

The Impact of Voicemail Message Content on RDD Cell Phone Response Rates in the National Immunization Surveys

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Abstract

The National Immunization Survey-Child (NIS-Child) is a cell phone random-digit-dial (RDD) survey used to assess vaccination coverage in the United States among children age 19-35 months. Among working telephone numbers in the cell phone RDD sample, the most common NIS-Child call outcome is reaching a potential respondent's voicemail. Under current procedures, the voicemail message left for respondents is a pre-recorded message delivered by an automated system rather than a live message left by the interviewer making the call.

Beginning in Quarter 1 of 2019, NORC conducted an operational evaluation of the content of the pre-recorded message. In Quarters 1 and 2 of 2019, telephone numbers in the sample were randomly assigned to one of four groups: 1) the standard NIS pre-recorded voicemail message serving as the control, 2) a pre-recorded version using informal language and mentioning criteria for household eligibility, 3) a pre-recorded version using informal language without mentioning criteria for household eligibility, and 4) a pre-recorded version emphasizing the importance of the study and excluding mention of the eligibility criteria. Respondent contact and cooperation rates in the NIS-Child were compared across groups for the first dial following the voicemail message. Groups 2 and 3 performed significantly worse than Groups 1 and 4 in key outcomes, but there was no significant difference between Groups 1 and 4. NORC continued the evaluation in Quarters 3 and 4 of 2019 without the second and third treatments, and found that the first group outperformed the fourth group when the aggregated results of all four quarters were considered.

Key Words: National Immunization Surveys, Voicemail Message, Pre-Recorded Message, Cell phone RDD, Response Rates

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

1. Introduction

When potential respondents to telephone surveys do not answer the phone, information about the survey can be provided to them in the form of a voicemail message. Published research indicates that leaving voicemail messages on cell phones decreases post-voicemail contact rates, but raises cooperation among those contacted (Benford et al., 2010). Research has also tied the decrease in contact rate primarily to a decline in the rate at which respondents call the survey back after receiving a voicemail message compared to when a message is not left (Skalland et al., 2019). This published research describes the impacts of the choice to either leave a voicemail message or not. The research is scant on the potential impacts of message content.

NORC has conducted research on modifying the content of the NIS survey introduction and found that a scripted introduction employing relatively informal language induced a higher rate of respondent participation than scripts using more formal language (Ravanam et al., 2019). Considering the decades of decline in survey response rates in telephone surveys (Lavrakas et al., 2017), it could be valuable to know whether similar, simple changes in the content of scripts could provoke matching improvements in participation. Scripts read to potential respondents early in the data collection protocol would be of particular interest, with special consideration for surveys with cell phone samples, to whom sending advance letters is rarely possible (National Research Council, 2013). Thus, NORC became interested in learning whether changing parts of the pre-recorded voicemail message, including testing the relative formality of the language, could impact the rates at which respondents later picked up the phone and then participated in the survey.

2. Design of the Operational Evaluation

The NIS-Child, one of the National Immunization Surveys (NIS), has been conducted every year since 1994; it was introduced in response to measles outbreaks in the early 1990s. The Centers for Disease Control and Prevention (CDC) sponsors the survey, which provides national, state, and selected local area estimates of vaccination coverage among children age 19-35 months. It is a two phase survey: the first phase is a household survey conducted with a cell phone RDD sample to gather demographic data and obtain parent/guardian consent to contact vaccination providers, and the second phase is a paper survey mailed to those providers to obtain vaccination data for the child identified in the first phase. This project was determined by CDC's National Center for Immunization and Respiratory Diseases not to constitute human subjects research and therefore did not require IRB review. However, the protocol was reviewed and approved by the NORC IRB.

In Quarters 1 and 2 of 2019, NORC tested four versions of the pre-recorded voicemail message script, including the existing script as a control. The control script has been in use for more than a decade and is more formal than most spoken language in that it uses the less common "hello" instead of "hi" as a greeting and contains no contractions. The three treatment scripts were designed to test concepts that might be salient to respondents. Other than the control, we tested three treatments that all used informal language: contractions, "hi" instead of "hello", and generally more conversational language; all included the sentence "This is not a sales call". All three treatment scripts also changed the language related to the respondent calling back from imperative ("please call us") in the control to

declarative (“you can call us”) in the three treatments. One of these treatments included a reference to determining eligibility on a future callback (Treatment 2), one did not include a reference to determining eligibility on a future call (Treatment 3), and one did not include a reference to determining eligibility on a future call, but did include language referring to the inclusion of teenagers in the survey and emphasizing the importance of the information collected by the survey (Treatment 4). All four scripts are displayed in Figure 1 below. Elements to be evaluated in Treatments 2-4 are displayed in bold face.

Treatment 1	Control
Hello. I am calling on behalf of the Centers for Disease Control and Prevention. We are conducting a nationwide survey about childhood immunization. Would you please call us at 1-877-XXX-XXXX to let us know whether or not there are any children between 12 months and 4 years old living or staying in this household? The number again is 1-877-XXX-XXXX. Thank you.	
Treatment 2	Informal
Hi, I'm calling on behalf of the Centers for Disease Control and Prevention. This is not a sales call. The CDC is conducting a really important study about kids' health and vaccinations to find out about the risk for certain diseases in our communities and we're asking for your help. We'll be calling you back to ask you a few questions to see if your household is eligible for this study. Or, if you prefer, you can call us at 1-877-XXX-XXXX.	
Treatment 3	Informal, No Mention of Eligibility
Hi, I'm calling on behalf of the Centers for Disease Control and Prevention. This is not a sales call. The CDC is conducting a really important study about kids' health and vaccinations to find out about the risk for certain diseases in our communities and we're asking for your help. We'll call you back, or, if you prefer, you can call us at 1-877-XXX-XXXX.	
Treatment 4	Informative, No Mention of Eligibility
Hi, I'm calling on behalf of the Centers for Disease Control and Prevention. This is not a sales call. The CDC is conducting an important study about the health and vaccination of children and teens, which will provide crucial information about the risk of diseases in our communities. We'll call you back, or, if you prefer, you can call us at 1-877-XXX-XXXX.	

Figure 1: Pre-recorded Message Scripts, Quarters 1 and 2 of 2019

Each phone number was randomly assigned to receive one of the four scripts, and we measured key outcomes, limiting results to the first call record after the voicemail message was left to estimate the impact on the next attempt at contact post-voicemail. Specifically, we measured:

- Contact rate – the number of cases in which we talked to a human being divided by the number of dialed phone numbers that did not return an error code (i.e., working phone numbers).
- Age-screener completion rate among contacts – the number of cases with a completed age-screener divided by the number of contacts.

- Age-eligibility rate among screener completes – the proportion of age-screener completes who are eligible for the NIS-Child survey.
- Interview completion rate among identified age-eligible households – the number of households with a completed interview divided by the number of households identified with an eligible child.
- Interview yield rate – the number of completed interviews divided by the number of dialed cases.
- Provider consent yield rate – the number of interviews in which consent to contact providers was gained divided by the number of dialed cases.

3. Results

In Quarters 1 and 2 of 2019, there were a total of 3,950,709 cases with a call after leaving one of the four pre-recorded voicemail message treatments. Figures 2 through 7 below show the key outcomes for the first call record after the voicemail message was left among those cases, and p-values for Pearson's chi-squared test of independence.

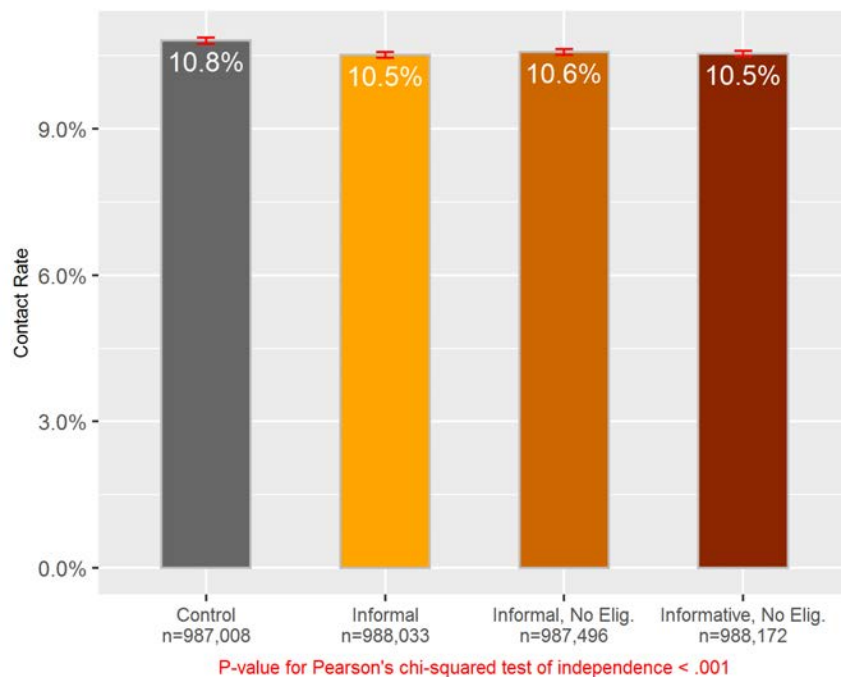


Figure 2: Quarters 1 and 2 of 2019: Contact Rate among Working Numbers

The Control script (Treatment 1) had a small but statistically significant advantage over the other three treatments in contact rate among working numbers (Figure 2).

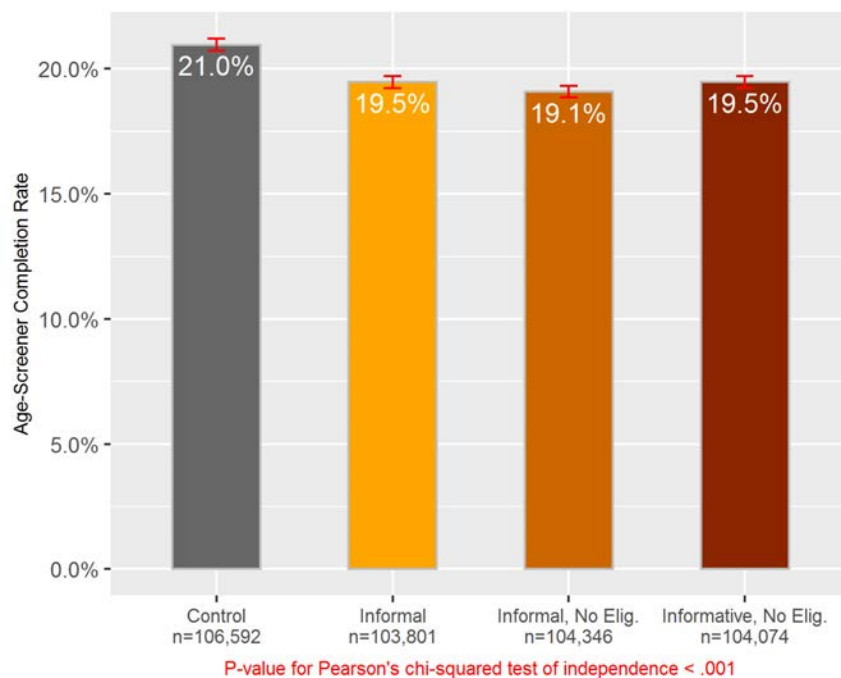


Figure 3: Quarters 1 and 2 of 2019: Age-Screener Completion Rate among Contacts

The Control script also had a significantly higher age-screener completion rate than the other three scripts (Figure 3).

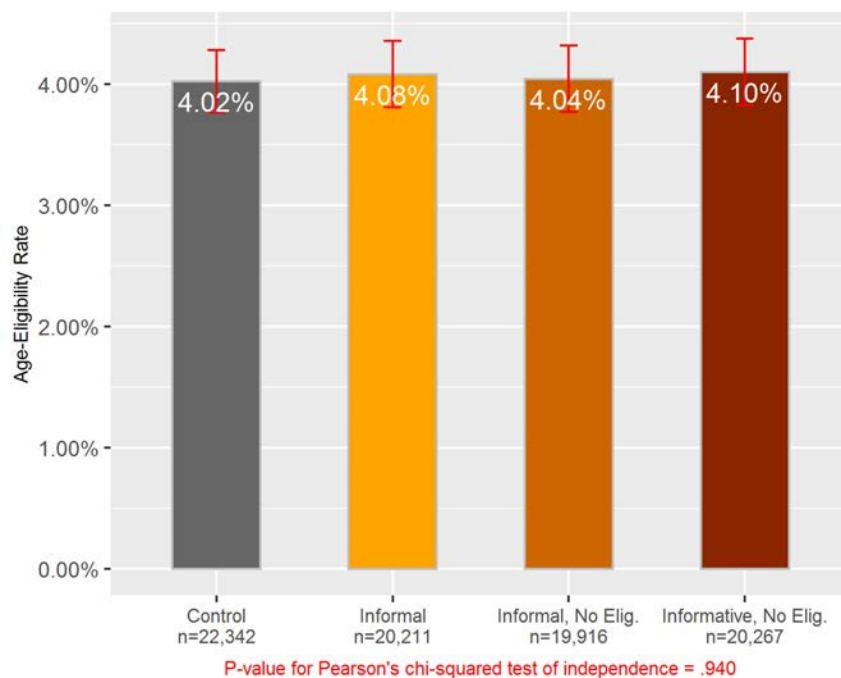


Figure 4: Quarters 1 and 2 of 2019: Age-Eligibility Rate among Age-Screener Completes

Differences were not observed in age-eligibility rate among age-screener completes (Figure 4).

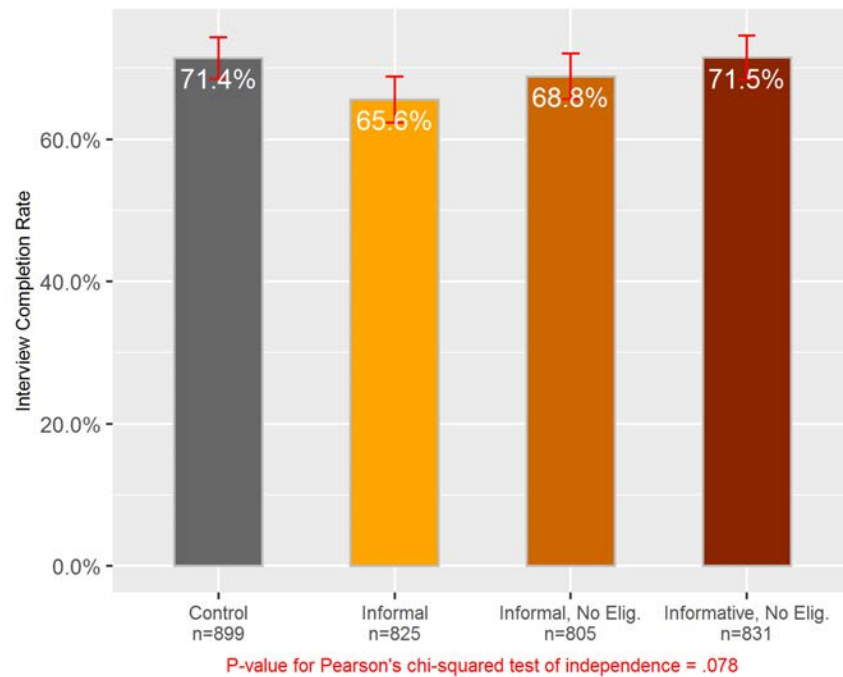


Figure 5: Quarters 1 and 2 of 2019: Interview Completion Rate among Age-Eligibles

For the interview completion rate among age-eligibles, the Control script and the Informative script (Treatment 4) had point estimates several points higher than the Informal (Treatment 2) and Informal, No Eligibility (Treatment 3) scripts, but confidence intervals overlap for all four scripts, and the p-value for Pearson's chi-squared test of independence was $> .05$ ($p = .078$).

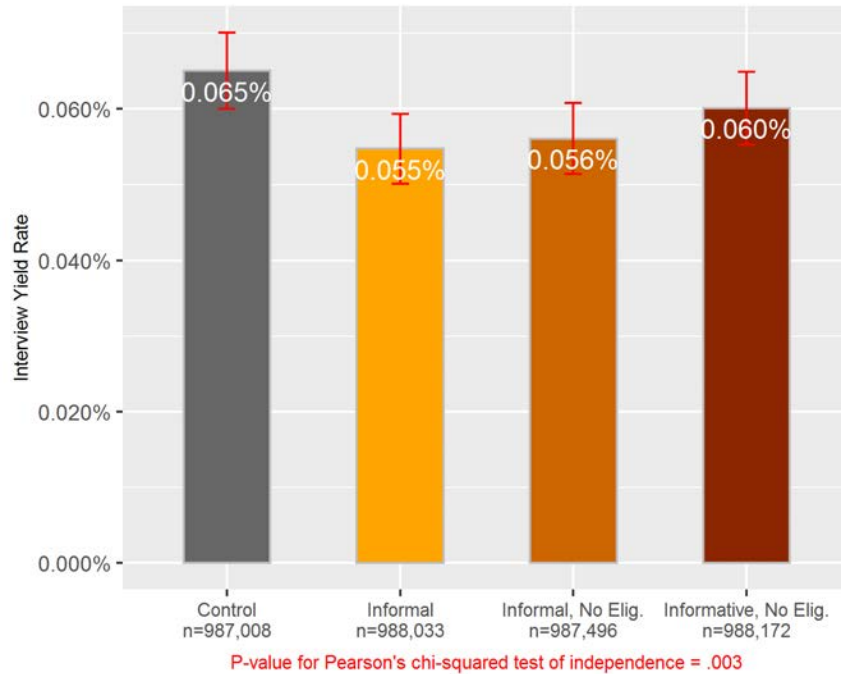


Figure 6: Quarters 1 and 2 of 2019: Interview Yield Rate among Dialed Numbers

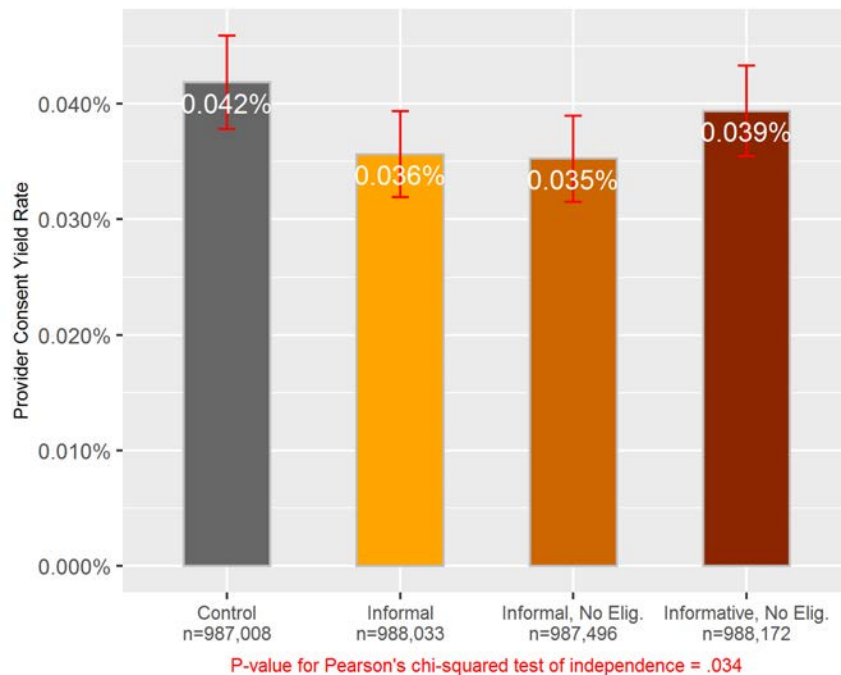


Figure 7: Quarters 1 and 2 of 2019: Provider Consent Yield Rate among Dialed Numbers

A statistically-significant relationship was observed between treatment group and interview yield rate among dialed (Figure 6) and between treatment group and provider consent yield rate among dialed (Figure 7). Pairwise t-tests comparing the Control script to each treatment script individually revealed a statistically-significant difference in the interview yield rate between the Control script and the Informal script ($p=0.003$) and between the Control script and the Informal, No Eligibility script ($p=0.011$) but not

between the Control script and the Informative script ($p=0.166$). Similarly, pairwise t-tests of differences in the provider consent yield rate between the Control script and the treatment script showed a statistically-significant difference between the Control script and the Informal script ($p=0.026$) and between the Control script and the Informal, No Eligibility script ($p=0.018$) but not between the Control script and the Informative script ($p=0.387$).

In Quarters 3 and 4 of 2019, the Informal and Informal, No Eligibility scripts were dropped from the survey instrument, and the sample was randomly assigned to receive either the Control script or the Informative script. A total of 7,551,331 cases had a call record following a voicemail message over the course of 2019 data collection in the two treatment groups combined. Figures 8 through 13 display the key outcome rates for the call record following the voicemail message and include observations taken from all four 2019 quarters, along with p-values for a test of no difference.

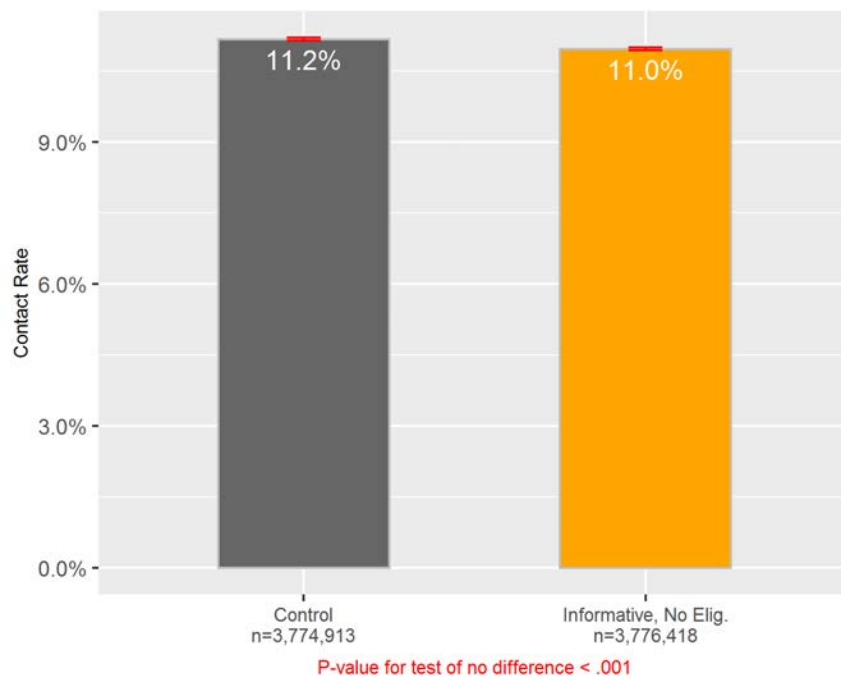


Figure 8: All 2019 Quarters: Contact Rate among Working Numbers

As was observed in Quarters 1 and 2, the Control script still had a significantly higher contact rate among working numbers when including all four quarters (Figure 8).

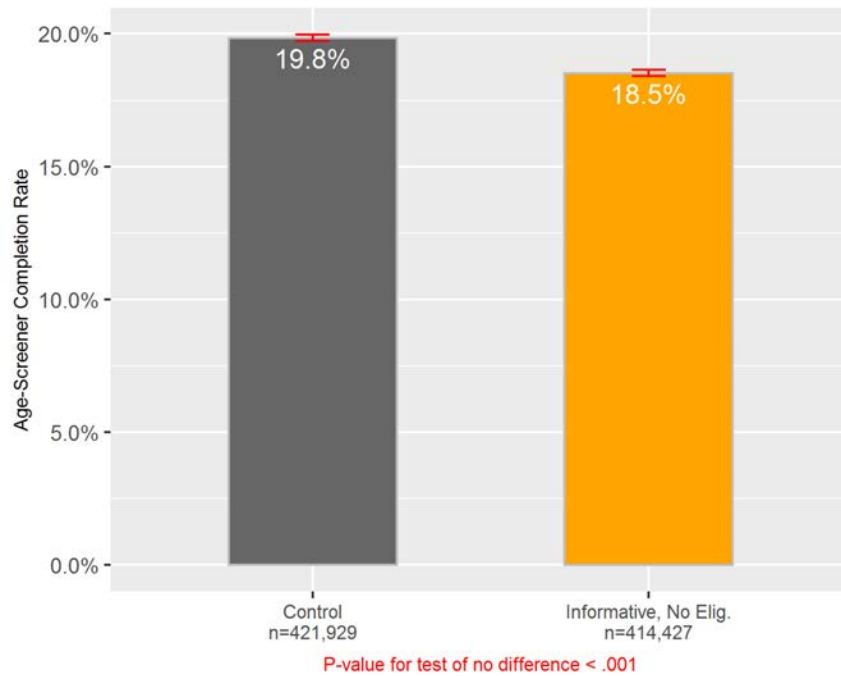


Figure 9: All 2019 Quarters: Age-Screener Completion Rate among Contacts

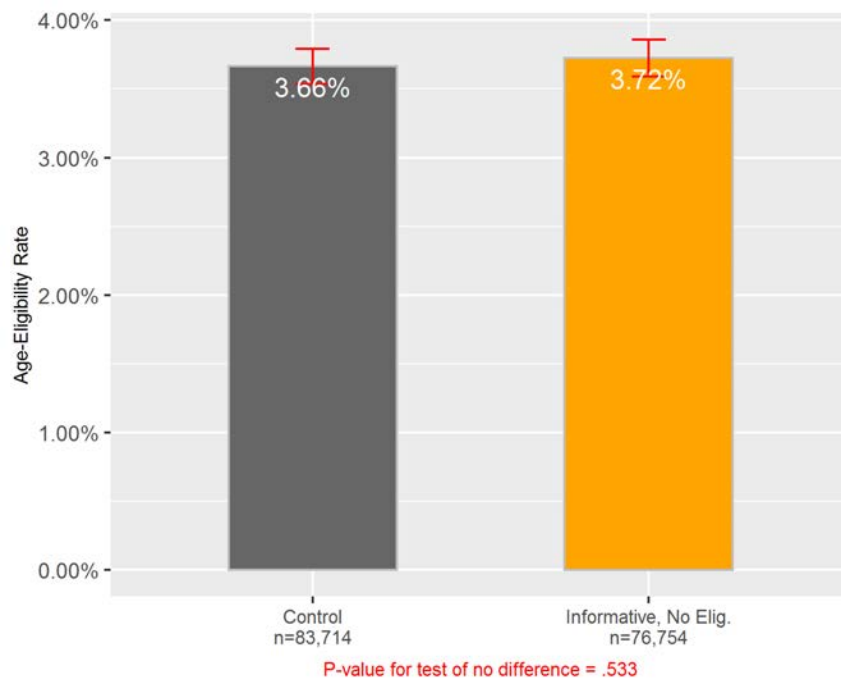


Figure 10: All 2019 Quarters: Age-Eligibility Rate among Age-Screener Completes

With the increased sample size, the age-screener completion rate was significantly higher in the Control group (Figure 9), and there was still no significant difference between the two groups in the age-eligibility rate among age-screener completes (Figure 10).

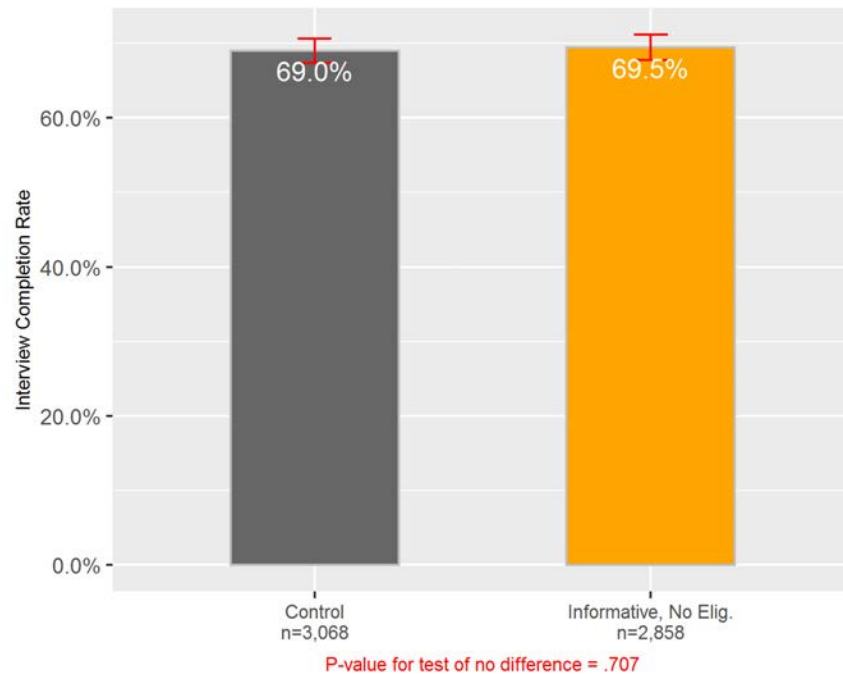


Figure 11: All 2019 Quarters: Interview Completion Rate among Age-Eligibles

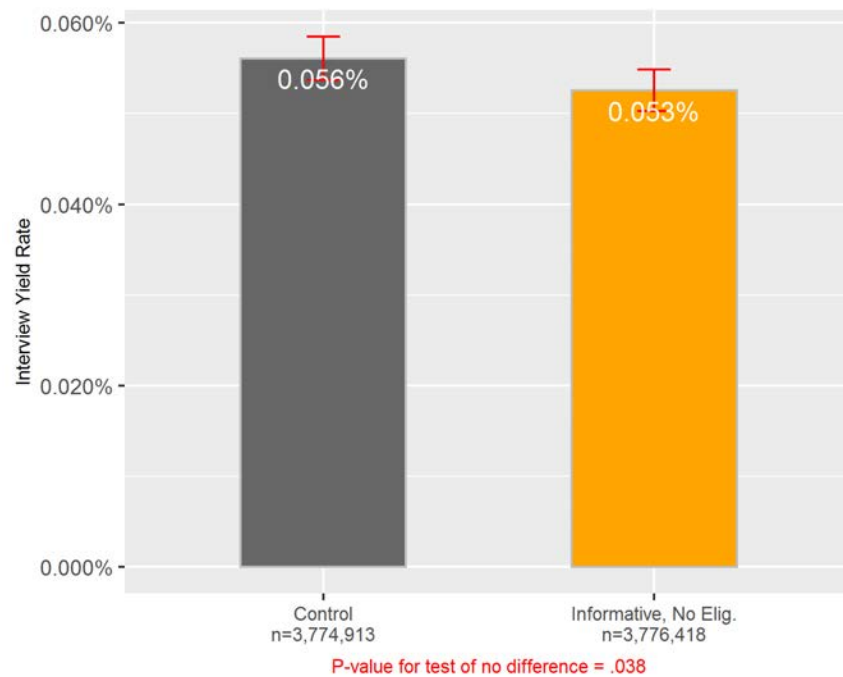


Figure 12: All 2019 Quarters: Interview Yield Rate among Dialed Numbers

There was also no significant difference between groups in the interview completion rate among age-eligibles (Figure 11), but the interview yield rate among dialed numbers was significantly higher in the Control group (Figure 12), owing largely to that group's higher age-screener completion rate.

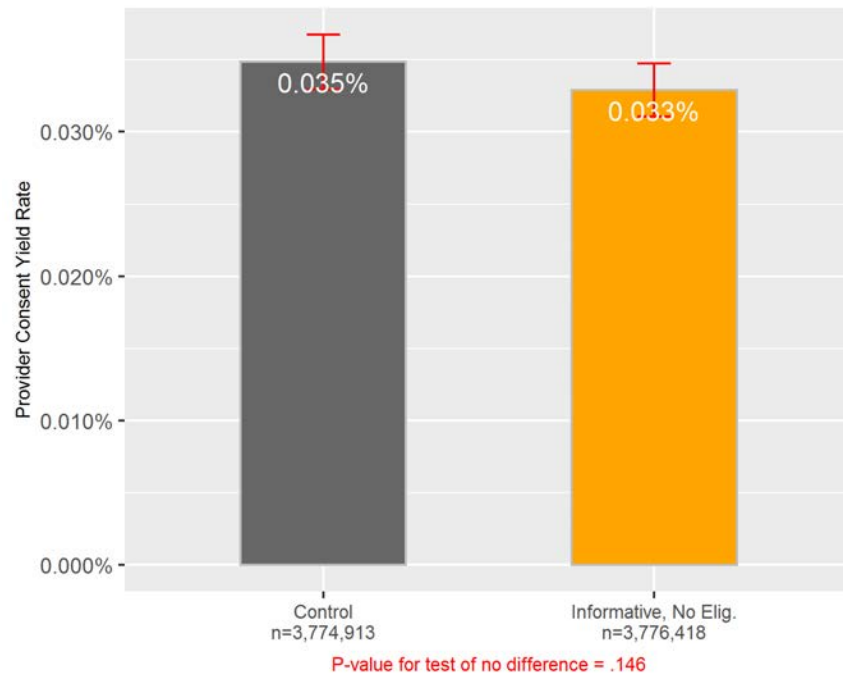


Figure 13: All 2019 Quarters: Provider Consent Yield Rate among Dialed Numbers

Finally, there was still no significant difference in the provider consent yield rate among dialed numbers between the two groups (Figure 13).

4. Discussion

Considering the significant differences in contact rate, age-screener completion rate, and interview yield rate on first dials post-voicemail, the decision was made to revert to the Control script for all sample starting in Quarter 1 of 2020.

Treatments 2 through 4 differed from the Control script in several ways: the three scripts used informal language and included the sentence “This is not a sales call,” whereas the Control script did not; the Control script mentioned a specific age range (12 months to 4 years), whereas the other three scripts mentioned only “kids” or “children and teens”; and the Control script asked the respondent to call us back, whereas the other three scripts did not.

One or more of these differences may have resulted in the variation in key outcome rates that we observed between the Control script group and the Treatment script groups. It is possible that the inclusion of “This is not a sales call” in the three Treatment scripts may have had unintended effects if the phrase’s popular use has engendered skepticism among potential respondents. The Control script’s specific instruction to call us may have resulted in more incoming calls from respondents receiving that message compared to respondents receiving one of the three Treatment scripts, which stated that we would be calling the respondent back. The specificity of the age range given in the Control script may have helped to legitimize the study compared to the three Treatment scripts.

5. Limitations and Future Research

There are unique aspects of the NIS-Child. The NIS-Child is a cell phone survey, it is sponsored by the CDC, and seeks to identify households with young children. Thus, the results of this evaluation are not easily applicable to other surveys.

Because the three Treatment scripts differed from the Control script in several ways, it is unclear which difference or combination of differences may have caused the Control script to outperform them.

Although the Control script outperformed the three Treatment scripts used in 2019, there has been continued testing of alternative voicemail message scripts in 2020. In Quarter 1 of 2020, there was testing of the Control script against equally formal scripts which exclude the “sales call” language and which all replace the Control’s eligibility language of “twelve months to four years” with “children and teens.” This was the eligibility language used in the Informative script (Treatment 4), the treatment that came closest to the success of the Control. These new scripts will also help to assess whether language emphasizing the importance of the survey has an impact on cooperation and whether scripts framing the survey as “nationwide” encourage participation more than scripts that describe impacts “in our communities.”

The plan is to also assess the impact of including the name of the survey (the National Immunization Surveys) in the voicemail message script.

References

- Benford R, Lavrakas P, Tompson T, and Fleury C (2010). An experiment testing the impact of leaving voice messages in cell phone surveying. Paper presented to the American Association for Public Opinion Research, Chicago, Illinois.
- National Research Council. (2013). *Nonresponse in Social Science Surveys: A Research Agenda*. Washington, DC: The National Academies Press.
<https://doi.org/10.17226/18293>.
- Ravanam M, Skalland B, Scott C, Ma Q, Welch V, Balok T, Elam-Evans L, and Smith C (2019). Assessing the impact of modifying the introduction on the National Immunization Survey. JSM Proceedings, Survey Research Methods Section. Alexandria, VA: American Statistical Association.
- Skalland B, Reimer B, Ma Q, Welch V, Kornlyo S, Hobson K, Hill HA, and Fredua B. (2018). Evaluating the impact of using pre-recorded voicemail messages in the National Immunization Survey. JSM Proceedings, Survey Research Methods Section. Alexandria, VA: American Statistical Association.
- Skalland B, Welch V, Hill H, Fredua B, Elam-Evans L and Smith C (2019). The impact of voicemail messages on RDD cell phone response rates in the National

Immunization Surveys. JSM Proceedings, Survey Research Methods Section.
Alexandria, VA: American Statistical Association.