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Impacts of Transition Statements in Survey Questions on Survey Break-off: Evidence from a Survey Experiment

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Summary

The California Health Interview Survey (CHIS) has employed an addressed-based sampling (ABS) frame with a mail push-to-web interview followed by a telephone nonresponse follow-up as the primary data collection approach since 2019. However, the nature of the self-administered web survey results in more survey break-offs than the previous computer-assisted telephone interview (CATI). During CHIS 2021 data collection, the CHIS team observed that a large proportion of questions with high break-off incidence began with transition statements, such as "The following questions are about…" or "These next questions are about...". Therefore, experiments were warranted to test whether eliminating transition statements leads to a reduction in survey break-offs during CHIS 2022.

This study evaluates an experiment conducted in CHIS 2022, where respondents were evenly split and randomly assigned to two conditions: (1) a treatment group where transition statements were removed from the selected twenty-six questions; (2) a control group with the original question wording, including transition statements. Our data demonstrate that eliminating transition statements results in substantive survey break-offs reductions. Aggregated break-offs from the twenty-six questions have decreased by 44.2%. For individual questions, reduction rates range from 14% to 82%. Results also show that removing the transition statements converted sufficient partials to fully completes and slightly shortened interview length. Consequently, all transition statements except an outlier have been removed for the remainder of the CHIS 2022 and transition statements will be less likely to be included in new survey question development for the CHIS.

Introduction

The California Health Interview Survey (CHIS) has employed the addressed-based sampling (ABS) frame with a mail push-to-web interview followed by telephone nonresponse follow-up as the primary data collection approach since 2019, a fundamental shift from random-digit-dialing (RDD) computer-assisted telephone interview (CATI). While various advantages were confirmed in the new approach (Wells & Fu 2021), such as substantially increasing response rate, rich auxiliary information available from ABS frame to target specific populations, abundant paradata to better monitor survey data quality, and lowering survey costs, the nature of self-administered web surveys results in a more saliant side effect, survey break-offs, as opposed to the previous CATI method. This is because break-offs in telephone interviews could be mitigated by interviewer characteristics or efforts (Groves 1990).

CHIS 2022 sent out a sequence of mailings consisting of an initial invitation letter, a sealed postcard reminder, a second reminder letter, and a sealed postcard final reminder to sampled households who had not yet responded or refused. Only an initial letter and a sealed reminder were sent out for those whose addresses were determined to be undeliverable. However, for those who began to participate in the survey but broke off before completion, CHIS 2022 did not implement any strategies to invite them to resume the survey.

Other than developing strategies to persuade respondents back to the survey, a more fundamental approach is to examine where break-offs are more likely to occur throughout the survey and explore modifications to prevent them from happening. The UCLA CHIS team examined questions in the CHIS adult interview with high break-off incidence during CHIS 2021 data collection. Among questions with high break-off rates, a large proportion of questions began with transition statements, such as "The following questions are about…" or "These next questions are about...". Consequently, experiments were designed to test during CHIS 2022 whether eliminating transition statements leads to a reduction in break-offs.

Assisted with CHIS 2022 paradata from the web survey, this paper seeks to detail how transition statements impact survey flow and survey break-off from an experimental perspective. This paper is structured as follows – the second section describes factors impacting web survey break-offs from previous theoretical and empirical studies. CHIS questionnaire and experiment design are discussed in section three, followed by the results in section four. Conclusions are discussed in the final section.

Factors Impacting Web Survey Break-offs

Reducing survey break-offs is a tenacious challenge, and existing literatures have discussed it under the total survey error (TSE) framework in almost every survey mode over the past decades, from mail surveys (Ayidiya & McClendon 1990), face-to-face surveys (Menold et al., 2018), telephone surveys (McGonagle 2013), text message surveys (Lau, Sanders & Lombaard 2019), and surveys through mobile devices such as smartphones (Mavletova & Couper 2015), and tablets (Wells, Bailey and Link 2013).

Peytchev (2009) outlined a framework for web survey participation decisions in addition with multiple factors influencing participation: (1) respondent factors (e.g., socio-demographics, survey predispositions, topic involvement, and cognitive ability), (2) survey design (e.g., sample selection and recruitment, sponsorship, and incentive structure), (3) page and question characteristics (e.g., as interview length, question content). Based on multiple factors mentioned above, this study conceptually identified the mechanism for specific survey participation outcomes, such as item-nonresponse, break-off or unit-nonresponse. The following discussions will concentrate on how the three components interact with survey break-offs.

Respondent factors. This set of factors, more associated with initial participation decisions rather than break-offs during interviews, is essentially out of the researcher's control since it almost comes by nature not by research design. Therefore, incongruent findings appear when the association between respondent factors and break-off is examined. For example, studies find that more break-offs from men than from women (Peytchev 2011), while there are findings in the opposite way (Steinbrecher, Roßmann & Blumenstiel 2015). Similarly, as for race, studies show White respondents are more likely complete surveys (Peytchev 2009), while others show Black or African American respondents are less likely drop off surveys (Patrick et al., 2013).

Additionally, since paradata from web survey is available, answering device types are also a good indicator of break-off. Past research shows that respondents who start web surveys on mobile devices have a greater chance of dropping off than on PCs (Couper, Antoun & Mavletova 2017).

Survey Design. Researchers always optimize survey features to maximize participation rather than minimize break-offs. However, efforts are still made to decrease survey break-off, such as informing length of interview (Crawford, Couper & Lamias 2001), displaying survey progress indicators (Callegaro & Yang 2013) or providing different incentives (Deutskens et al. 2004).

Page & question characteristics. Page and question characteristics only affect the likelihood of break-off instead of initial participation (Mittereder & West 2022). Page and question features in web survey include scrolling formats, question types (matrix layout questions, open-ended questions or sensitive questions), question sophistication (esoteric technical/medical terms embedded or lengthy questions). A meta-analysis also shows that the first few pages suffer the most in web surveys, with 80% of all break-offs (Vehovar & Cehovin 2014). The CHIS 2022 interview is consistent with the trend where break-offs are more likely to happen at an early stage. Over 40% of break-offs occurred during the first section (there are 18 sections in CHIS 2022), and the majority of participants completed through the web instrument. Furthermore, some survey researchers believe that transitional pages introducing new sections or new questions should be avoided since it signals additional component of the survey (Vehovar & Cehovin 2014; Mittereder & West 2022).

Research Questions

As discussed, CHIS 2021 observed the same break-off pattern as previous studies, showing that transition statements resulted in a higher risk of break-offs. However, the current literature includes more observational studies rather than experimental studies. Besides, the current literature mostly targets a specific target population, such as faculty or college students (see Heerweg & Loosvelt 2006; Sakshaug & Crawford 2010; Peytchev 2011; Patrick et al., 2013; Mittereder & West 2022) rather than based on general population. As a result, this paper aims to answer the following questions experimentally based on a probability-based sample from the general population (adults aged 18+) in California, which is equipped with more power for generalization and extrapolation:

- How does eliminating transition statements impact the overall survey flow, such as completion status or interview length?
- Does eliminating transition statements reduce break-offs in the CHIS web survey?

Data and Method

The CHIS 2022 transition statement experiment was conducted in the adult extended interview component of the survey from February 2022 to June 2022. The experiment explores whether

removal of the transition statements results in fewer survey break-offs and provides empirical evidence to assist with data-driven decisions on CHIS data quality improvement.

Two experimental conditions were constructed in the CHIS 2022 adult survey: 1) treatment group where transition statements were removed from the selected questions; 2) control group with original questions. Respondents were roughly evenly split and randomly assigned to the two conditions. A total of 19,389 respondents were included in the experiment. 47.8% of respondents were assigned to the treatment group, and 52.2% to the control group.

In this experiment, if a transition statement was a full sentence prior to a survey question, the statement was directly eliminated when displayed to respondents. If a survey question sentence only began with a transition statement clause, the transition statement clause would be removed with slight wording changes in the treatment group.

Table 1 illustrates question stems and variable IDs in CHIS 2022 adult questionnaire. Transition statements placed prior to survey questions that were removed in the experimental treatment are in italic. For questions AF110, AJ101B, and AQ16, both the original and abbreviated questions are listed. Twenty-six questions in which high break-off rates were observed during CHIS 2021 data collection were selected and tested in the experiment, covering various crucial CHIS topics such as health behavior, health care and insurance, health conditions, and socioeconomic characteristics.

Table 1. CHIS 2022 Variables and Question Contents Selected in the Experiment

	VAR ID	Survey Question Contents
1	AB1	*These next questions are about your health*. Would you say that in general your health is excellent, very good, good, fair, or poor?
2	AE15	*Now, I am going to ask about various health behaviors*. Altogether, have you smoked at least 100 or more cigarettes in your entire lifetime?
3	AC81C	*The next questions are about electronic cigarettes and other electronic vaping products*. These products typically contain nicotine, flavors, and other ingredients. They may also be called e-cigs, vape pens, pod mods, hookah pens or e-hookah. Popular brands include JUUL, Blu, NJOY, Suorin, and Vuse. Do not include products used only for marijuana. Have you ever used an e-cigarette or other electronic vaping product, even just once in your lifetime?
4	AC115	*The next questions are about marijuana also called cannabis or weed, hashish, and other products containing THC*. There are many methods for consuming these products, such as smoking, vaporizing, dabbing, eating, or drinking. Have you ever, even once, tried marijuana or hashish in any form?
5	AC195	*In the following questions, we are specifically asking about products that contain CBD, but not THC*. CBD, or cannabidiol, is a chemical found in both marijuana and hemp plants that many people use for medicinal purposes. CBD does not make the user high. Have you ever, even once, tried CBD in any form?
6	AC207	*These questions are about drinks of alcoholic beverages*. In these questions a drink means a can or bottle of beer; a wine cooler or a glass of wine, champagne, or sherry; a shot of liquor or a mixed drink or cocktail. Have you ever, even once, had a drink of any type of alcoholic beverage? Please do not include times when you only had a sip or two from a drink.
7	AGV1	*The next questions are about firearms*. Please include weapons such as pistols, shotguns, and rifles. Include those kept in a garage, outdoor storage area, or motor vehicle. Please do not count BB guns, starter pistols, or guns that cannot fire. We are asking these in a health survey because of our interest in firearm-related injuries. How many firearms are kept in or around your home?
8	AE17	*These next questions are about your height and weight*. How tall are you without shoes? You answer in feet and inches or centimeters.
9	AG44	*The next questions are about your use of technology*. People may use the internet for streaming video/music, playing games, checking social media, using apps, browsing the web, etc., on a computer or on a phone or mobile device. On a typical day, how often do you use the internet?
10	AF110	*Abbreviated question*: Potentially hazardous weather-related events that are increasing in California, including extreme heat waves, flooding, wildfires, smoke from wildfires, and the public safety power shutoffs of electricity to prevent a wildfire. In the past two years, have you or members of your household personally experienced any of these events?

		Original question: The next set of questions are about potentially hazardous weather-related events that are increasing in California, including extreme heat waves, flooding, wildfires, smoke from wildfires, and the public safety power shutoffs of electricity to prevent a wildfire. In the past two years, have you or members of your household personally experienced any of these events?
11	AH39	*The next questions are about citizenship and immigration*. Are you a citizen of the United States?
12	AH1	*The next topics are about health insurance and health care*. Is there a place that you usually go to when you are sick or need advice about your health?
	AI37intro	*These next questions are about the type of health insurance your {spouse/partner} may have.*
13	AI37	{You said that you are covered by Medicare.} Is (SPOUSE/PARTNER) {also} covered by Medicare?
14	CF10A	*These next questions are about health insurance (CHILD) may have*. Does (CHILD) have the same insurance as you?
15	IA10A	*These next questions are about health insurance (TEEN) may have*. Does (TEEN) have the same insurance as you?
16	AH5	*Now, I'd like to ask about the health care you receive*. During the past 12 months, how many times have you seen a medical doctor
17	AJ136	*The next questions ask about specialists*. Specialists are doctors like surgeons, heart doctors, allergy doctors, skin doctors, and others who specialize in one area of health care. In the past12 months, did you or a doctor think you needed to see a medical specialist?
18	AD13	*These next questions are about women's health*. These next questions may be relevant to you because you were assigned female at birth. To your knowledge, are you now pregnant?
19	AG1	*These next questions are about dental health*. About how long has it been since you visited a dentist or dental clinic? Include hygienists and all types of dental specialists.
20	DMC8	*These next questions are about things that have happened to you while receiving medical care*. The questions ask about times where you were treated unfairly. Was there ever a time when you would have gotten better medical care if you had belonged to a different race or ethnic group?
21	AJ87	*Now we'd like to ask about care giving*. Some people provide short-term or long-term help to a family member or friend who has a serious or chronic illness or disability. This may include help with things they cannot do for themselves. During the past 12 months, did you provide any such help to a family member or friend? This may include help with baths, medicines, household chores, paying bills, driving to doctor's visits or the grocery store, arranging for medical and support services, or just checking in to see how they are doing.
22	AJ101B	*Abbreviated question*: Please think about the person for whom you provided the most care. Do you currently provide care for this person? *Original question*: For the next set of questions, please think about the person for whom you provided the most care. Do you currently provide care for this person?

23	AK3	*The next questions are about your employment*. How many hours per week do you usually work at all jobs or businesses?
24	AK20	*The next question is about your spouse's employment*. How many hours per week does your {spouse/partner} usually work at all jobs or businesses?"
25	AK23	*These next questions are about your housing and neighborhood*. Do you live in a house, a duplex, a building with 3 or more units, or in a mobile home?
26	AQ16	*Abbreviated question*: Still, looking back before you were 18 years of age how often did you...feel able to talk to family about feelings? Was it… *Original question*: The following questions refer to the time period before you were 18 years of age. Now, looking back before you were 18 years of age how often did you… feel able to talk to family about feelings?

Results

We start with an overview of CHIS 2022 survey question break-offs (data collected from February 2022 to June 2022). All survey questions in CHIS 2022 with at least one break-off are examined.

Table 2 depicts the break-off frequency distribution by percentile ranks. This right-skewed distribution demonstrates that, among those questions with break-offs, the majority of CHIS 2022 questions have break-offs of fewer than 10. However, there are some questions that have substantially higher frequencies of breakoffs. The top 5% of questions with the highest breakoff frequencies have 34 breakoffs or more, and the top 3% have 59 breakoffs or more.

Table 2. Percentile ranks: overall CHIS 2022 question break-off frequencies

Percentile	25%	50%	75%	95%	97%
Break-off frequency	2	4	10	34	59

We first consider how the experiment interacts with the survey flow, including completion status and interview length. There are mainly three completion statuses for the CHIS adult interview: (1) complete, interviews that complete the entire survey, (2) sufficient partial interviews, interviews that break off after the end of Section K, but before the end of the survey, and (3) insufficient partial interviews, interviews that break off prior to the end of Section K.

Table 3 shows adult completion status by transition statement status. The insufficient partial rates are identical in both groups and the completion rate in the treatment group is slightly higher (by 0.37%) than in the control group. This indicates that the transition statement removal helps shift sufficient partials to fully completes.

Table 3. CHIS 2022 Adult completion status by transition statement status

Adult completion status	Treatment	Control	Total
Completes	68.48% (5,778)	68.11% (6,264)	68.29% (12,042)
Sufficient partials	3.91% (330)	4.23% (389)	4.08% (719)
Insufficient partials	27.58% (2,327)	27.59% (2,537)	27.58% (4,864)
Other	0.02% (2)	0.08% (7)	0.05% (9)
Total	100% (8,437)	100% (9,197)	100% (17,634)

Table 4 presents descriptive statistics for CHIS interview duration by survey mode and transition statement status. Due to the survey modes' nature, the web interview duration is shorter than CATI interviews. In CATI mode, the average interview length is almost identical in both groups (treatment group is even marginally higher, presumably due to small sample size). In the web mode, the average and median interview duration in treatment group is 47.4 and 43.02, respectively. Albeit no statistical significance, the average and median interview lengths are reduced by 0.78 and 0.96 minutes, respectively, from the control group to the treatment group, because the abbreviated question stems reduced the respondents' reading burden.

Table 4. Descriptive statistics: CHIS interview length in minute by transition statement status

CATI	n	mean	median	max	min	s.d.
Treatment	458	70.37	67.08	141.90	7.93	18.80
Control	453	70.25	67.62	137.02	30.13	17.55

Web	n	mean	median	max	min	s.d.
Treatment	5,320	47.40	43.02	197.85	7.05	19.92
Control	5,812	48.18	43.98	302.52	11.4	20.79

Table 5 illustrates the aggregated break-offs from the selected questions by the two groups. For the 26 questions tested in the experiment, we see a total of 419 break-offs. Aggregated break-offs are reduced by 44.2% in the treatment group, and statistical results confirm that eliminating transition statements significantly reduces break-offs.

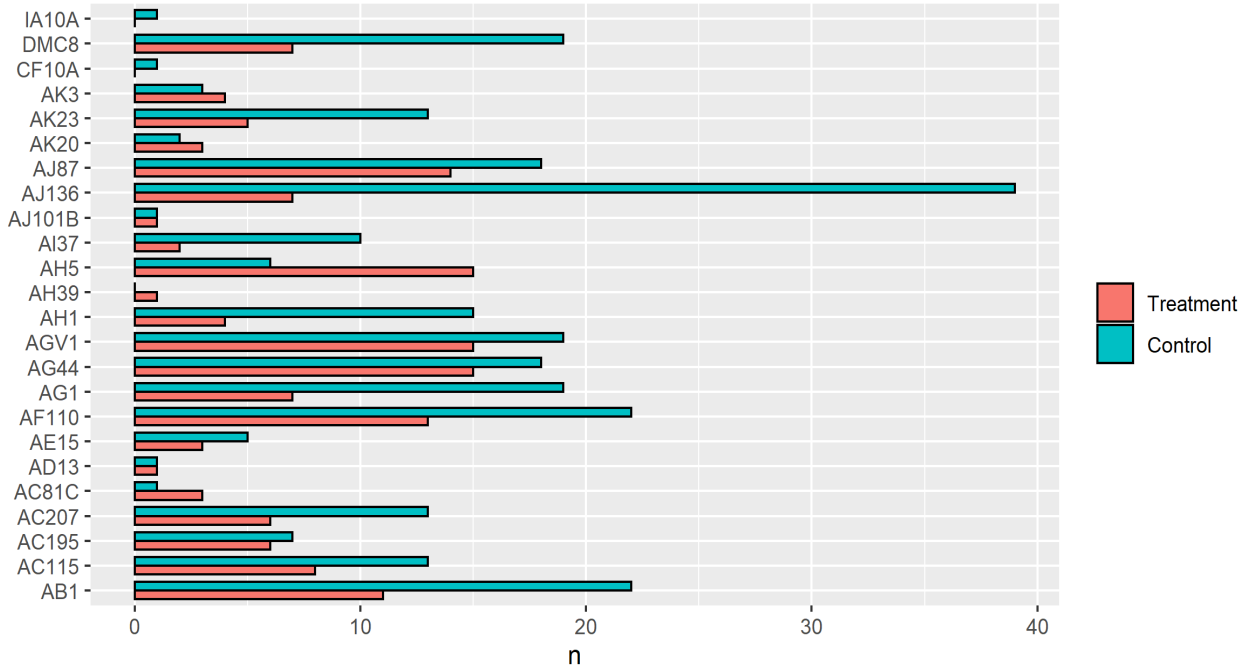
Table 5. Aggregated break-offs: treatment group vs. control group

	n	Proportion	Chi-squared	95% CI	p-value[1]
Treatment	150	0.358	33.23	(0.312, 0.406)	0.000
Control	269	0.642	33.23	(0.594, 0.688)	
Total	419	1.00			

Note 1: respondents were roughly evenly split, and therefore the null probability to be tested is 0.5.

The paired bar plot (Figure 1) shows the break-off frequencies by treatment group and control group for each question. According to the distribution by percentiles we discussed, we see the majority of the questions tested are at high risk of being left without answering (total break-offs larger than 20 in a question). We see gains in most of the questions and the largest gains are AJ136 (asking health specialists) in which 32 break-offs are reduced. Inconsistency occurs in a few questions, like AH5, where more break-offs are observed in the treatment group than in the control group. Only one question (AE17, how tall are you without shoes) records no break-off in either the treatment group or control group and is not included in the plot.

Figure 1. Break-off frequencies by questions: treatment group vs. control group

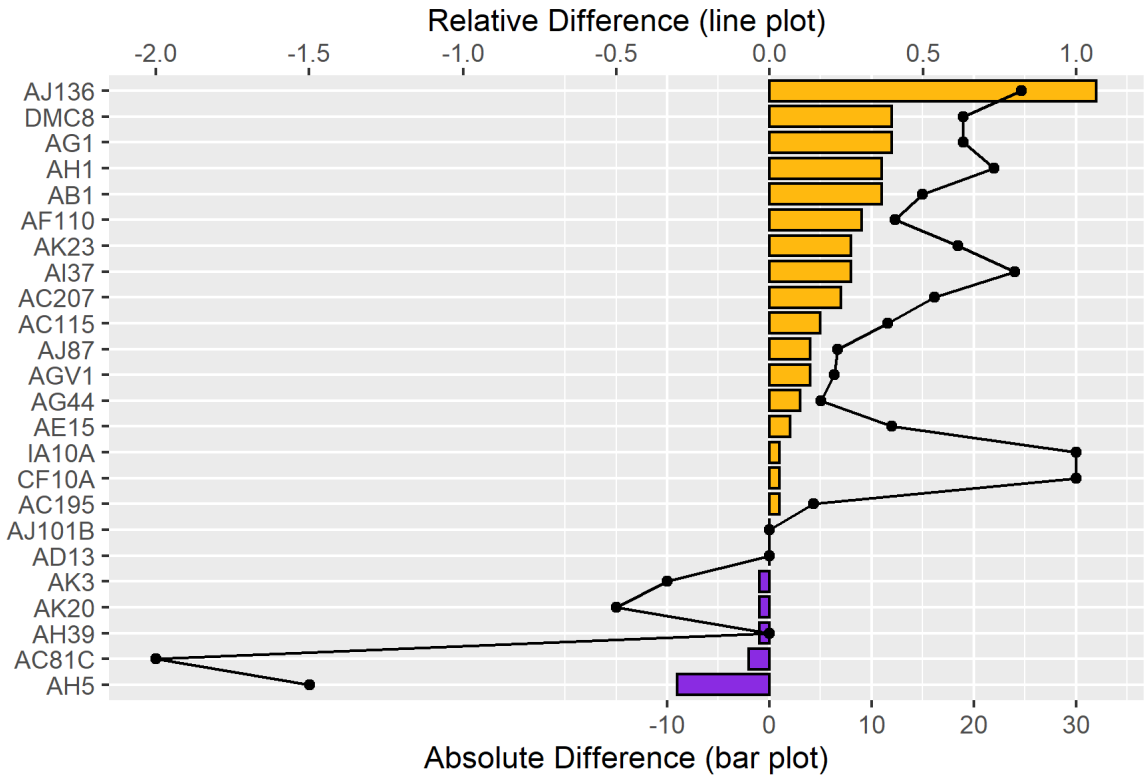


The bar plot and line plot in Figure 2 illustrates the two groups' absolute differences and relative changes, respectively. The relative change is calculated as $\frac{Control-Treatment}{Control} * 100\%$. The bar plot demonstrates that the conclusion that eliminating transition statements reduces break-offs still holds in most of the questions. In terms of relative change, as shown in the line plot, we see substantive reductions by percentages in a variety of questions — break-offs are reduced by 82% in AJ136, by 80% in AI37, by 73% in AH1, by 63% in AG1 and DMC8, and by 61% in AK23.

As shown in the bar plot, there are five questions where there are more break-offs in the control group over the treatment group. However, the absolute differences are negligible (except AH5), and consequently, the relative change is with large unreliable variations.

Only one question, AH5, stood out dramatically and performed differently. In CHIS 2022, AH5 was placed right after the Health Insurance Section and was the opening question for the Health Care Utilization and Access Section. We speculate that respondents may feel relieved to see a transition statement that indicates a topic change, after a long series of questions on health insurance.

Figure 2. Absolute differences and relative changes: treatment group vs. control group



Discussions and Conclusions

In summary, we saw that removal of transition statements exerted positive, albeit limited, influence on the adult interview as a whole. It converted a few sufficient partials to fully completes and slightly shortened interview length. This positive but limited effect is expected since we only simplified the wording of twenty-six questions out of hundreds of CHIS questions.

We conclude that eliminating transition statements in survey questions results in substantive survey break-off reductions from the experiment results. Aggregated break-offs from the 26 questions have decreased by 44.2%. For individual questions, reduction rates range from 14% to 82%. Only one question, AE17, records no break-off.

For questions where there are more break-offs in the treatment group, it is largely due to "randomness" because break-off cases in each question are limited, and results are volatile. As for the outlier, we believe that the transition statement in question AH5 provided a smoother transition from a series of health insurance questions to a new topic.

As a result, all transition statements in the 26 questions except AH5 and AE17 have been removed for the remainder of the CHIS 2022 survey year and future CHIS surveys. Furthermore, transition statements will be less likely to be included in new survey question development for the CHIS.

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