the July 2020 through March 2021 panels. All of the treatments adhered to the same overall ACS mailing strategy (the number of mailings, types of mailings, and timing of mailings).

See Appendix E for a comparison of the treatments.

4.3 Research Questions

The research questions for the 2021 IMPS Test were as follows:

¹¹ All pressure seal letters included a User ID on the letter. A User ID is provided in the initial mail package on the instruction card, but is not provided on the letter itself due to how the initial mail package is pre-printed and then assembled at the NPC.

RQ1. What is the impact of using a pressure seal letter in the initial mailing on self-response return rates (overall and by mode)?

RQ2. What is the impact of removing the reference to a paper questionnaire on self-response return rates (overall and by mode)?

RQ3. What is the impact of de-emphasizing the reference to a paper questionnaire on self-response return rates (overall and by mode)?

RQ4. What is the overall impact of each of the experimental treatments on final response rates and data collection costs (overall and by mode)?

4.4 Analysis Metrics

All self-response analyses, except for the cost analysis, were weighted using the ACS base sampling weight (the inverse of the probability of selection). For the final response rates, cases in the CAPI subsample had a CAPI subsampling factor that was multiplied by the base weight, unless they were self-responses.

The sample size is able to detect differences of approximately 1.25 percentage points between the self-response return rates or response rates of the experimental treatments (with 80 percent power at $\alpha=0.1$). We used a significance level of $\alpha=0.1$ when determining significant differences between treatments.

4.4.1 Self-Response Return Rates

To determine the effect of each treatment on self-response, we calculated the self-response return rates at two points in time in the data collection cycle—before the third mailing and before the start of CAPI. Self-response return rates were calculated for total self-response combined and separately for internet, mail, and TQA responses.

The self-response return rates were calculated using the following formula:

$$\text{Self-Response Return Rate} = \frac{\text{Number of mailable and deliverable sample addresses that either provided a non-blank}^{12} \text{ return by mail or TQA, or a complete or sufficient partial}^{13} \text{ response by internet}}{\text{Total number of mailable and deliverable sample addresses}^{14}} * 100$$

The by-mode return rates were calculated using the formulas:

$$\text{Internet Response Return Rate} = \frac{\text{Number of mailable and deliverable sample addresses that provided a complete or sufficient partial}^{13} \text{ response by internet}}{\text{Total number of mailable and deliverable sample addresses}^{14}} * 100$$

$$\text{Mail Response Return Rate} = \frac{\text{Number of mailable and deliverable sample addresses that provided a non-blank}^{12} \text{ return by mail}}{\text{Total number of mailable and deliverable sample addresses}^{14}} * 100$$

$$\text{TQA Response Return Rate} = \frac{\text{Number of mailable and deliverable sample addresses that provided a return by TQA}}{\text{Total number of mailable and deliverable sample addresses}^{14}} * 100$$

If we received more than one return from an address, then the return received first was considered the response. In the rare case that we received two returns on the same day, then we chose the response in the following order: (1) mail, (2) TQA, (3) internet.

4.4.2 Final Response Rates

To determine the effect of the experimental treatments on overall response to the survey, we calculated final overall response rates and how each response mode contributes to the overall final response rate. The final response rates were calculated using the following formula:

$$\text{Final Response Rate} = \frac{\text{Number of eligible sample addresses that either provided a non-blank return}^{12} \text{ by mail or TQA, a complete or sufficient partial}^{13} \text{ response by internet, or a complete CAPI interview}}{\text{Total number of sample addresses eligible to reply to the survey and not sampled out of CAPI}} * 100$$

¹² A blank form is a form in which there are no persons with sufficient response data and there is no telephone number listed on the form.

¹³ In general, a sufficient partial internet response is one that has at least minimal information, which indicates an attempt to respond. The specific definition of a sufficient partial internet response is sensitive and for Census Bureau internal use only.

¹⁴ We remove addresses deemed to be undeliverable as addressed (UAA) by the U.S. Postal Service if no response is received.

The denominator does not include UAAs (unless the address did respond or was in the CAPI sample) and does not include addresses that are found to be a business, demolished, under construction, etc.

If we received more than one response from an address, then the response received first was considered the response. In the rare case that we received two responses on the same day, then we chose the response in the following order: (1) mail, (2) TQA, (3) internet, and (4) CAPI.

4.4.3 Standard Error of the Estimates

All return rates were weighted using the full sample base weight, which takes into account the initial probability of selection of a housing unit. Response rates and demographic distributions were weighted using subsampling-adjusted weights, which were created by multiplying the base weight by a CAPI subsampling factor (see U.S. Census Bureau, 2022, Chapter 11).

We estimated the variances of the point estimates and differences using the Successive Differences Replication (SDR) method with replicate weights – the standard method used in the ACS (see U.S. Census Bureau, 2022, Chapter 12). In calculating the return rates, we used replicate base weights created by multiplying the full sample base weight by the appropriate replicate factor. For the response rates and demographic distributions, we used replicate subsampling-adjusted weights created by multiplying the replicate base weights by the CAPI subsampling factor. We calculated the variance for each rate and for the difference between rates using the formula below:

$$\text{Var}(X_0) = \frac{4}{80} \sum_{r=1}^{80} (X_r - X_0)^2$$

where:

X_r = the estimate calculated using the r^{th} replicate

X_0 = the estimate calculated using the full sample

The standard error of the estimate (X_0) is the square root of the variance.

4.4.4 Cost Analysis

In evaluating the different experimental treatments, it is not sufficient to compare only the self-response return rates and final response rates. If one or more of the experimental treatments increases self-response, subsequent mailings and the CAPI workloads (which cost more per case to complete than self-response cases) would be smaller, thus lowering the cost of data collection operations. However, there are some instances where the data collection cost saving may not reflect the net cost impact. For example, adding a colorful brochure to the mailing

materials may increase self-response, but the costs of printing the brochure could outweigh the cost savings in reduced workloads.

Because the only changes we made were to the initial mailing, we were interested in the effect on self-response prior to determining the second mailing universe (M2). An increase in self-response before the M2 cut decreases the number of subsequent mailing pieces that need to be sent out and reduces cost.¹⁵ Calculating the return rates before the M2 cut and before the CAPI cut will give us an idea of how the experimental treatments would affect operational and mailing costs if they were implemented into a full ACS production year.

We conducted a cost analysis to estimate the costs of putting each of the treatments into production. Since the cost model uses projected workload differences to project survey costs, this part of the analysis was not weighted.

4.4.5 Additional Analysis Metrics

Prior to answering the research questions, we investigated the underlying data to ensure there were no differences between treatments in metrics that could affect the research question results. We examined the rate at which addresses were flagged by the USPS as being UAA, as return rates and response rates can be influenced by UAA rates.

Because there were significant differences between treatments in how each response mode contributed to the overall final response rate, we looked at major demographic distributions of Person 1 (who is typically the respondent) from sufficiently complete responses. We assume respondents in all of the treatments have similar demographic characteristics, but mode differences in response rates could indicate an experimental difference in the treatments.

We also examined TQA workloads during the months the test was active. Not telling recipients that a paper questionnaire will be sent in a few weeks could increase calls to TQA. Since the TQA workload is collected daily for all calls and not differentiated by panel, we cannot know for certain if a change in workload is because of a particular treatment or the test overall. However, we still examined the workload and performed nominal comparisons to historical workloads to see if there were any obvious changes during the months the test was active.

5. ASSUMPTIONS AND LIMITATIONS

5.1 Assumptions

1. A single ACS monthly sample is representative of an entire year (twelve panels) and the entire frame sample, with respect to both response rates and cost, as designed.

¹⁵ The M2 mailing universe cut occurs before sending the third mailing (paper questionnaire).

2. A single methods panel group (1/24 of the full monthly sample) is representative of the full monthly sample, as designed.
3. We assume that there is no difference between treatments in mail-delivery timing or subsequent response time. The treatments had roughly the same sample size and used the same postal sort and mailout procedures. Previous research indicated that postal procedures alone could cause a difference in response rates at a given point in time between experimental treatments of different sizes, with response for the smaller treatments lagging (Heimel, 2016).

5.2 Limitations

1. Group quarters and sample housing unit addresses from remote Alaska and Puerto Rico were not included in the sample for the test.
2. The cost analysis uses estimates to make cost projections. These estimates do not account for monthly variability in production costs such as changes in staffing, production rates, or printing price adjustments.
3. There are materials and information in the initial mail package that were not provided with the pressure seal letter (e.g., the multilingual brochure). Thus, we cannot draw separate conclusions about the effects of the mailer-type distinguished from the inclusion of extra materials.
4. Because the pressure seal letter contains a User ID on the letter, unlike the initial mail package which has the User ID on a separate instruction card, we cannot draw separate conclusions about the effects of the mailer-type distinguished from the User ID placement.

6. RESULTS

For this test we compared return rates and final response rates. Our analyses also included a cost analysis, an examination of TQA workload, a comparison of return rates for Spanish returns and within urban/rural categories, and a comparison of demographic distributions within mode.

6.1 Self-Response Return Rates

As mentioned in Section 4.4.1, we calculated the self-response return rates to determine the effect of each treatment on self-response at two points in time in the data collection cycle—before the third mailing and before the start of CAPI.

6.1.1 Research Question 1

What is the impact of using a pressure seal letter in the initial mailing on self-response return rates (overall and by mode)?

We performed three comparisons testing the effect of replacing an initial mail package with a pressure seal letter: one comparison where both treatments included a paper questionnaire reference, one comparison where neither treatment included a paper questionnaire reference, and one comparison where we pooled the treatments (some cases in the pooled treatment would have a paper questionnaire reference and some would not).

Table 3 shows the return rates for the first comparison between Modified Control and Treatment 2. Modified Control used an initial mail package with a paper questionnaire reference, and Treatment 2 used a pressure seal letter with a paper questionnaire reference.

Table 3. 2021 IMPS Return Rates: Modified Control (MC) vs Treatment 2 (T2)

Point in Data Collection	Mode	T2	MC	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	25.8 (0.3)	24.6 (0.3)	1.2 (0.4)	0.03*
	Internet	25.5 (0.3)	24.4 (0.3)	1.1 (0.4)	0.04*
	TQA	0.2 (<0.1)	0.2 (<0.1)	0.1 (<0.1)	0.26
Before CAPI	Total Self-Response	48.6 (0.4)	48.5 (0.4)	0.1 (0.5)	0.99
	Internet	37.8 (0.4)	37.4 (0.4)	0.4 (0.5)	0.99
	Mail	10.2 (0.2)	10.4 (0.2)	-0.1 (0.3)	0.99
	TQA	0.6 (0.1)	0.8 (0.1)	-0.2 (0.1)	0.17

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

Treatment 2 had higher return rates than Modified Control in the internet mode and for total self-response prior to the third mailing. The difference was no longer significant at the later time point.

Table 4 shows the return rates for the next comparison between Treatment 1 and Treatment 3. Treatment 1 used an initial mail package without a paper questionnaire reference, and Treatment 3 used a pressure seal letter without a paper questionnaire reference.

Table 4. 2021 IMPS Return Rates: Treatment 1 (T1) vs Treatment 3 (T3)

Point in Data Collection	Mode	T3	T1	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	27.3 (0.3)	26.1 (0.3)	1.2 (0.5)	0.10
	Internet	27.0 (0.3)	25.9 (0.3)	1.1 (0.5)	0.13
	TQA	0.3 (<0.1)	0.2 (<0.1)	0.1 (0.1)	0.26
Before CAPI	Total Self-Response	49.5 (0.4)	49.0 (0.4)	0.5 (0.5)	0.99
	Internet	39.8 (0.4)	38.5 (0.4)	1.3 (0.6)	0.23
	Mail	9.0 (0.2)	9.8 (0.2)	-0.8 (0.3)	0.15
	TQA	0.7 (0.1)	0.7 (0.1)	<0.1 (0.1)	0.99

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

There was no significant difference in the return rates between these two treatments at either data collection point.

Table 5 shows the return rates for the final comparison made for Research Question 1: a pooled comparison between the initial mail package and pressure seal letter. The Initial Mail Package (IMP) treatment was a combination of Modified Control and Treatment 1. The Pressure Seal Letter (PSL) treatment was a combination of Treatment 2 and Treatment 3.

Table 5. 2021 IMPS Return Rates: Initial Mail Package (IMP) vs Pressure Seal Letter (PSL)

Point in Data Collection	Mode	PSL	IMP	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	26.5 (0.3)	25.3 (0.2)	1.2 (0.3)	<0.01*
	Internet	26.3 (0.3)	25.1 (0.2)	1.1 (0.3)	<0.01*
	TQA	0.3 (<0.1)	0.2 (<0.1)	0.1 (<0.1)	0.20
Before CAPI	Total Self-Response	49.0 (0.3)	48.8 (0.3)	0.3 (0.3)	0.99
	Internet	38.8 (0.3)	37.9 (0.2)	0.8 (0.3)	0.15
	Mail	9.6 (0.1)	10.1 (0.2)	-0.5 (0.2)	0.20
	TQA	0.6 (<0.1)	0.7 (<0.1)	-0.1 (0.1)	0.64

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

The PSL treatment had higher return rates for the internet mode and for total self-response prior to the third mailing. The difference was no longer significant at the later time point.

6.1.2 Research Question 2

What is the impact of removing the reference to a paper questionnaire on self-response return rates (overall and by mode)?

We performed three comparisons testing the effect of removing the paper questionnaire reference from the initial mailing: one comparison where both treatments were an initial mail package, one comparison where both treatments were pressure seal letters, and one comparison where we pooled the treatments.

Table 6 shows the return rates for the first comparison between Modified Control and Treatment 1. Modified Control used an initial mail package with a paper questionnaire reference, and Treatment 1 used an initial mail package without a paper questionnaire reference.

Table 6. 2021 IMPS Return Rates: Modified Control (MC) vs Treatment 1 (T1)

Point in Data Collection	Mode	T1	MC	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	26.1 (0.3)	24.6 (0.3)	1.5 (0.5)	0.01*
	Internet	25.9 (0.3)	24.4 (0.3)	1.5 (0.5)	0.02*
	TQA	0.2 (<0.1)	0.2 (<0.1)	<0.1 (0.1)	0.42
Before CAPI	Total Self-Response	49.0 (0.4)	48.5 (0.4)	0.5 (0.5)	0.70
	Internet	38.5 (0.4)	37.4 (0.4)	1.1 (0.6)	0.31
	Mail	9.8 (0.2)	10.4 (0.2)	-0.6 (0.3)	0.23
	TQA	0.7 (0.1)	0.8 (0.1)	<0.1 (0.1)	0.77

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

Treatment 1 had higher return rates for the internet mode and for total self-response prior to the third mailing. This difference was no longer significant at the later time point.

Table 7 shows the return rates for the next comparison between Treatment 2 and Treatment 3. Treatment 2 used a pressure seal letter with a paper questionnaire reference, and Treatment 3 used a pressure seal letter without a paper questionnaire reference.

Table 7. 2021 IMPS Return Rates: Treatment 2 (T2) vs Treatment 3 (T3)

Point in Data Collection	Mode	T3	T2	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	27.3 (0.3)	25.8 (0.3)	1.5 (0.5)	0.01*
	Internet	27.0 (0.3)	25.5 (0.3)	1.5 (0.4)	0.01*
	TQA	0.3 (<0.1)	0.2 (<0.1)	0.1 (0.1)	0.42
Before CAPI	Total Self-Response	49.5 (0.4)	48.6 (0.4)	0.9 (0.6)	0.48
	Internet	39.8 (0.4)	37.8 (0.4)	2.0 (0.6)	<0.01*
	Mail	9.0 (0.2)	10.2 (0.2)	-1.3 (0.3)	<0.01*
	TQA	0.7 (0.1)	0.6 (0.1)	0.2 (0.1)	0.31

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

Treatment 3 had higher return rates in the internet mode and for total self-response prior to the third mailing. At the second point in time (before CAPI), Treatment 3 had higher internet return rates and lower mail return rates than Treatment 2.

Table 8 shows the return rates for the final comparison made for Research Question 2: a pooled comparison between including and not including a paper questionnaire reference. The Questionnaire Reference (YQ) treatment was a combination of Modified Control and Treatment 2. The No Questionnaire Reference (NQ) treatment was a combination of Treatment 1 and Treatment 3.

Table 8. 2021 IMPS Return Rates: Paper Questionnaire Reference (YQ) vs No Paper Questionnaire Reference (NQ)

Point in Data Collection	Mode	NQ	YQ	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	26.7 (0.2)	25.2 (0.3)	1.5 (0.3)	<0.01*
	Internet	26.4 (0.2)	25.0 (0.3)	1.5 (0.3)	<0.01*
	TQA	0.3 (<0.1)	0.2 (<0.1)	<0.1 (<0.1)	0.42
Before CAPI	Total Self-Response	49.2 (0.3)	48.6 (0.3)	0.7 (0.4)	0.31
	Internet	39.1 (0.2)	37.6 (0.3)	1.6 (0.4)	<0.01*
	Mail	9.4 (0.1)	10.3 (0.2)	-0.9 (0.2)	<0.01*
	TQA	0.7 (<0.1)	0.7 (<0.1)	0.1 (0.1)	0.70

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

The treatments without a paper questionnaire reference had higher returns rates in the internet mode and for total self-response prior to the third mailing. At the later time point

(before CAPI), the treatments without the reference had higher internet return rates and lower mail return rates than the treatments with the paper questionnaire reference.

6.1.3 Research Question 3

What is the impact of de-emphasizing the reference to a paper questionnaire on self-response return rates (overall and by mode)?

We performed two comparisons testing the effect of de-emphasizing the paper questionnaire reference in the initial mailing.

Table 9 shows the return rates for the first comparison between Treatment 4 and Treatment 2. Treatment 4 used a pressure seal letter that de-emphasized the paper questionnaire reference, and Treatment 2 used a pressure seal letter with the standard, bolded paper questionnaire reference.

Table 9. 2021 IMPS Return Rates: Treatment 2 (T2) vs Treatment 4 (T4)

Point in Data Collection	Mode	T4	T2	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	26.0 (0.4)	25.8 (0.3)	0.2 (0.5)	0.73
	Internet	25.8 (0.4)	25.5 (0.3)	0.2 (0.5)	0.73
	TQA	0.2 (<0.1)	0.2 (<0.1)	<0.1 (<0.1)	0.73
Before CAPI	Total Self-Response	49.8 (0.4)	48.6 (0.4)	1.2 (0.6)	0.20
	Internet	38.5 (0.4)	37.8 (0.4)	0.8 (0.6)	0.83
	Mail	10.5 (0.2)	10.2 (0.2)	0.3 (0.3)	0.83
	TQA	0.7 (0.1)	0.6 (0.1)	0.1 (0.1)	0.31

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

There was no significant difference in the return rates between the two treatments at either point in time.

Table 10 shows the return rates for the second comparison between Treatment 4 and Treatment 3. Again, Treatment 4 used a pressure seal letter with a de-emphasized paper questionnaire reference. Treatment 3 used pressure seal letter without a paper questionnaire reference.

Table 10. 2021 IMPS Return Rates: Treatment 3 (T3) vs Treatment 4 (T4)

Point in Data Collection	Mode	T4	T3	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	26.0 (0.4)	27.3 (0.3)	-1.3 (0.5)	0.03*
	Internet	25.8 (0.4)	27.0 (0.3)	-1.2 (0.5)	0.04*
	TQA	0.2 (<0.1)	0.3 (<0.1)	-0.1 (0.1)	0.59
Before CAPI	Total Self-Response	49.8 (0.4)	49.5 (0.4)	0.3 (0.5)	0.83
	Internet	38.5 (0.4)	39.8 (0.4)	-1.3 (0.6)	0.18
	Mail	10.5 (0.2)	9.0 (0.2)	1.6 (0.3)	<0.01*
	TQA	0.7 (0.1)	0.7 (0.1)	<0.1 (0.1)	0.83

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

Treatment 3 had higher return rates for the internet mode and for total self-response prior to the third mailing. Before CAPI, Treatment 3 had lower mail return rates than Treatment 4.

6.1.4 Removing Director's Signature

In addition to analyzing the mailing type and questionnaire reference, we tested the effect of removing the director's signature from the initial mailing letter. To test this effect, we compared the Modified Control treatment to Production. The only difference between these treatments was that Production had the signature and Modified Control did not. Table 11 shows the return rates for that comparison.

Table 11. 2021 IMPS Return Rates: Modified Control (MC) vs Production (Prod)

Point in Data Collection	Mode	MC	Prod	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	24.6 (0.3)	25.0 (0.1)	-0.4 (0.4)	0.42
	Internet	24.4 (0.3)	24.7 (0.1)	-0.3 (0.4)	0.42
	TQA	0.2 (<0.1)	0.3 (<0.1)	-0.1 (<0.1)	0.02*
Before CAPI	Total Self-Response	48.5 (0.4)	49.0 (0.2)	-0.4 (0.4)	0.87
	Internet	37.4 (0.4)	37.8 (0.1)	-0.4 (0.4)	0.87
	Mail	10.4 (0.2)	10.4 (0.1)	-0.1 (0.2)	0.87
	TQA	0.8 (0.1)	0.8 (<0.1)	<0.1 (0.1)	0.87

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

The Production TQA return rates were higher than those for the Modified Control before the third mailing. All other comparisons were not significant.

6.2 Final Response Rates

As mentioned in Section 4.4.2, we calculated final response rates to determine the effect of the experimental treatments on response to the survey and how each response mode contributes to the overall final response rate.

6.2.1 Research Question 4

What is the overall impact of each of the experimental treatments on final response rates and data collection costs (overall and by mode)?

Table 12 shows the final overall response rates for all treatments compared to Modified Control.

Table 12. 2021 IMPS Overall Response Rates

Treatment	Total Response	Treatment – Modified Control	Adjusted P-value
Modified Control	85.6 (0.4)	--	--
Treatment 1	85.8 (0.4)	0.3 (0.5)	0.58
Treatment 2	86.1 (0.4)	0.5 (0.6)	0.58
Treatment 3	85.9 (0.4)	0.3 (0.6)	0.58
Treatment 4	86.7 (0.5)	1.1 (0.6)	0.25

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

There were no statistically significant differences between the final response rates of any of the experimental treatments and Modified Control.

Table 13 through Table 16 show the final response rate distribution across mode for each treatment versus Modified Control. Table 13 shows the percentage of final response from the internet mode.

Table 13. Percentage of 2021 IMPS Final Response from Internet

Treatment	Internet Response	Treatment – Modified Control	Adjusted P-value
Modified Control	41.2 (0.5)	--	--
Treatment 1	43.1 (0.5)	1.9 (0.7)	0.03*
Treatment 2	42.0 (0.5)	0.8 (0.6)	0.22
Treatment 3	43.7 (0.5)	2.5 (0.7)	<0.01*
Treatment 4	43.4 (0.5)	2.2 (0.7)	<0.01*

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

Treatment 1, Treatment 3, and Treatment 4 had higher internet response than Modified Control. These three treatments are the treatments in which the reference to the paper questionnaire was either removed or de-emphasized.

Table 14 shows the percentage of final response from the mail mode. Treatment 3 had lower mail response than Modified Control.

Table 14. Percentage of 2021 IMPS Final Response from Mail

Treatment	Mail Response	Treatment – Modified Control	Adjusted P-value
Modified Control	10.7 (0.2)	--	--
Treatment 1	10.3 (0.2)	-0.4 (0.3)	0.43
Treatment 2	10.8 (0.2)	<0.1 (0.3)	0.92
Treatment 3	9.4 (0.2)	-1.4 (0.3)	<0.01*
Treatment 4	11.1 (0.3)	0.3 (0.4)	0.73

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

Table 15 shows the percentage of final response from the TQA mode. There were no statistically significant differences in TQA response between any of the experimental treatments and Modified Control.

Table 15. Percentage of 2021 IMPS Final Response from TQA

Treatment	TQA Response	Treatment – Modified Control	Adjusted P-value
Modified Control	0.8 (0.1)	--	--
Treatment 1	0.8 (0.1)	<0.1 (0.1)	0.78
Treatment 2	0.6 (0.1)	-0.2 (0.1)	0.17
Treatment 3	0.8 (0.1)	<0.1 (0.1)	0.78
Treatment 4	0.7 (0.1)	-0.1 (0.1)	0.78

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

Table 16 shows the percentage of final response from the CAPI mode. There were no statistically significant differences in CAPI response between any of the experimental treatments and Modified Control.

Table 16. Percentage of 2021 IMPS Final Response from CAPI

Treatment	CAPI Response	Treatment – Modified Control	Adjusted P-value
Modified Control	32.8 (0.5)	--	--
Treatment 1	31.7 (0.4)	-1.1 (0.7)	0.34
Treatment 2	32.7 (0.5)	-0.1 (0.8)	0.88
Treatment 3	32.1 (0.5)	-0.7 (0.8)	0.74
Treatment 4	31.5 (0.6)	-1.3 (0.8)	0.34

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

6.3 Cost Analysis

We conducted a cost analysis to estimate the annual costs of putting each of the treatments into a year's production. To determine total cost, a number of factors need to be looked at:

- The costs of printing, assembling, and mailing the first mailing per treatment (e.g., pressure seal letter vs initial mail package).
- The costs of printing, assembling, and mailing the follow-up mailings per treatment. Although mailings 2 through 5 were identical for all treatments of this test, the costs will differ based on the self-response rates of the different treatments (i.e., if one treatment has higher self-response rates, then fewer follow-up mailings are needed for that treatment).

- The costs of the CAPI operation per treatment. Higher self-response rates will result in lower CAPI workloads.

We did not include the costs of the TQA operation per treatment because, due to the way TQA calls are recorded, it was not possible to connect any changes in total call volume to specific treatments.

We compared all of the treatments to Modified Control to estimate the annual cost differences from implementing each treatment into production. Table 6 and Table 3 compare the Modified Control return rates to the Treatment 1 and Treatment 2 return rates, respectively. Table 17 shows the comparisons of the Modified Control returns rates to the Treatment 3 and Treatment 4 return rates. As in Section 4.4.1, the rates are at two points in time in the data collection cycle because differences in response at various times in the data collection cycle could affect workloads.

Table 17. 2021 IMPS Return Rates: Modified Control (MC) vs Treatment 3 (T3) and Treatment 4 (T4)

Point in Data Collection	Mode	MC	T3	T4
Before Third Mailing	Total Self-Response	24.6 (0.3)	27.3 (0.3)*	26.0 (0.4)*
	Internet	24.4 (0.3)	27.0 (0.3)*	25.8 (0.4)*
	TQA	0.2 (<0.1)	0.3 (<0.1)*	0.2 (<0.1)
Before CAPI	Total Self-Response	48.5 (0.4)	49.5 (0.4)*	49.8 (0.4)*
	Internet	37.4 (0.4)	39.8 (0.4)*	38.5 (0.4)*
	Mail	10.4 (0.2)	9.0 (0.2)*	10.5 (0.2)
	TQA	0.8 (0.1)	0.7 (0.1)	0.7 (0.1)

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level.

Before the third mailing, the total self-response return rates were significantly higher than Modified Control for all four treatments. However, at the later time point before the start of CAPI, only the self-response return rates for Treatment 3 and Treatment 4 were significantly higher. The higher rates affect data collection costs by reducing CAPI workloads and associated costs.

Table 18 shows the estimated annual total cost savings for each treatment in the IMPS test compared to Modified Control.

Table 18. Estimated Annual Cost Savings for all Experimental Treatments versus the Control Treatment

Treatment	Printing, Postage, and Assembly Savings	CAPI Savings	Total Cost Savings
Modified Control	--	--	--
Treatment 1	\$201,000	\$0	\$201,000
Treatment 2	\$343,000	\$0	\$342,000
Treatment 3	\$719,000	\$3,855,000	\$4,574,000
Treatment 4	\$395,000	\$6,425,000	\$6,819,000

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

The implementation of any of the treatments would result in cost savings for the ACS program, but the largest savings would be from Treatment 3 or Treatment 4 – the pressure seal letter treatments with the questionnaire reference either removed or deemphasized. This cost savings is driven by the estimated costs of the CAPI operation, with Treatment 4 having the larger predicted savings of about \$6.8 million.¹⁶

6.4 TQA Analysis

There was some concern that removing the reference to a paper questionnaire could lead to an increase in phone calls to our telephone centers. We examined TQA workload from April 30, 2021 through June 30, 2021, the days the IMPS test was active, and compared it to the same time frame from 2019.¹⁷ Since the TQA workload is collected daily for all calls and not differentiated by panel, we cannot know for certain if a change in workload is because of a particular treatment.

To examine TQA workload, we created graphs of the number of daily calls received before CAPI for the May 2021 and 2019 panels.¹⁸ We examined the workload at three overlapping stages in the TQA process: the calls to the TQA phone number, the calls transferred, and the completed TQA cases. The number of calls in the graphs were from the start of the May panel data collection through the beginning of CAPI for the May panel, but could also include calls from other panels still in data collection.

The TQA workload for all call types for 2019 and 2021 followed the same general pattern. The TQA workload for 2019 and 2021 were similar prior to the third mailing (questionnaire package), indicating that there was no noticeable spike in calls to TQA due to removing the paper questionnaire reference. The TQA workload for 2021 did appear to be larger between the

¹⁶ The difference in savings between Treatment 3 and Treatment 4 is only estimated and not statistically proven.

¹⁷ We did not compare the corresponding 2020 TQA workload because mail and TQA operations were modified due to the pandemic.

¹⁸ We cannot show the graphs because the daily TQA workload is sensitive and for Census Bureau internal use only.

fifth mailing and the start of CAPI. However, in 2019, the fifth mailing did not have a due date on the letter while the 2021 letter did.

6.5 Additional Analyses

After presenting preliminary results, some stakeholders were concerned about the effect some of the treatments would have on those who do not speak English, specifically those who only speak Spanish, or those from rural areas.¹⁹ These next sections discuss our additional analyses to explore those issues.

6.5.1 Spanish Returns

Because the pressure seal letter treatments do not include a multilingual brochure or an instruction card (which has Spanish instructions), we were concerned that using a pressure seal letter in the initial mailing could have a negative effect on Spanish returns.

Table 19 shows the Spanish-language return rates. For the comparison, we pooled the treatments that were pressure seal letters and pooled the treatments that were initial mail packages.

Table 19. 2021 IMPS Spanish Return Rates: Pressure Seal Letter vs Initial Mail Package

Point in Data Collection	Pressure Seal Letter	Initial Mail Package	Difference	P-value
Before Third Mailing	<0.1 (<0.1)	0.1 (<0.1)	<0.1 (<0.1)	0.59
Before CAPI	0.2 (<0.1)	0.2 (<0.1)	<0.1 (<0.1)	0.77

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were NOT adjusted for multiple comparisons since they were not significant to begin with.

There was no difference between the return rates of the treatments that used pressure seal letters versus the treatments that used initial mail packages.

6.5.2 Return Rates by Urban or Rural Areas

Previous research shows that rural areas tend to have higher mail return rates and lower internet return rates than urban areas. Since we were considering removing the paper questionnaire reference from the initial mailing, we wanted to see what effect removing the reference might have in urban and rural areas.²⁰

¹⁹ Only English and Spanish versions of the ACS instruments are available for response. It is possible for someone to respond to the ACS by TQA or CAPI in a language other than English or Spanish if there is an interviewer available that speaks that additional language, but those situations are rare.

²⁰ We defined urban and rural areas using the 2020 Census urban and rural classification. For more information, visit <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html>.

Table 20 shows the return rates for urban areas. For the comparison, we pooled the treatments without the paper questionnaire reference and pooled the treatments that used a bolded paper questionnaire reference.

Table 20. 2021 IMPS Return Rates: Paper Questionnaire Reference (YQ) vs No Paper Questionnaire Reference (NQ) for Urban Areas

Point in Data Collection	Mode	NQ	YQ	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	26.4 (0.2)	24.8 (0.3)	1.5 (0.4)	<0.01*
	Internet	26.1 (0.2)	24.6 (0.3)	1.5 (0.4)	<0.01*
	TQA	0.3 (<0.1)	0.2 (<0.1)	0.1 (<0.1)	0.12
Before CAPI	Total Self-Response	48.2 (0.3)	47.6 (0.3)	0.6 (0.4)	0.13
	Internet	39.0 (0.3)	37.6 (0.3)	1.4 (0.4)	<0.01*
	Mail	8.4 (0.2)	9.4 (0.2)	-0.9 (0.2)	<0.01*
	TQA	0.7 (0.1)	0.6 (<0.1)	0.1 (0.1)	0.13

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

The treatments that did not include a paper questionnaire reference had higher return rates for the internet mode and for total self-response prior to the third mailing in urban areas. Before CAPI, those treatments had higher internet return rates and lower mail return rates.

Table 21 shows the return rates for rural areas. Again, we pooled the treatments without the paper questionnaire reference and pooled the treatments that used a bolded paper questionnaire reference.

Table 21. 2021 IMPS Return Rates: Paper Questionnaire Reference (YQ) vs No Paper Questionnaire Reference (NQ) for Rural Areas

Point in Data Collection	Mode	NQ	YQ	Difference	Adjusted P-value
Before Third Mailing	Total Self-Response	28.3 (0.6)	27.0 (0.6)	1.3 (0.7)	0.15
	Internet	28.1 (0.6)	26.7 (0.6)	1.4 (0.7)	0.15
	TQA	0.3 (0.1)	0.3 (0.1)	<0.1 (0.1)	0.65
Before CAPI	Total Self-Response	54.2 (0.7)	53.5 (0.6)	0.7 (0.9)	0.44
	Internet	40.0 (0.7)	37.9 (0.6)	2.1 (0.8)	0.04*
	Mail	13.5 (0.4)	14.7 (0.4)	-1.2 (0.5)	0.04*
	TQA	0.7 (0.1)	0.9 (0.1)	-0.2 (0.2)	0.44

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a two-tailed t-test at the $\alpha=0.1$ level. P-values were adjusted for multiple comparisons using the Hochberg method.

There was no difference in return rates prior to the third mailing in rural areas. Before CAPI, the treatments without the questionnaire reference had higher internet return rates and lower mail return rates.

6.5.3 Demographic Distributions

Since the treatments with changes to the paper questionnaire reference had significantly higher internet response rates compared to the Modified Control, and we know that the demographic characteristics of internet respondents and mail respondents are different, we wanted to compare the demographic distributions across treatments within mode.

Table 22 shows the demographic distributions overall for age, sex, Hispanic origin, and race. The distributions for age and sex were significantly different among the treatments based on a Rao-Scott chi-square test. However, when comparing each treatment individually to Modified Control, only the distribution for sex for Treatment 2 was significantly different than Modified Control. This difference was driven by a larger proportion of male respondents and smaller proportion of female respondents of Treatment 2 compared with Modified Control.

Table 22. Overall Demographic Distributions

Variable	Value	MC	T1	T2	T3	T4	Chi-Square P-value
Age	Less than 18	0.4 (0.1)	0.2 (<0.1)	0.5 (0.1)	0.4 (0.1)	0.2 (<0.1)	0.07*
	18 to 29	9.5 (0.4)	10.3 (0.4)	9.6 (0.3)	10.6 (0.3)	10.1 (0.4)	
	30 to 49	31.6 (0.5)	30.4 (0.5)	30.8 (0.6)	30.7 (0.5)	31.1 (0.4)	
	50 to 64	27.8 (0.5)	27.5 (0.5)	28.0 (0.5)	27.7 (0.4)	27.1 (0.4)	
	65 and over	29.8 (0.5)	30.5 (0.5)	30.1 (0.5)	29.7 (0.5)	30.4 (0.4)	
	Missing	0.9 (0.1)	1.0 (0.1)	1.0 (0.1)	1.0 (0.1)	1.2 (0.1)	
Sex	Male	46.1 (0.6)	45.7 (0.5)	47.8 (0.5)	45.6 (0.5)	45.7 (0.5)	0.03*
	Female	53.5 (0.6)	53.9 (0.5)	51.9 (0.5)	54.0 (0.5)	53.9 (0.5)	
	Missing	0.4 (0.1)	0.5 (0.1)	0.3 (0.1)	0.4 (0.1)	0.4 (0.1)	
Hispanic Origin	Hispanic	13.4 (0.4)	12.8 (0.5)	13.0 (0.3)	12.9 (0.4)	13.2 (0.4)	0.47
	Not Hispanic	84.9 (0.4)	85.3 (0.5)	85.4 (0.4)	85.6 (0.4)	85.3 (0.4)	
	Missing	1.7 (0.1)	1.9 (0.1)	1.6 (0.1)	1.5 (0.1)	1.5 (0.1)	
Race	White Only	74.7 (0.5)	74.1 (0.5)	74.5 (0.5)	74 (0.5)	74.1 (0.5)	0.92
	Black Only	9.8 (0.3)	10.7 (0.3)	10.6 (0.4)	10.8 (0.4)	10.8 (0.4)	
	Other Race Only	10.9 (0.3)	10.6 (0.3)	10.5 (0.4)	11.0 (0.3)	10.7 (0.4)	
	Two or More Races	3.3 (0.2)	3.1 (0.2)	3.1 (0.2)	3.1 (0.2)	3.1 (0.2)	
	Missing	1.3 (0.1)	1.4 (0.1)	1.4 (0.1)	1.2 (0.1)	1.4 (0.1)	

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a Rao-Scott chi-square test at the $\alpha=0.1$ level.

Table 23 and Table 24 show the demographic distributions for the internet and mail modes, respectively. None of the demographic distributions were significantly different among the treatments for internet, and only the distribution for Hispanic origin was significantly different for mail. When comparing each treatment individually to Modified Control for the mail mode, the distributions for Hispanic origin for Treatment 1 and Treatment 4 were significantly different than Modified Control. For both treatments, the difference was driven by a smaller proportion of respondents who are not Hispanic.

Table 23. Demographic Distributions for the Internet Mode

Variable	Value	MC	T1	T2	T3	T4	Chi-Square P-value
Age	Less than 18	0.1 (<0.1)	0.2 (<0.1)	0.3 (0.1)	0.2 (<0.1)	0.1 (<0.1)	0.60
	18 to 29	9.8 (0.4)	9.8 (0.4)	9.6 (0.4)	9.5 (0.3)	10.1 (0.4)	
	30 to 49	35.0 (0.6)	33.4 (0.6)	34.4 (0.6)	33.9 (0.5)	34.2 (0.5)	
	50 to 64	28.9 (0.6)	28.7 (0.6)	29.0 (0.5)	28.8 (0.4)	28.7 (0.5)	
	65 and over	25.2 (0.6)	26.9 (0.5)	25.7 (0.6)	26.5 (0.5)	25.7 (0.5)	
	Missing	0.9 (0.1)	1.0 (0.1)	1.1 (0.1)	1.0 (0.1)	1.1 (0.1)	
Sex	Male	45.7 (0.6)	46.0 (0.6)	47.5 (0.6)	45.5 (0.6)	46.6 (0.6)	0.22
	Female	54.2 (0.6)	53.7 (0.6)	52.3 (0.6)	54.3 (0.6)	53.1 (0.6)	
	Missing	0.2 (<0.1)	0.3 (0.1)	0.2 (0.1)	0.2 (0.1)	0.3 (0.1)	
Hispanic Origin	Hispanic	10.6 (0.4)	9.9 (0.4)	10.3 (0.4)	9.7 (0.4)	10.2 (0.3)	0.55
	Not Hispanic	88.6 (0.4)	89.0 (0.4)	88.6 (0.4)	89.4 (0.4)	89.0 (0.3)	
	Missing	0.8 (0.1)	1.0 (0.1)	1.0 (0.1)	0.9 (0.1)	0.8 (0.1)	
Race	White Only	78.7 (0.5)	78.0 (0.5)	77.9 (0.5)	78.0 (0.4)	77.8 (0.5)	0.68
	Black Only	6.6 (0.3)	6.5 (0.3)	7.0 (0.3)	6.8 (0.3)	6.7 (0.3)	
	Other Race Only	10.6 (0.3)	10.9 (0.4)	10.4 (0.3)	10.6 (0.4)	11.0 (0.4)	
	Two or More Races	3.2 (0.2)	3.3 (0.2)	3.4 (0.2)	3.4 (0.2)	3.1 (0.2)	
	Missing	0.9 (0.1)	1.2 (0.1)	1.3 (0.1)	1.2 (0.1)	1.4 (0.1)	

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a Rao-Scott chi-square test at the $\alpha=0.1$ level.

Table 24. Demographic Distributions for the Mail Mode

Variable	Value	MC	T1	T2	T3	T4	Chi-Square P-value
Age	Less than 18	0.2 (0.1)	<0.1 (<0.1)	0.2 (0.1)	0.3 (0.1)	0.3 (0.1)	0.93
	18 to 29	2.6 (0.4)	2.8 (0.4)	2.5 (0.4)	2.8 (0.4)	2.8 (0.4)	
	30 to 49	12.8 (0.8)	11.9 (0.8)	11.3 (0.8)	11.6 (0.8)	11.3 (0.8)	
	50 to 64	24.3 (1.1)	25.6 (1.1)	26.6 (1.1)	26.2 (1.1)	26.2 (1.0)	
	65 and over	58.5 (1.2)	57.8 (1.2)	57.6 (1.0)	57.0 (1.2)	57.8 (1.1)	
	Missing	1.6 (0.4)	1.8 (0.3)	1.9 (0.4)	2.0 (0.4)	1.5 (0.2)	
Sex	Male	48.2 (1.2)	46.6 (1.3)	48.2 (1.2)	48.2 (1.2)	46.0 (1.4)	0.70
	Female	49.6 (1.3)	51.4 (1.3)	50.2 (1.3)	50.2 (1.3)	52.5 (1.4)	
	Missing	2.1 (0.4)	2.0 (0.3)	1.6 (0.3)	1.6 (0.3)	1.6 (0.3)	
Hispanic Origin	Hispanic	6.5 (0.6)	7.3 (0.5)	7.3 (0.5)	7.2 (0.6)	8.5 (0.6)	0.03*
	Not Hispanic	86.9 (0.8)	84.1 (0.9)	86.5 (0.7)	86.4 (0.8)	84.8 (0.8)	
	Missing	6.7 (0.7)	8.6 (0.7)	6.2 (0.5)	6.5 (0.6)	6.7 (0.5)	
Race	White Only	79.8 (1.0)	78.7 (0.9)	79.5 (1.0)	80.5 (0.7)	79.2 (1.0)	0.81
	Black Only	7.4 (0.6)	9.4 (0.7)	8.6 (0.7)	8.6 (0.7)	8.9 (0.6)	
	Other Race Only	4.7 (0.5)	4.5 (0.5)	4.5 (0.5)	4.7 (0.5)	4.9 (0.6)	
	Two or More Races	5.1 (0.5)	4.6 (0.5)	4.2 (0.5)	3.8 (0.4)	4.4 (0.5)	
	Missing	3.0 (0.4)	2.8 (0.3)	3.1 (0.3)	2.4 (0.4)	2.6 (0.4)	

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. An asterisk (*) indicates a statistically significant result. Significance was tested based on a Rao-Scott chi-square test at the $\alpha=0.1$ level.

Appendix F lists the demographic distributions for the TQA and CAPI modes. None of the distributions was significantly different among the treatments.

7. CONCLUSIONS

The pressure seal letter increased self-response in early data collection compared to the initial mail package. There were significant differences between mailing types for total self-response and internet return rates before the third mailing, as well as between Treatment 2 and the Modified Control. Some stakeholders were concerned that the pressure seal letter treatments would negatively affect Spanish responses because those treatments did not receive the multilingual brochure; however, there were no significant differences in Spanish return rates between letter types.

Removing the paper questionnaire reference also increased self-response in early data collection compared to referencing the paper questionnaire. There were significant differences between reference or no reference for total self-response and internet return rates before the

third mailing, as well as between Treatment 1 and the Modified Control and between Treatment 3 and Treatment 2. Removing the paper questionnaire reference also decreased mail response compared to referencing the paper questionnaire, with the mail return rate before CAPI being significantly lower for the combined no questionnaire reference treatments, as well as for Treatment 3 compared to Treatment 2.

We were concerned that TQA workload could be affected by removing the paper questionnaire reference. However, our TQA analysis did not indicate any noticeable spike in calls due to the IMPS test compared to 2019 call volume. Also, some stakeholders were concerned that the treatments without the paper questionnaire reference would negatively affect response in rural areas, which have less internet access than urban areas. However, there were no significant differences in rural self-response return rates between the combined no questionnaire reference treatments and combined questionnaire reference treatments. Contrary to the concerns, the rural internet return rates were significantly higher and the rural mail return rates significantly lower in the no questionnaire reference treatments before CAPI.

Although the treatment with the de-emphasized reference (Treatment 4) had significantly lower self-response return rates before the third mailing compared to a treatment without a paper questionnaire reference (Treatment 3), the total self-response return rate before CAPI was not significantly different between the treatments. In addition, there were no significant differences between the self-response return rates for Treatment 4 (de-emphasized reference) and Treatment 2 (paper questionnaire reference) at any point in data collection, but the rates for Treatment 4 were nominally higher.

Because the only difference between the Modified Control and the other treatments was the first mailing, we did not expect any differences in overall final response rates, which corresponds to the results. There were, however, significant differences in internet response rates between the Modified Control and some of the treatments, with Treatment 1, Treatment 3, and Treatment 4 having higher rates. There was also a significant difference in mail response rates, with the rate for Treatment 3 being lower than the rate for the Modified Control.

Because the initial mail packages are ordered several months in advance, the ACS program made a decision in August 2021 about whether to change the first mailing based on preliminary results (i.e., the self-response return rates and the TQA analysis). The program decided to change the first mailing to a pressure seal letter and use a de-emphasized paper questionnaire reference starting in the January 2022 panel (Treatment 4). The de-emphasized paper questionnaire reference was ultimately chosen for production over the removal of the reference due to stakeholder concern about public perception regarding a lack of full disclosure of the paper option. After completing the analysis, we support the previous decision of implementing Treatment 4 into production.

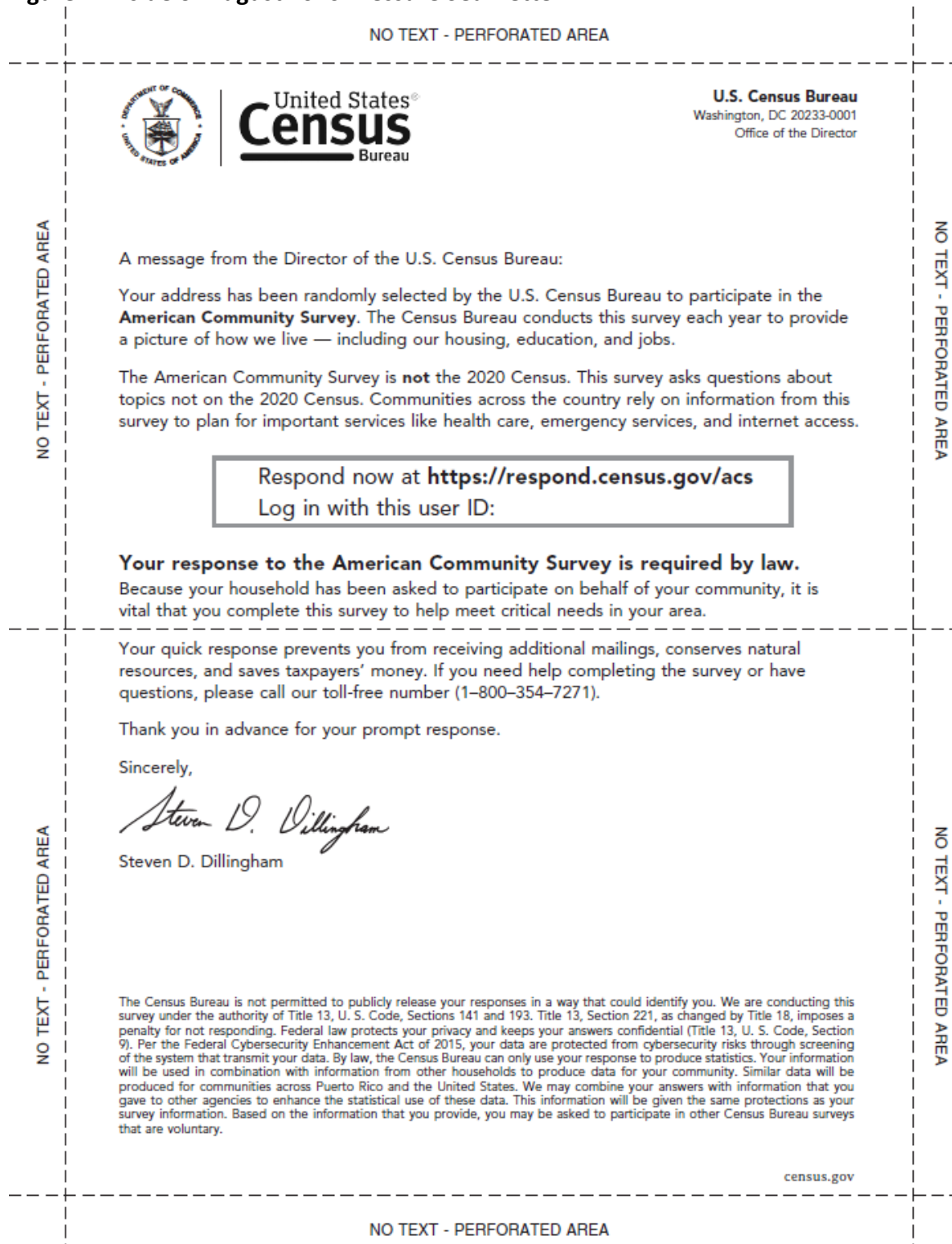
We also tested the effect of removing the director’s signature from the initial mailing letter. We compared self-response return rates from the Modified Control treatment to those from Production, and found no differences in total self-response. Based on preliminary results, the director’s signature was temporarily removed from ACS mailings until the beginning of 2022 when a new Census Bureau director was sworn in.

8. REFERENCES

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Appendix A. Images of the August 2020 Pressure Seal Letter

Figure 2. Inside of August 2020 Pressure Seal Letter



Appendix B. Images of the January 2021 Pressure Seal Letter

Figure 4. Inside of January 2021 Pressure Seal Letter

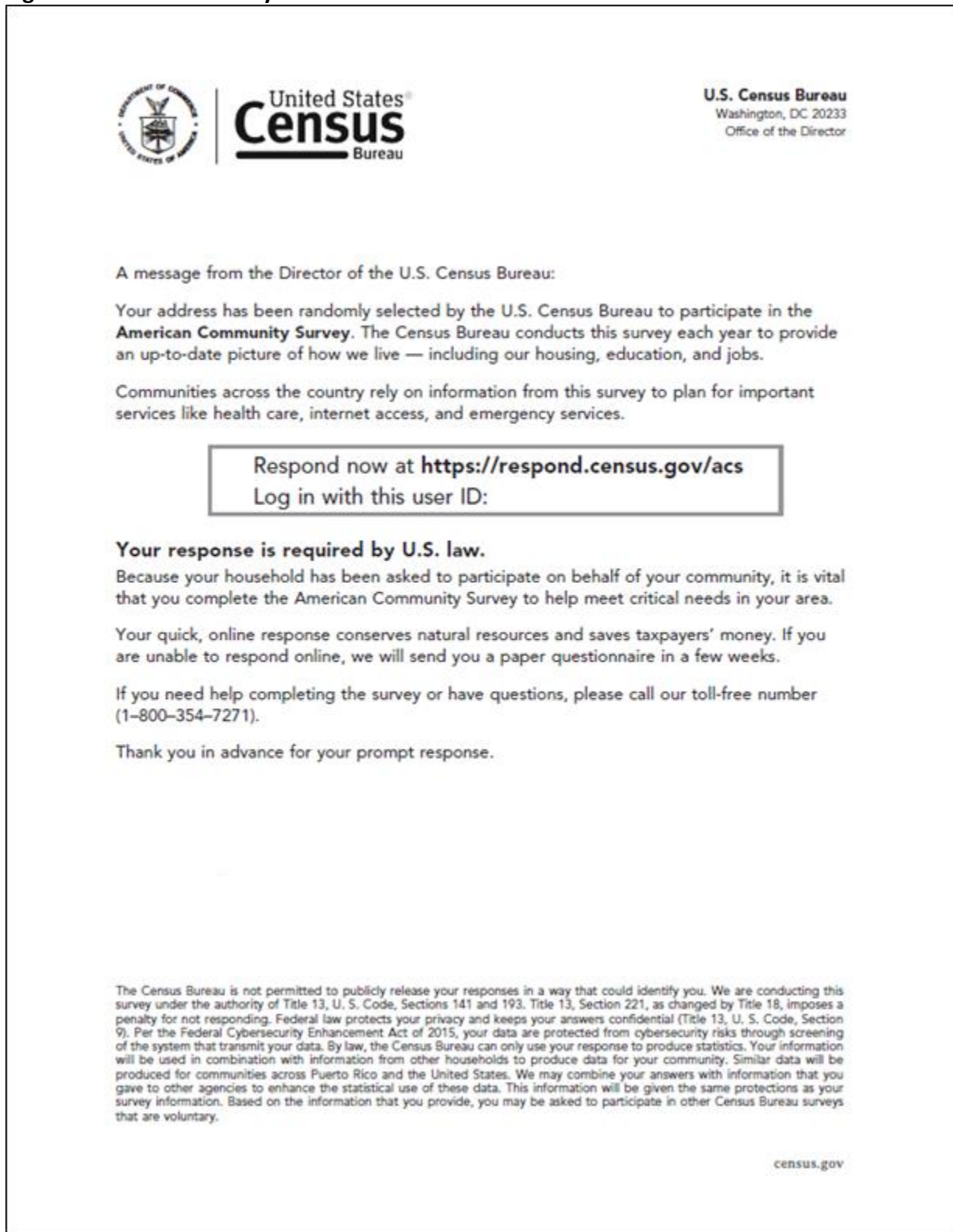


Figure 5. Outside of January 2021 Pressure Seal Letter

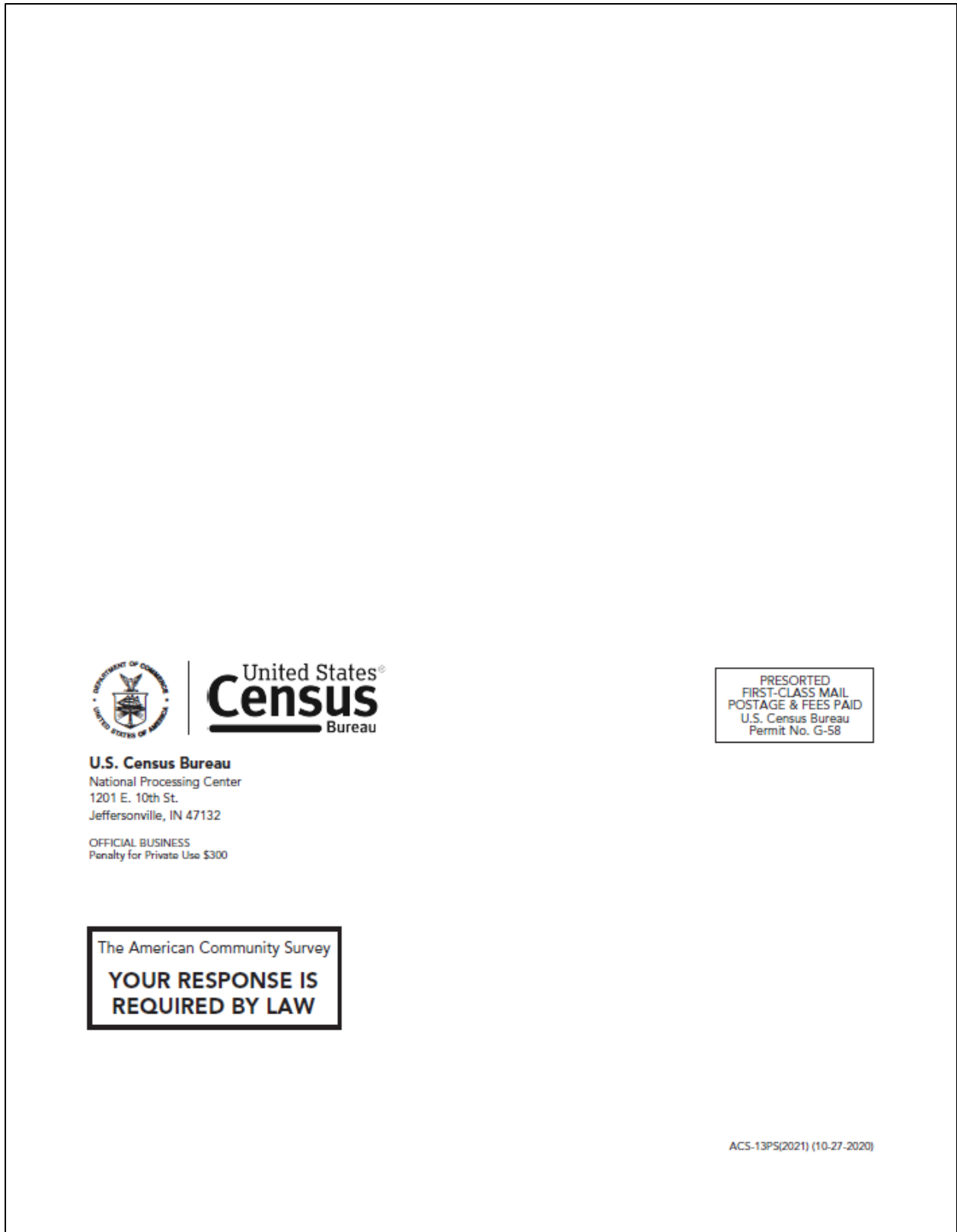


Figure 6. Differences Between Inside of August 2020 and January 2021 Pressure Seal Letters


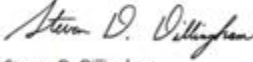

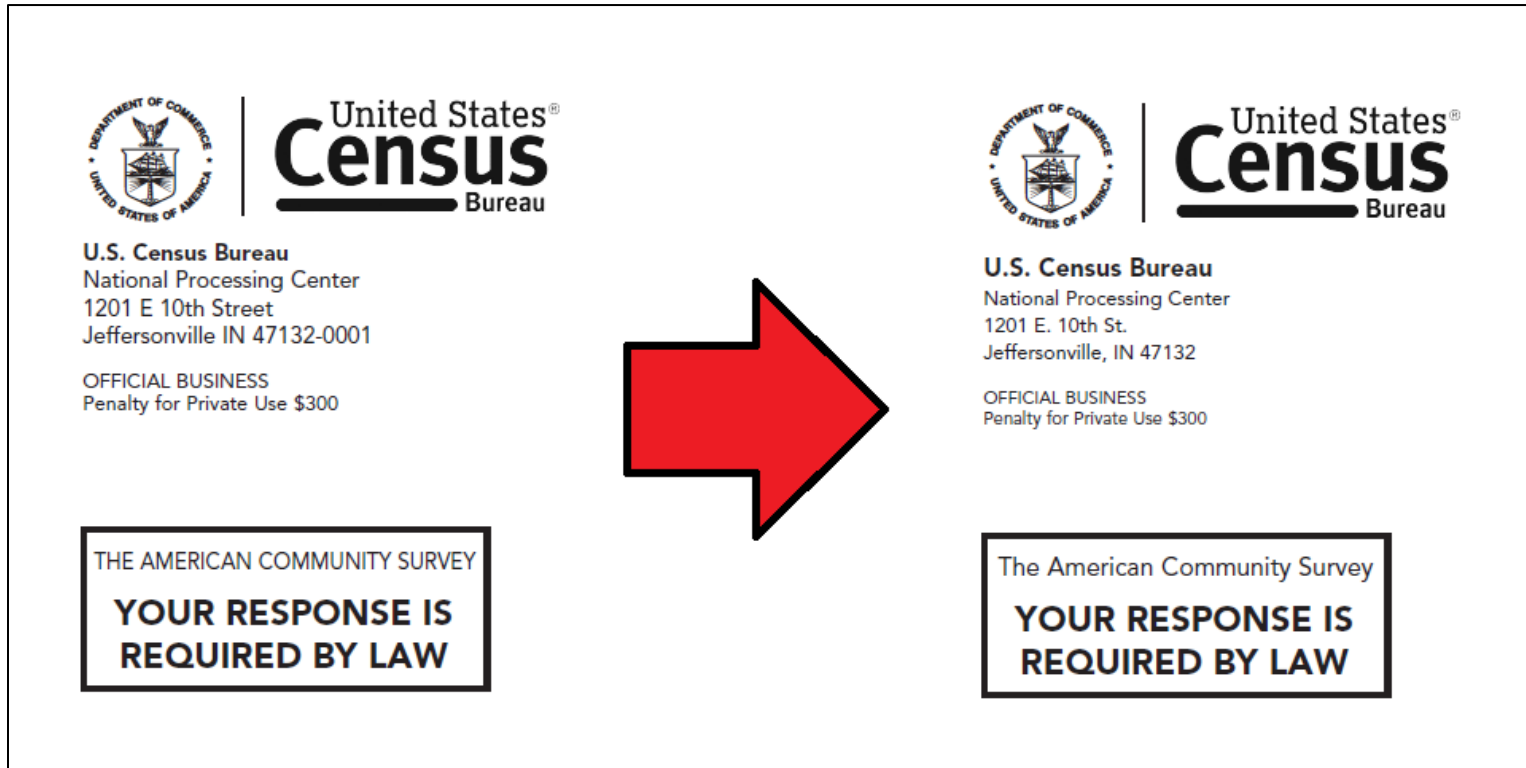
 <p>U.S. Census Bureau Washington, DC 20233-4000 Office of the Director</p> <p>A message from the Director of the U.S. Census Bureau:</p> <p>Your address has been randomly selected by the U.S. Census Bureau to participate in the American Community Survey. The Census Bureau conducts this survey each year to provide a picture of how we live — including our housing, education, and jobs.</p> <p>The American Community Survey is not the 2020 Census. This survey asks questions about communities across the country. 2020 Census Communities across the country rely on information from this survey to plan for important services like health care, emergency services, and internet access.</p> <p>Respond now at https://respond.census.gov/acs Log in with this user ID:</p> <p>Your response to the American Community Survey is required by law. Because your household has been asked to participate on behalf of your community, it is vital that you complete this survey to help meet critical needs in your area.</p> <p>Your quick response protects your information and privacy, conserves natural resources, and saves taxpayers' money. If you need help completing the survey or have questions, please call our toll-free number (1-800-354-7271).</p> <p>Thank you in advance for your prompt response.</p> <p>Sincerely,  Steven D. Dillingham</p> <p><small>The Census Bureau is not permitted to publicly release your responses in a way that could identify you. We are conducting this survey under the authority of Title 13, U. S. Code, Sections 141 and 193. Title 13, Section 221, as changed by Title 18, imposes a penalty for not responding. Federal law protects your privacy and keeps your answers confidential (Title 13, U. S. Code, Section 9). Per the Federal Cybersecurity Enhancement Act of 2015, your data are protected from cybersecurity risks through screening of the system that transmit your data. By law, the Census Bureau can only use your response to produce statistics. Your information will be used in combination with information from other households to produce data for your community. Similar data will be produced for communities across Puerto Rico and the United States. We may combine your answers with information that you gave to other agencies to enhance the statistical use of these data. This information will be given the same protections as your survey information. Based on the information that you provide, you may be asked to participate in other Census Bureau surveys that are voluntary.</small></p> <p>census.gov</p>	 <p>U.S. Census Bureau Washington, DC 20233 Office of the Director</p> <p>A message from the Director of the U.S. Census Bureau:</p> <p>Your address has been randomly selected by the U.S. Census Bureau to participate in the American Community Survey. The Census Bureau conducts this survey each year to provide an up-to-date picture of how we live — including our housing, education, and jobs.</p> <p>Communities across the country rely on information from this survey to plan for important services like health care, internet access, and emergency services.</p> <p>Respond now at https://respond.census.gov/acs Log in with this user ID:</p> <p>Your response is required by U.S. law. Because your household has been asked to participate on behalf of your community, it is vital that you complete the American Community Survey to help meet critical needs in your area.</p> <p>Your quick online response conserves natural resources and saves taxpayers' money. If you are unable to respond online, we will send you a paper questionnaire in a few weeks.</p> <p>If you need help completing the survey or have questions, please call our toll-free number (1-800-354-7271).</p> <p>Thank you in advance for your prompt response.</p> <p><small>The Census Bureau is not permitted to publicly release your responses in a way that could identify you. We are conducting this survey under the authority of Title 13, U. S. Code, Sections 141 and 193. Title 13, Section 221, as changed by Title 18, imposes a penalty for not responding. Federal law protects your privacy and keeps your answers confidential (Title 13, U. S. Code, Section 9). Per the Federal Cybersecurity Enhancement Act of 2015, your data are protected from cybersecurity risks through screening of the system that transmit your data. By law, the Census Bureau can only use your response to produce statistics. Your information will be used in combination with information from other households to produce data for your community. Similar data will be produced for communities across Puerto Rico and the United States. We may combine your answers with information that you gave to other agencies to enhance the statistical use of these data. This information will be given the same protections as your survey information. Based on the information that you provide, you may be asked to participate in other Census Bureau surveys that are voluntary.</small></p> <p>census.gov</p>
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Figure 7. Differences Between Outside of August 2020 and January 2021 Pressure Seal Letters



Appendix C. Images of the Initial Mail Package (Modified Control)

Figure 8. Front of Initial Mail Package Envelope

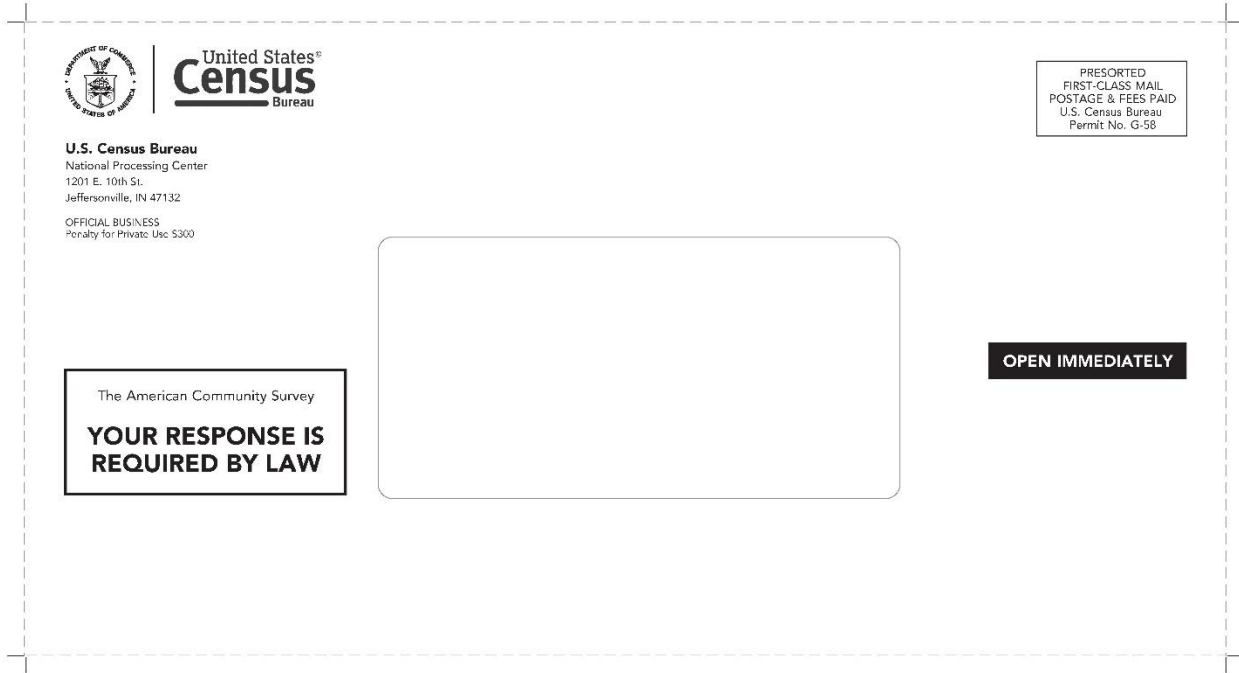


Figure 9. Back of Initial Mail Package Envelope

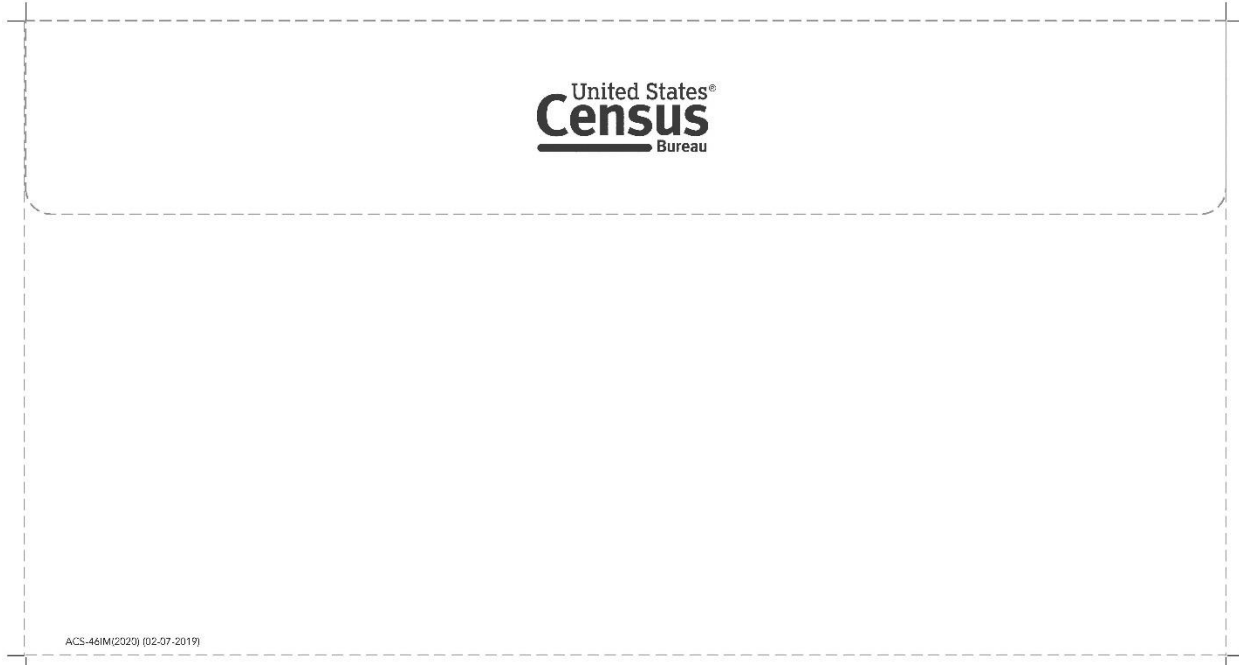


Figure 10. Front of Initial Mail Package Letter



U.S. Census Bureau
Washington, DC 20233
Office of the Director

A message from the Director of the U.S. Census Bureau:

Your address has been randomly selected by the U.S. Census Bureau to participate in the **American Community Survey**. The Census Bureau conducts this survey each year to give our country an up-to-date picture of how we live – including our education, housing, and jobs.

Communities across the country rely on information from this survey to decide where important services are needed, including:

- Improving roads and reducing traffic
- Building schools
- Planning for the health care needs of the elderly

Respond now at <https://respond.census.gov/acs>

Your response is required by U.S. law.

Because your household has been asked to participate on behalf of your community, it is vital that you complete this survey to help meet critical needs in your area.

If you are unable to complete the survey online, we will send you a paper questionnaire in a few weeks. The Census Bureau is using the internet to collect this information to conserve natural resources, save taxpayers' money, and process data more efficiently.

If you need help completing the survey or have questions, please call our toll-free number (1-800-354-7271).

Thank you in advance for your prompt response.

Enclosures

American Community Survey data help determine the annual distribution of more than **\$675 billion** in federal funds to **communities nationwide**.

Figure 11. Back of Initial Mail Package Letter

Will my response be confidential?

Yes. The U.S. Census Bureau is required by law to protect this information. The Census Bureau is not permitted to publicly release your responses in a way that could identify you. We are conducting this survey under the authority of Title 13, United States Code, Sections 141 and 193. Federal law protects your privacy and keeps your answers confidential (Title 13, United States Code, Section 9). Per the Federal Cybersecurity Enhancement Act of 2015, your data are protected from cybersecurity risks through screening of the systems that transmit your data.

Am I required to fill out the survey?

Yes. Your response to this survey is required by law (Title 13, U.S. Code, Sections 141, 193, and 221). Title 13, as changed by Title 18, imposes a penalty for not responding. As a randomly selected representative of your community, you are the voice of your neighbors and peers. To create an accurate picture of your community, it is critical that you respond.

How will the Census Bureau use the information I provide?

By law, the Census Bureau can only use your responses to produce statistics. Your information will be used in combination with information from other households to produce data for your community. Similar data will be produced for communities across Puerto Rico and the United States.

We may combine your answers with information that you gave to other agencies to enhance the statistical uses of these data. This information will be given the same protections as your survey information. Based on the information that you provide, you may be asked to participate in other Census Bureau surveys that are voluntary.

Figure 14. Front of Instruction Card

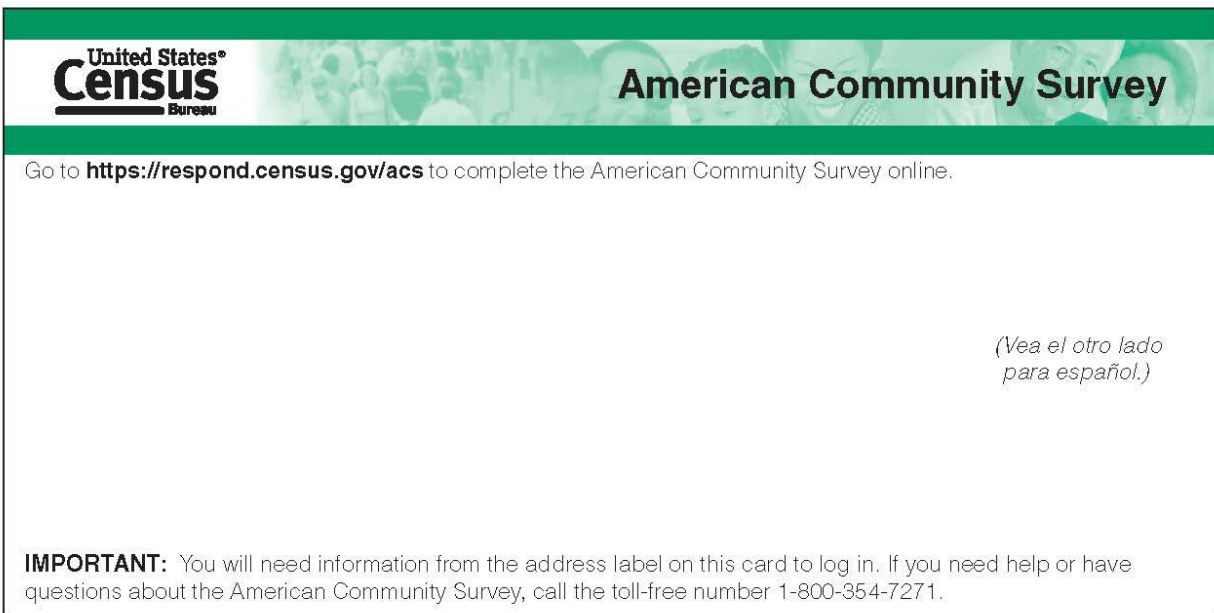


Figure 15. Back of Instruction Card



Appendix D. Images of the Experimental Treatments (Treatment 1 – 4)

Figure 16. Front of Treatment 1 Letter



U.S. Census Bureau
Washington, DC 20233
Office of the Director

A message from the Director of the U.S. Census Bureau:

Your address has been randomly selected by the U.S. Census Bureau to participate in the **American Community Survey**. The Census Bureau conducts this survey each year to give our country an up-to-date picture of how we live – including our education, housing, and jobs.

Communities across the country rely on information from this survey to decide where important services are needed, including:

- Improving roads and reducing traffic
- Building schools
- Planning for the health care needs of the elderly

Respond now at <https://respond.census.gov/acs>

Your response is required by U.S. law.

Because your household has been asked to participate on behalf of your community, it is vital that you complete this survey to help meet critical needs in your area.

The Census Bureau is using the internet to collect this information to conserve natural resources, save taxpayers' money, and process data more efficiently.

If you need help completing the survey or have questions, please call our toll-free number (1-800-354-7271).

Thank you in advance for your prompt response.

Enclosures

American Community Survey data help determine the annual distribution of more than **\$675 billion** in federal funds to **communities nationwide**.

Figure 17. Back of Treatment 1 Letter

Will my response be confidential?

Yes. The U.S. Census Bureau is required by law to protect this information. The Census Bureau is not permitted to publicly release your responses in a way that could identify you. We are conducting this survey under the authority of Title 13, United States Code, Sections 141 and 193. Federal law protects your privacy and keeps your answers confidential (Title 13, United States Code, Section 9). Per the Federal Cybersecurity Enhancement Act of 2015, your data are protected from cybersecurity risks through screening of the systems that transmit your data.

Am I required to fill out the survey?

Yes. Your response to this survey is required by law (Title 13, U.S. Code, Sections 141, 193, and 221). Title 13, as changed by Title 18, imposes a penalty for not responding. As a randomly selected representative of your community, you are the voice of your neighbors and peers. To create an accurate picture of your community, it is critical that you respond.

How will the Census Bureau use the information I provide?

By law, the Census Bureau can only use your responses to produce statistics. Your information will be used in combination with information from other households to produce data for your community. Similar data will be produced for communities across Puerto Rico and the United States.

We may combine your answers with information that you gave to other agencies to enhance the statistical uses of these data. This information will be given the same protections as your survey information. Based on the information that you provide, you may be asked to participate in other Census Bureau surveys that are voluntary.

Figure 18. Front of Treatment 2 Pressure Seal Letter

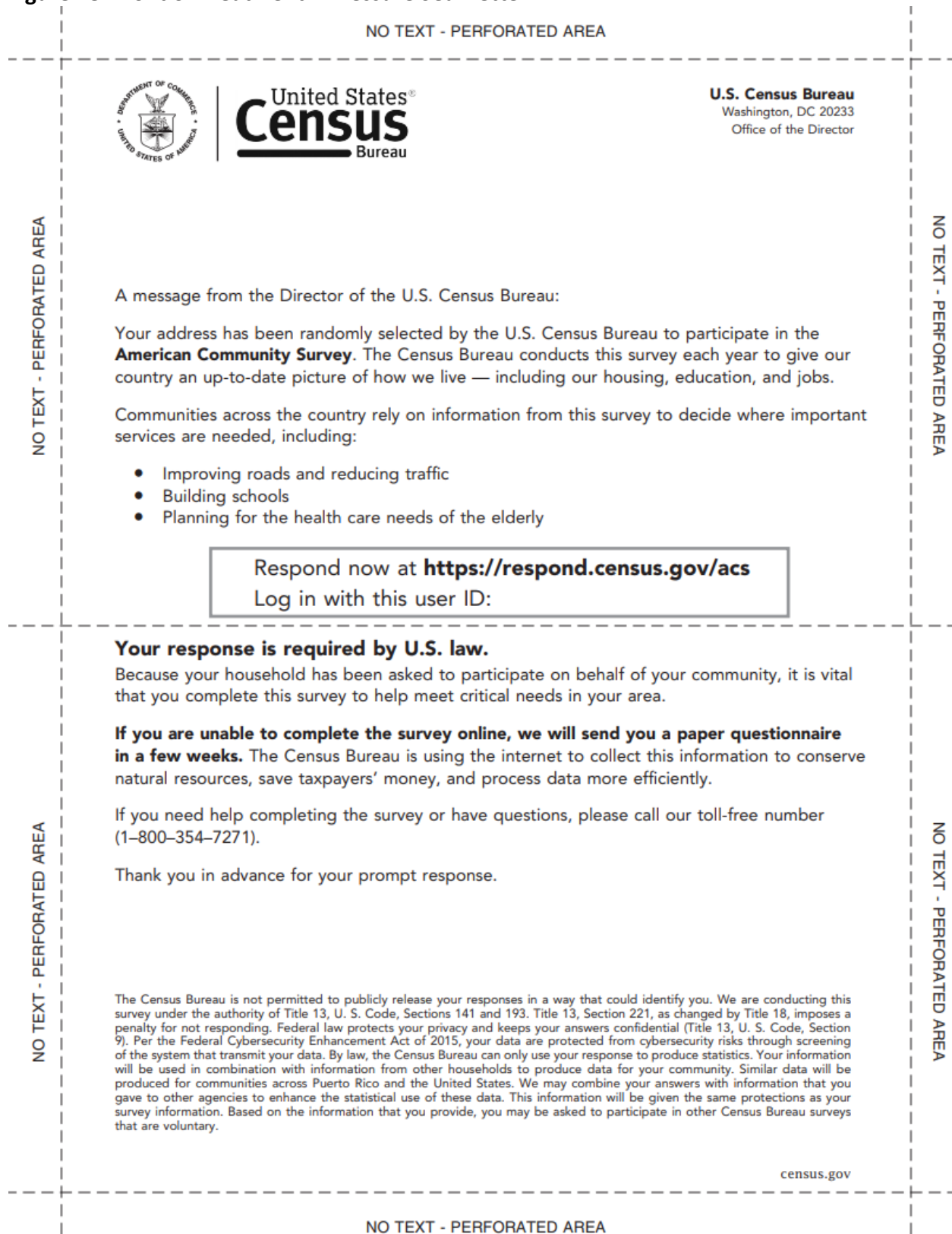


Figure 19. Back of Treatment 2 Pressure Seal Letter

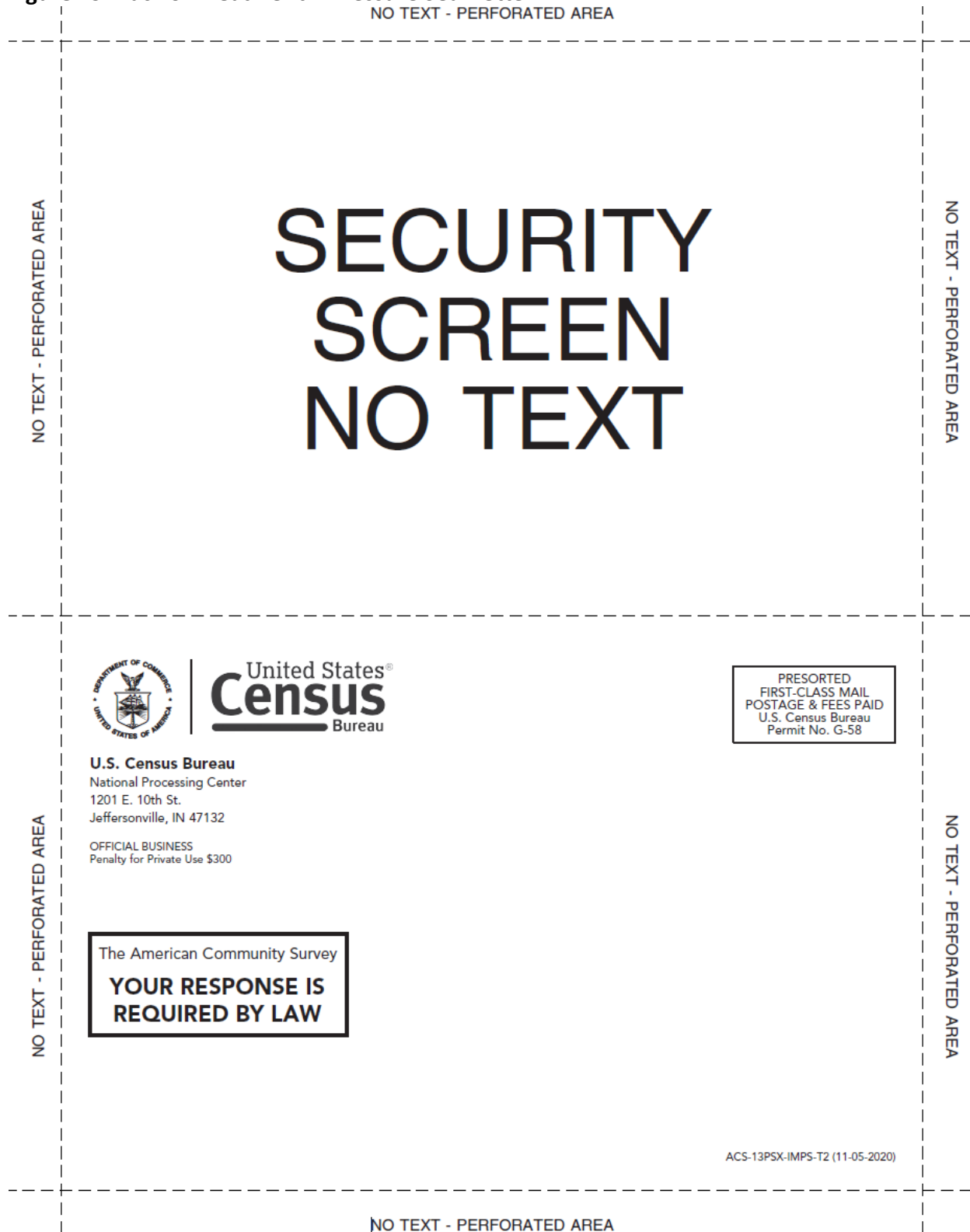


Figure 20. Front of Treatment 3 Pressure Seal Letter

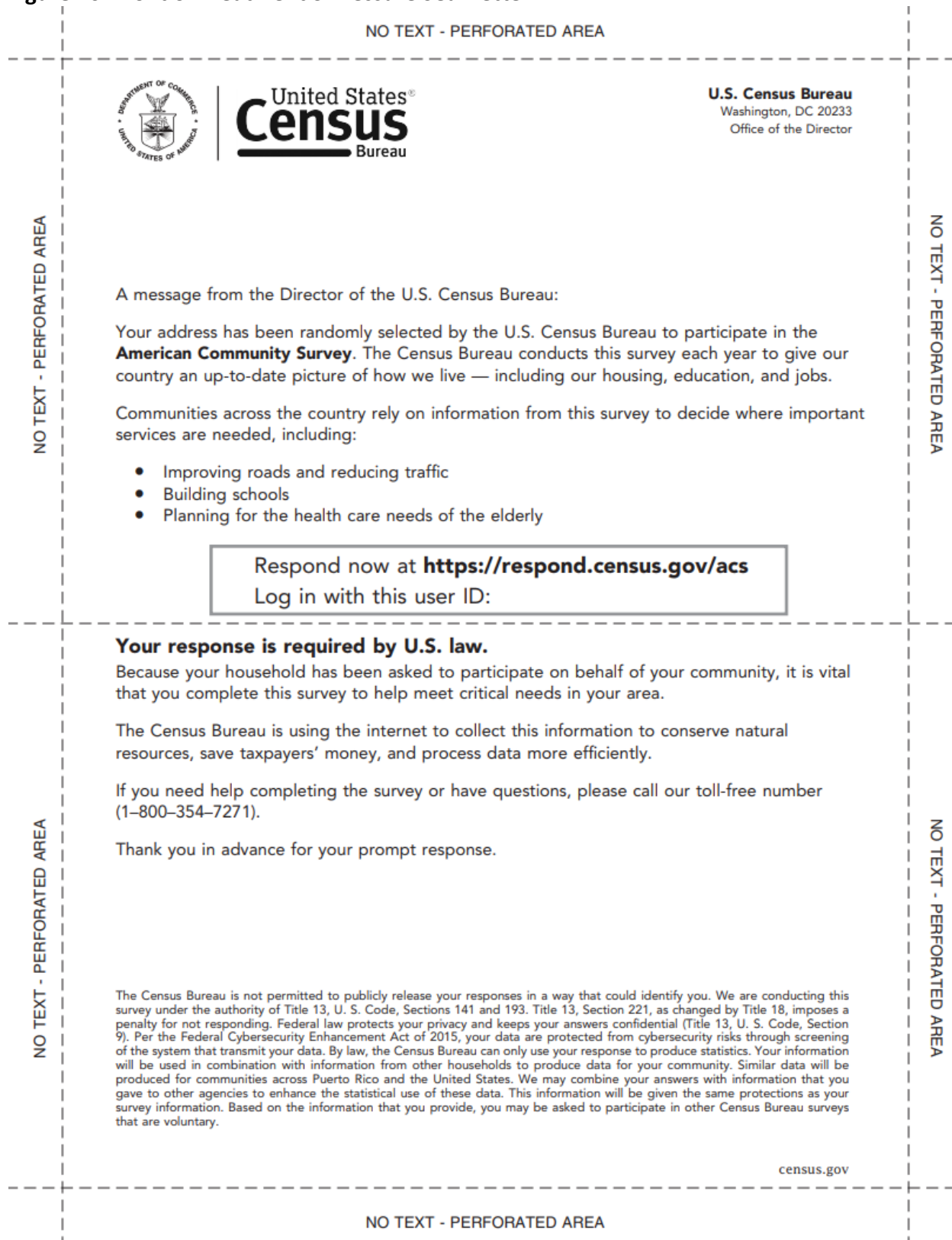


Figure 21. Back of Treatment 3 Pressure Seal Letter

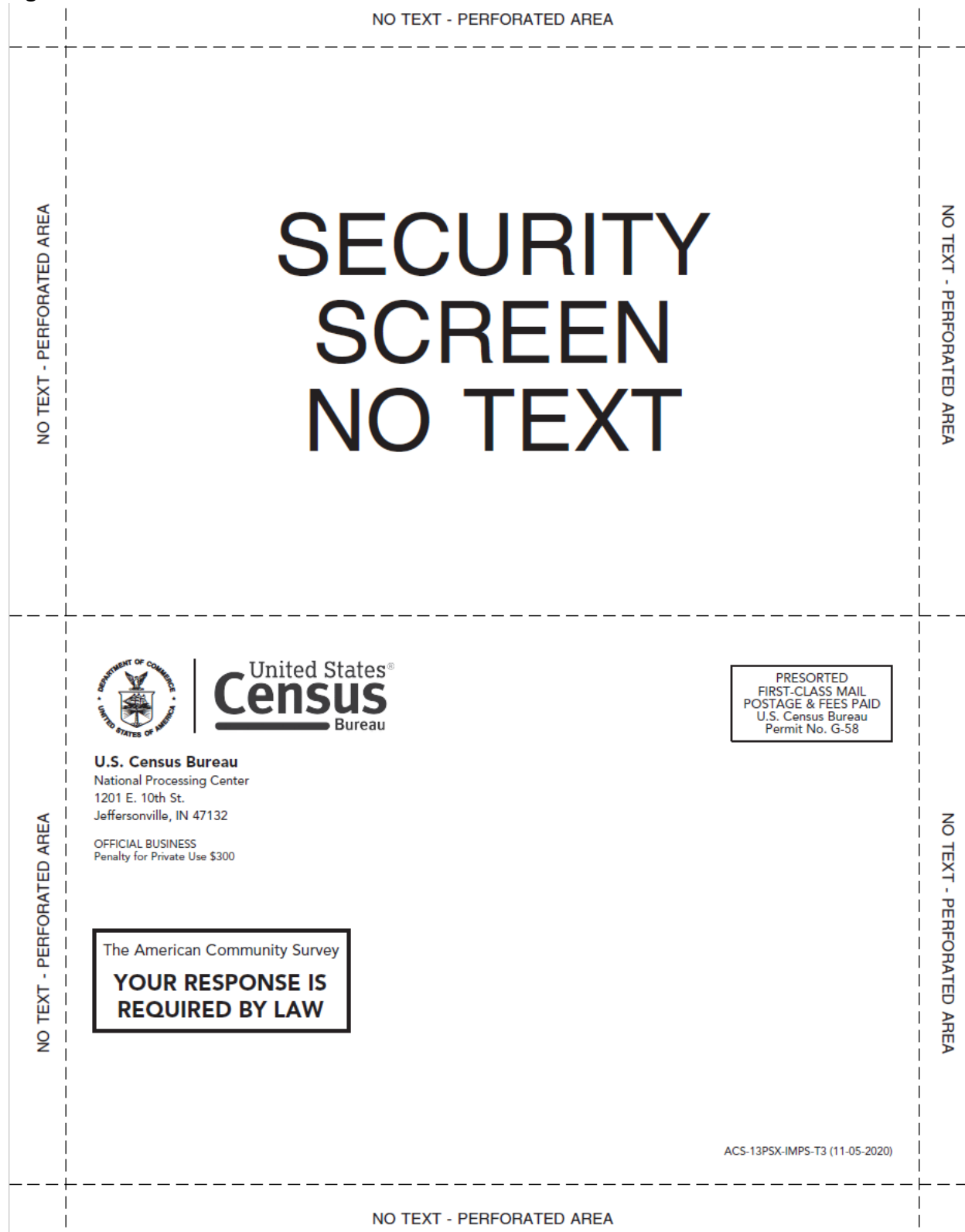


Figure 22. Front of Treatment 4 Pressure Seal Letter

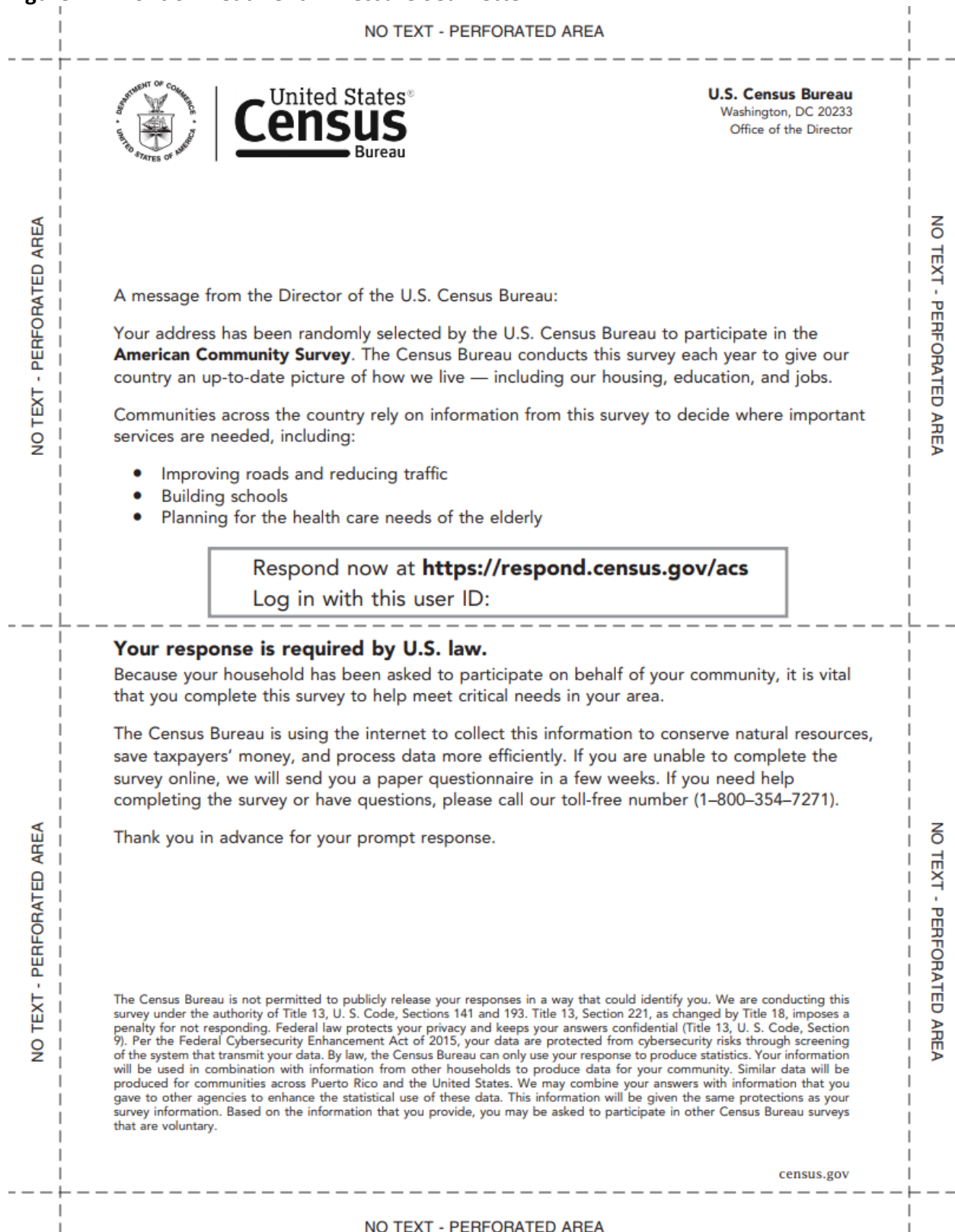
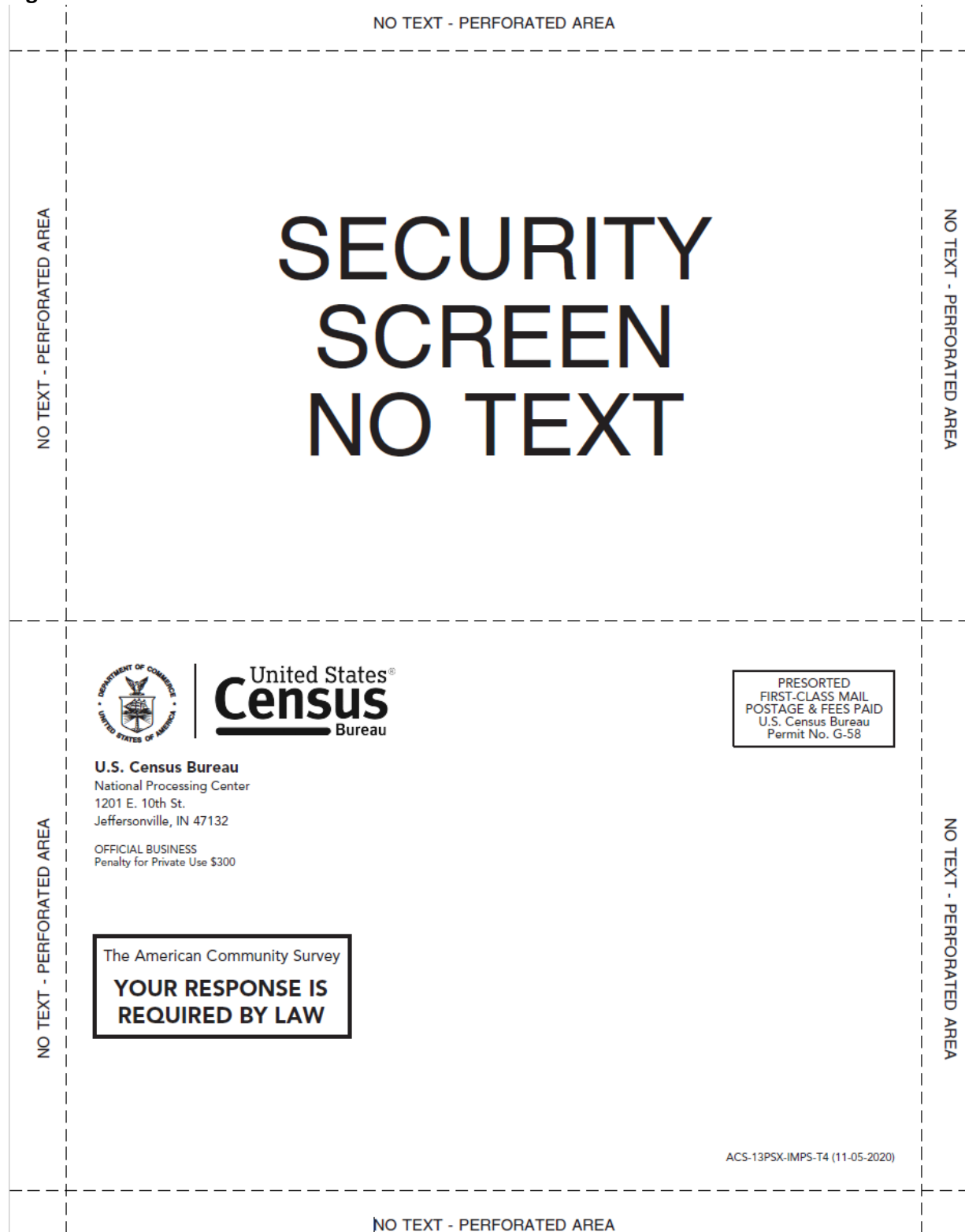


Figure 23. Back of Treatment 4 Pressure Seal Letter



Appendix E. Comparison of Treatments

Table 25. Comparison of Treatments

Item	Modified Control	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Description	Initial Mail Package used in production.	Initial Mail Package without a paper questionnaire reference.	Pressure Seal Letter with paper questionnaire reference.	Pressure Seal Letter without paper questionnaire reference.	Pressure Seal Letter with de-emphasized paper questionnaire reference.
Comparison(s)	Treatment 1 Treatment 2	Control Treatment 3	Control Treatment 3 Treatment 4	Treatment 1 Treatment 2 Treatment 4	Treatment 2 Treatment 3
Return Address*	Under logo	Under logo	Upper right corner	Upper right corner	Upper right corner
Response call out box†	No User ID	No User ID	Contains User ID	Contains User ID	Contains User ID
Questionnaire Reference‡	If you are unable to complete the survey online, we will send you a paper questionnaire in a few weeks.	Sentence omitted.	If you are unable to complete the survey online, we will send you a paper questionnaire in a few weeks.	Sentence omitted.	If you are unable to complete the survey online, we will send you a paper questionnaire in a few weeks (no bold).
Response Motivation‡ – <i>“The Census Bureau is using the internet to collect this information to conserve natural resources, save taxpayers’ money, and process data more efficiently.”</i>	After paper questionnaire reference	Own paragraph	After paper questionnaire reference	Own paragraph	Before the paper questionnaire reference
Signature	No signature	No signature	No signature	No signature	No signature
Legal Text*	In FAQs on back of letter	In FAQs on back of letter	In small print at bottom of letter, text rearranged to fit and some text removed	In small print at bottom of letter, text rearranged to fit and some text removed	In small print at bottom of letter, text rearranged to fit and some text removed
Size (in inches)*	Envelope - 11.5x6	Envelope - 11.5x6	Bi-fold mailer - 8.5x5.5	Bi-fold mailer - 8.5x5.5	Bi-fold mailer - 8.5x5.5

*Difference will not be tested and is a consequence of changing to pressure seal letter.

† Difference will be tested.

‡Difference will be tested in conjunction with other changes.

Appendix F. Demographic Distributions for the TQA and CAPI Modes

Table 26 and Table 27 show the demographic distributions for age, sex, Hispanic origin, and race for the TQA and CAPI modes, respectively. None of the distributions was significantly different among the treatments based on a Rao-Scott chi-square test. Some of the categories within a demographic had to be combined for the TQA mode due to small cell sizes.

Table 26. Demographic Distributions for the TQA Mode

Variable	Value	MC	T1	T2	T3	T4	Chi-Square P-value
Age [^]	Less than 49	14.6 (4.2)	9.8 (2.6)	8.8 (3.1)	10.0 (2.6)	10.8 (2.9)	0.85
	50 to 64	28.0 (4.4)	22.2 (4.1)	28.2 (5.2)	24.2 (3.8)	24.1 (4.0)	
	65 and over	57.4 (4.5)	68.0 (5.3)	62.9 (5.8)	65.8 (4.8)	65.1 (4.7)	
Sex [^]	Male	34.1 (4.2)	40.1 (4.8)	28.1 (4.9)	36.6 (4.6)	31.1 (4.5)	0.41
	Female	65.9 (4.2)	59.9 (4.8)	71.9 (4.9)	63.4 (4.6)	68.9 (4.5)	
Hispanic Origin [^]	Hispanic	13.7 (3.2)	12.5 (2.7)	14.4 (3.2)	12.9 (2.9)	20.1 (3.9)	0.44
	Not Hispanic	86.3 (3.2)	87.5 (2.7)	85.6 (3.2)	87.1 (2.9)	79.9 (3.9)	
Race	White Only	71.3 (4.1)	73.7 (4.3)	70.3 (4.6)	77.3 (4.2)	71.3 (4.1)	0.45
	Black Only	15.8 (3.3)	17.0 (3.3)	17.2 (3.9)	14.4 (3.1)	20.8 (4.1)	
	Other Race Only	8.7 (2.5)	3.3 (1.8)	6.0 (2.0)	6.8 (2.5)	4.8 (1.8)	
	Two or More Races	2.4 (1.3)	1.5 (0.9)	4.1 (1.7)	1.0 (0.8)	2.2 (1.3)	
	Missing	1.7 (1.0)	4.4 (1.9)	2.5 (1.4)	0.4 (0.4)	1.0 (0.8)	

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

[^] Missing values removed from rates due to small cell sizes.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a Rao-Scott chi-square test at the $\alpha=0.1$ level.

Table 27. Demographic Distributions for the CAPI Mode

Variable	Value	MC	T1	T2	T3	T4	Chi-Square P-value
Age	Less than 18	1.0 (0.3)	0.3 (0.1)	1.1 (0.3)	0.8 (0.2)	0.3 (0.1)	0.11
	18 to 29	12.7 (1.0)	15.3 (1.2)	13.3 (1.0)	16.4 (1.1)	14.2 (1.1)	
	30 to 49	35.2 (1.3)	34.3 (1.3)	34.3 (1.5)	33.2 (1.3)	35.7 (1.1)	
	50 to 64	27.5 (1.3)	26.0 (1.3)	26.8 (1.2)	26.2 (1.1)	24.1 (1.1)	
	65 and over	23.1 (1.1)	23.4 (1.3)	24.1 (1.0)	22.9 (1.0)	24.6 (1.2)	
	Missing	0.5 (0.2)	0.6 (0.2)	0.4 (0.2)	0.5 (0.2)	1.1 (0.3)	
Sex	Male	46.2 (1.5)	44.6 (1.5)	48.7 (1.3)	44.9 (1.2)	44.0 (1.3)	0.23
	Female	53.7 (1.5)	55.2 (1.5)	51.4 (1.3)	54.9 (1.1)	55.9 (1.3)	
	Missing	0.1 (0.1)	0.1 (0.1)	<0.1 (<0.1)	0.2 (0.1)	0.1 (0.1)	
Hispanic Origin	Hispanic	22.4 (1.1)	21.4 (1.3)	20.8 (0.9)	21.7 (1.2)	21.6 (1.1)	0.46
	Not Hispanic	76.7 (1.2)	78.2 (1.3)	78.9 (0.9)	77.7 (1.2)	78.1 (1.1)	
	Missing	0.9 (0.3)	0.4 (0.2)	0.3 (0.2)	0.6 (0.2)	0.4 (0.2)	
Race	White Only	64.4 (1.4)	64.0 (1.5)	65.6 (1.4)	62.9 (1.4)	63.8 (1.5)	0.80
	Black Only	17.1 (1.0)	19.6 (1.1)	18.2 (1.1)	19.6 (1.1)	20.0 (1.2)	
	Other Race Only	14.6 (1.0)	13.3 (0.9)	13.7 (1.0)	14.6 (1.0)	13.3 (1.0)	
	Two or More Races	2.5 (0.5)	2.1 (0.4)	1.9 (0.4)	2.1 (0.4)	2.3 (0.4)	
	Missing	1.2 (0.3)	1.0 (0.3)	0.7 (0.3)	0.7 (0.2)	0.7 (0.2)	

Source: U.S. Census Bureau, American Community Survey, 2021 Initial Mailing Pressure Seal Test, DRB Approval Number: CBDRB-FY23-ACSO003-B0049.

Note: Minor additive discrepancies are due to rounding. Standard errors are in parentheses. Significance was tested based on a Rao-Scott chi-square test at the $\alpha=0.1$ level.