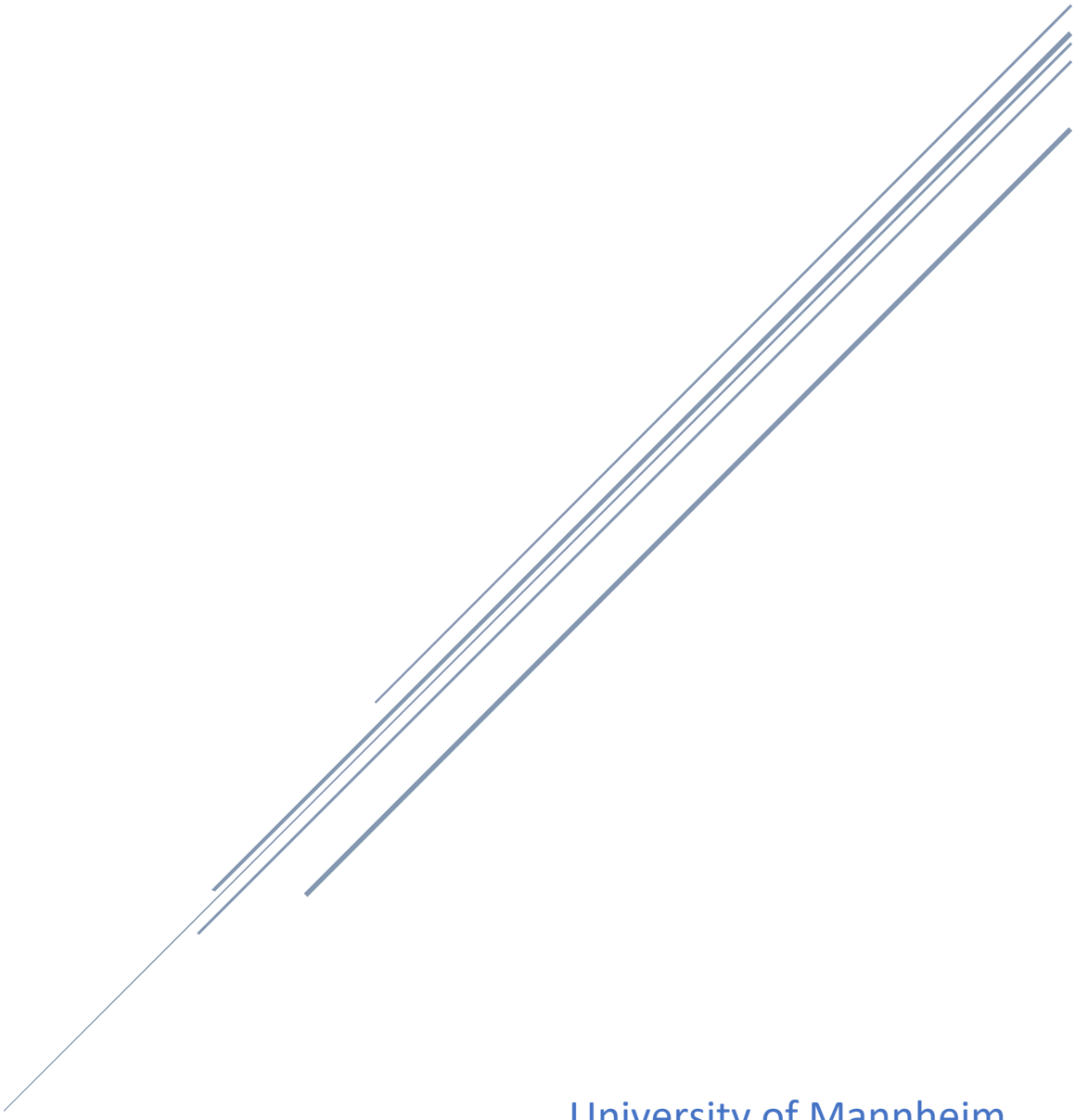
CROSS-NATIONAL ITEM NONRESPONSE RATES

Matriculation Number: 1819689



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Abstract

Social desirability bias can lead survey respondents to misleadingly answer questions, or, in some cases, to not answer them at all. In many cases, the socially desirable answer is known, but at other times when a society is divided on an issue, there might be no universally socially desirable response. This research investigates a negative correlation between item nonresponse rates and how divided opinions in a country in a given year are on homosexuality, using data from Pew Research and the World Values Survey. It finds a statistically significant negative correlation between item nonresponse on these questions and the absolute difference between pro- and anti-LGBT opinions.

Keywords: social desirability bias, item nonresponse, homosexuality

Introduction

On April 1st, 2001, the Netherlands became the first country in modern times to legalize same-sex marriage. Since that decision, dozens of other countries around the world have followed through votes or court cases, with Chile and Switzerland set to join their number in 2022. Polls across a variety of countries have shown dramatic increases in acceptance of LGBT people, but the spread is uneven. Homosexual relations of any kind are illegal in many countries, Russia has instituted a series of anti-LGBT laws, and as of 2022, on each of the two most populous continents, only one country has legalized same-sex marriage (South Africa and Taiwan). Put simply: there are countries today where any discussion of homosexuality is taboo, other countries where it is accepted by over ninety percent of the population, and the majority of countries at different points in between.

Surveys conducted worldwide often contain questions about LGBT issues, and as with any sensitive political or social theme, often have to contend with a heightened item nonresponse rate. In this paper, I'll be evaluating the nonresponse rate of two questions related to LGBT acceptance asked by Pew Research and the World Value Survey. The goal of this research will be to see if survey-years which found smaller differences between support and rejection of the LGBT community will also see higher item nonresponse rates.

Existing Research

Item nonresponse is, simply put, the failure to obtain information from a survey question (de Leeuw et al., 2003). There exists an expansive literature on the subject, covering its causes, effects, and methods to cope with it or reduce it when doing social science research. As the causes of item nonresponse are the most pertinent for this research, I will focus on them. Researchers have found multiple reasons for item nonresponse, with two of the most important being lack of knowledge and refusal to answer (Shoemaker et al., 2002). In the first case, nonresponse often, but not always, takes the form of "don't knows," while in the second, it can often be a refusal to answer the question. One common explanation for why a survey question has a high nonresponse rate is that it is a sensitive question (Krumpal, 2013). Various researchers have proposed different theoretical justifications of what makes a question sensitive. Lee and Renzetti (1993), for example, emphasize that answering a sensitive question honestly comes with risks or costs- this could be mere feelings of embarrassment, or the possibility of police officers breaking down a respondent's door. According to this theory, the problem with a sensitive question comes from a possible response, not the question itself. Tourangeau and Yan (2007) propose a different theory, emphasizing that questions about taboo topics can be sensitive in and of themselves, even if the respondent, answering honestly, would give a socially acceptable answer. They do, however, concur with Lee and Renzetti that risks or cost of answering the question- if the response is disclosed or an answer is socially undesirable- can cause a question to be sensitive.

Sensitive questions can occur in a broad range of topics, such as racially inclusive education (Lüke & Grosche, 2018), immigration (Piekut, 2021), sexual orientation (Powell, 2013), sexual relations (Kelly et al., 2013), illicit drug use, abortion (Tourangeau & Yan, 2007), income (Riphahn & Serfling, 2005), alcohol consumption, smoking, health, political views, electoral participation, and family structure (Andreenovka & Javeline, 2018). With regards to sexual orientation, Powell (2013) found that in the United States opposition to pro-same sex marriage ballot questions were five to seven points higher on election day, when voters cast secret ballots, than in pre-election polls. He hypothesizes that this is due to social desirability bias, with people choosing to give the answers they believe are socially acceptable even if they don't line up with their personal beliefs. Other researchers have also found a link between questions about sexual orientation and social desirability bias. In a 2006 study, researchers conducted a telephone survey of US households using two survey modes- human interviewers and the automated T-ACASI system. They found that respondents were significantly more likely to disclose same-sex attraction and sexual experiences when being interviewed by the automated system, and thus assured of privacy and a lack of judgement by another person. Notably, this effect was especially strong in areas with especially strong anti-LGBT attitudes (Villarroel et al., 2006). Taken together, these two studies establish that questions about homosexuality can be sensitive, and thus prone to social desirability bias, but importantly, of varying sensitivity, with anti-LGBT areas in the United States seeing the question as either more intrusive or carrying greater risk.

There are additional studies that provide further evidence that the sensitivity of questions can vary based on the country or area it is being asked in. In a 2018 study, Andreenovka and Javeline surveyed respondents in eleven ex-USSR states and established that question sensitivity can vary wildly based on cultural, historical, and political reasons. For example, they found that respondents in Tajikistan, Moldova, Azerbaijan, and Ukraine considered questions about political views to be sensitive, while respondents in other countries largely did not. Other research has also shown a link between collectivist societies and higher levels of social desirability bias, with rates in Singapore exceeding those in the United States. (Lalwali et al., 2006) Respondents in dictatorships have also been found to be more reticent to answer survey questions out of security concerns. (Blair et al., 2020)

Researchers have established connections between question sensitivity and item nonresponse, although the strength of that relationship is debated. In a 1998 paper analyzing data from a sex survey in Britain, Kupek found that item nonresponse due to question sensitivity was relatively limited, only driving nonresponse among around five percent of survey respondents. Other factors, like recall problems, were the primary driver for the rest of the population. Other researchers have found stronger effects, however, in surveys dealing with income. (Moore et al., 1997, Riphahn & Serfling, 2005) Piekut (2021) also found a strong effect when analyzing immigration data, with respondents being especially unwilling to answer questions based on the identity of their interviewer, indicating that they might feel judged by or at odds with their interviewer and prefer to stay silent. Lastly, on sensitive questions where

respondents feel the subject is taboo, rather than merely uncomfortable, they might refuse to answer entirely (Blair et al., 2020).

Theory and Hypothesis

Much of the literature on social desirability bias focuses on situations where the socially desirable answer is obvious to respondents. In many countries, however, there is no obviously socially correct attitude towards homosexuality. In countries where the population is divided on homosexuality and the issue is controversial, a person who wishes to avoid offending the interviewer, whoever else might be listening, or whoever ends up with access to the survey data might choose to not respond to the question or say they have no opinion. This could be especially powerful in countries where homosexuality is not accepted. Respondents might assume that interviewers are connected to large companies, universities, or Western institutions, and therefore hold more progressive attitudes. This would correspond with research that finds that item nonresponse increases as social distance between the interviewer and respondent increases (Tu & Liao, 2007). In countries where there is a more universally accepted attitude towards homosexuality, this effect would not be as apparent. Respondents would know the socially "correct" answer, and if they are misidentifying their preferences, would have an obvious answer to choose. Additionally, as Groves (2009) points out, refusing to answer a question when there is a socially desirable response is tantamount to admitting one holds the opposite view.

This leads me to my hypothesis for this research.

Item nonresponse rates for questions about homosexuality will decrease as the opinions about homosexuality in a country become more uniform.

If this is true, we would expect to see higher item nonresponse rates in countries where public opinion is evenly divided on homosexuality, and lower nonresponse rates when the population is closer to unanimity. However, if the null hypothesis, that uniformity of opinions on homosexuality in a country have no effect on nonresponse rates, is true, we would expect to see no statistically significant relationship between agreement on the topic and item nonresponse.

Data Sources

The data I will be using comes from two different sources, with the goal of seeing if the results are replicable. The first is the Global Attitudes Project (GAP) conducted by Pew Research. As Pew calculates and publishes topline results, and I will be comparing countries rather than demographic groups or individuals, I have chosen to use their pre-calculated topline results rather than re-calculate the country-level data from induvial survey results myself. The question whose data I will be analyzing has changed slightly across years. In 2019, it read: "And which one of these comes closer to your opinion? Homosexuality should be accepted by society

OR Homosexuality should not be accepted by society." The interviewer then read two options: "Homosexuality should be accepted by society." And "Homosexuality should not be accepted by society." Interviewers were instructed to rotate the two answers. No third option, including "don't know" was read, but if the respondent supplied it, it was recorded. In the data, refusals to answer and statements similar to "don't know" were recorded separately. Prior to 2019, the question had been phrased slightly differently. Respondents were asked "And which one of these comes closer to your opinion, number 1 or number 2?" Following this, they were shown a card on which two options were written. In 2013, this was "Homosexuality should be accepted by society/ Homosexuality should not be accepted by society." Before 2013, the phrasing was again different, reading: "Homosexuality is a way of life that should be accepted by society / Homosexuality is not a way of life that should be accepted by society."

I will be using data from five waves of the Global Attitudes Project: Summer 2002, Spring 2007, Spring 2011, Spring 2013, and Spring 2019. A final additional observation comes from India in the winter of 2013-2014. Overall, the data represents 34 countries in Africa, Asia, Europa, the Americas, and Oceania, totaling 122 samples. Due to the analysis method I was using, I dropped four observations, leaving 118. The majority of samples are nationally representative, with a handful being disproportionately urban, and included between 500 and 2000 respondents. The samples are a mixture of face-to-face and telephone interviews, with the sample design typically being probability based. Although most countries that were surveyed multiple times utilized the same survey mode (in-person or telephone) some, such as the Czech Republic, Slovakia, and Japan, switched between the two in various years. As I'll be controlling for survey mode, I decided not to exclude them from the data set.

The second data set comes from the World Values Survey. In all seven waves of surveys that the organization has conducted, a question concerning the justifiability of homosexuality has been asked. Specifically, this question reads:

> Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between, using this card.

Interviewers then read out "Homosexuality" and respondents have the option to choose a response on a ten-point scale. "Don't know" is an option as well, and respondents can choose not to answer. Unlike the Pew question, it's not binary, and researchers have in the past noted that the center option of a scale can become an incidental "don't know." (Scholz & Zuell, 2012) It is possible that this is occurring here- a review of the data shows that in every survey wave, five is a more popular option than four or six. However, it's difficult, if not impossible, to disentangle this effect from the effect of preferences for round numbers, or five standing in for neutrality or disinterest.

The World Value Survey has been conducted largely face-to-face and aims for a minimum of 1200 adult respondents (18+) per country. Some of the observations do fall below that threshold, however, to as low as 240 participants. Overall, across all seven waves, there

are 314 observations, each representing a survey in a particular country. As with the data from Pew, my analysis method required me to drop some of the observations, leaving only 285.

Variables and Models

The measure of the dependent variable, the item nonresponse rate, varies considerably across country and year. In the Pew data, I will be measuring it as the combination of "don't know" and refusal to answer. It extends from a high of 29% of all responses in Turkey in the spring of 2007 to a low of zero in Kenya and France in various years. The mean level of nonresponse was 7.7%; the median was 6.5%. Overall, the distribution of nonresponse is right-skewed, with 50 of the 122 samples having under 5% nonresponse.

The data from the World Value Survey is constructed similarly. I believe that different countries' survey teams conducted their interviews differently, as in many countries there is a high percentage of don't knows and absolutely no refusals. The opposite is true as well. As such, I will also be combining these two into a measure of nonresponse. Like in the Pew data, nonresponse rates are heavily right-skewed, with the majority of observations under 5%. The mean is 4.9%, the median 4%, and the maximum 35%.

In order to explain the rate of nonresponse, I'll be using two independent variables. For the first variable, I attempted to operationalize the degree to which a country was united in its opinions on homosexuality. This variable will use an absolute value because whether a country at a particular time is for or against LGBT rights is not part of the hypothesis, simply the degree to which these values are universal. Due to differences in how the surveys I'm using as data sources were constructed, I'm using slightly different methods in each to operationalize this variable. For the Pew surveys, the question asked was a binary. Therefore, I can simply subtract anti-LGBT opinions from pro-LGBT opinions and take the absolute value. Following that, I divided the resulting value by the percentage of respondents that answered the question, i.e., the item *response* rate.

My reasons for doing this are twofold, with the first justification being theoretical. As this variable is supposed to operationalize how uniform positively or negatively people in a country in a given year feel about the LGBT community, and thereby allow for comparison between them, I judged that it wouldn't make sense to essentially discount a country's rating on this scale if it had a high nonresponse rate, which, as discussed earlier, can have multiple causes. A concrete example serves to illustrate this best. The country in the Pew data with the highest nonresponse rate on this item was Turkey in 2007, at 29%. The results from the people who did answer the survey, however, are staunchly anti-LGBT, with a 57-14 split against. If this this 43-point difference was analyzed without further manipulation, it would look like Turkey had an entirely average split- the mean of the absolute difference is 47.6%. That would disguise the fact that near exactly four times as many people surveyed in Turkey expressed anti- as pro-LGBT opinions. Dividing Turkey's base absolute difference by its response rate gives instead a

value of 0.66, well ahead of the mean of the adjusted variable (0.56), as fits the widely divided nature of opinion in the country.

The second justification is mathematical. Both this independent and the dependent variable are percentages of the same whole. If the independent variable were not further manipulated, higher absolute differences leading to lower nonresponse rates risks being a tautology, even if item nonresponse rates are completely unrelated to the absolute difference. A survey-year that finds a zero percent absolute difference could, theoretically, find a nonresponse rate of one hundred percent, but a survey year with a seventy percent absolute difference could only find a nonresponse rate of thirty. Even if every respondent had given completely random answers to these surveys, and nonresponse rates were unconnected to the content of the question being asked, there is still a strong possibility that nonresponse rates would decline as absolute values rise, simply because the variance of the nonresponse would decline. This possibility is mitigated somewhat by the fact that item nonresponse rates in both surveys were relatively low, averaging 4.9% (World Values Survey) and 7.7% (Pew). Theoretically, then, an observation with an absolute difference of over ninety percent could give a higher-than-average nonresponse rate in both data sources. It is, however, less likely. Dividing the absolute difference in opinion by the item response rate minimizes that further.

Turning to the second data source, the World Value Survey data required more manipulation. Respondents gave their opinions on the justifiability of homosexuality on a ten-point scale, with one being never justifiable and ten being always justifiable. I chose to rank any responses of one, two, or three as being anti-LGBT and responses of eight, nine, or ten as pro-LGBT, leaving four options as neutral answers. Following this, I did the same as with the Pew data, finding the absolute difference and then dividing by the item response rate.

Values of this variable in the Pew data are fairly evenly distributed in a rough bell curve, with the mean at 0.5. Additionally, values from 0 to 0.98 were recorded. The World Values Survey data is similar, with a mean difference of 0.56 and a range of 0.004 to 0.997. The difference in means is possibly due to the question format, but in my opinion, it is partially due to the inclusion of more countries in Africa and Asia which have more uniformly anti-LGBT opinions, as well as the earlier start date of the data.

The second variable will only be used on the Pew data. It is a dummy variable which shows whether the interview was conducted in-person. As the World Values Survey is conducted almost entirely in-person, it isn't necessary to control for it in that analysis. I decided to include this variable to control for survey mode effects. There is, however, a potential issue with the data source. Countries in Western Europe, North America, and Oceania were largely surveyed by phone; in person interviews were used more often in Eastern Europe, Africa, Latin America, and Asia. As there is a rough correspondence between those divisions and LGBT acceptance, it means that almost all countries with anti-LGBT majorities were surveyed face-to-face, with the exception only of South Korea in 2013 and 2019. More pro-LGBT countries were

surveyed both by phone and face-to-face. This means the causal mechanism is somewhat muddled. As such, I will include a model both with and without this variable.

I evaluated the data from both Pew and the World Values Survey with beta regression models, due to the rightward skew of the dependent variable and fact that the data was in percentages. As beta regression only allows values of between, but not including, zero and one in the dependent variable, I eliminated values in both the Pew and World Values Survey that had item nonresponse rates of zero. Following the initial analysis, I performed a series of robustness checks in order to test both the mathematical and theoretical bases of the analysis.

Analysis

I analyzed the data from Pew using two models. The first is a beta regression of the absolute difference between pro and anti-LGBT values, while the second also controls for in-person interviews. As can be seen in Table 1 below, in both models all variables are significant at the one percent level, and point in the theorized direction- an increasing absolute difference between positive and negative opinions of homosexuality is associated with decreased nonresponse. Face-to-face interviews are correlated with nonresponse, which seems logical- previous research has found increased rates of social desirability bias due to bystanders or interviewer effects, and it's possible that nonresponse to this question is an example of that (Krumpal, 2013).

Table 1- Beta Regression Models of Item Nonresponse- Pew Data		
	Dependent variable:	
	Nonresponse	
	(1)	(2)
Absolute Difference	-1.343***	-1.195***
	(0.219)	(0.210)
In-Person Interview		0.499***
		(0.132)
Constant	-1.827***	-2.252***
	(0.113)	(0.157)
Observations	118	118
Pseudo-R^2	0.271	0.374
Log Likelihood	204.784	212.083
Note:	*p<0.1;**p<0.05;***p<0.01	

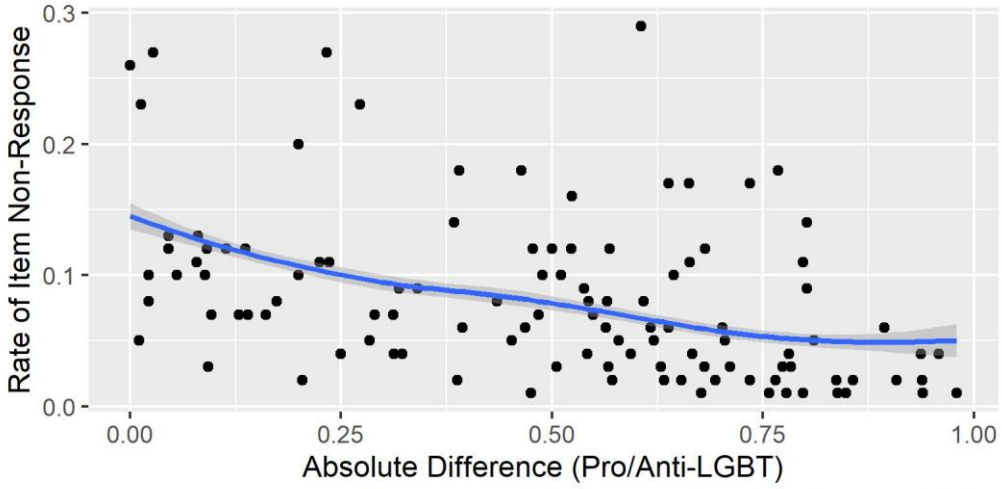
My goal in analyzing two data sources was to ensure the results were reproducible. Pew has conducted surveys with this question relatively few times, and the data source is disproportionately European. The World Value Survey has had more waves of surveys and surveyed nearly quadruple the number of countries. As seen in Table 2, their results largely line up with Pew's.

Table 2- Beta Regression Model of Item Nonresponse- World Value Survey Data	
	Dependent variable:
	Nonresponse
Absolute Difference	-0.642***
	(0.157)
Constant	-2.511***
	(0.098)
Observations	285
Pseudo-R^2	0.054
Log Likelihood	555.238
Note:	*p<0.1;**p<0.05;***p<0.01

As stated before, it was not possible to control for whether the interview was conducted in-person, as the World Value Survey conducts the majority of its surveys that way. Like in the Pew data, the value of the absolute difference is also negative, and significant at the one percent level. One key difference between the two sets of results is the difference between the pseudo-r-squared values of the two regressions. Model 2 from the Pew data has a pseudo-r-squared of 0.374, while the pseudo-r-squared from the World Values Survey data is only 0.054. In my opinion, part of the reason for this is survey design. Five, the center option, was noticeably more popular than its neighbors (9.5% of responses vs. 3.3% for four and 3.9% for six). As stated previously, researchers have noted that center options can become a pseudo-"don't know" for many people. Additionally, other research has shown that item nonresponse can drop when surveys expand beyond two options, (Kaplowitz et al., 2013, pg. 421-423) meaning that a higher percentage of the nonresponse on the questions becomes the background nonresponse rate that occurs on any question, whether it's sensitive or not. It's possible that this is the explanation for what can be clearly seen in Figures 1 and 2- the expected nonresponse rate in the Pew data starts high and then rapidly declines as public opinion becomes more uniform, while in the World Values Survey data, the expected nonresponse rate only declines by a few percent.

Figure 1- Expected Non-Response Rate

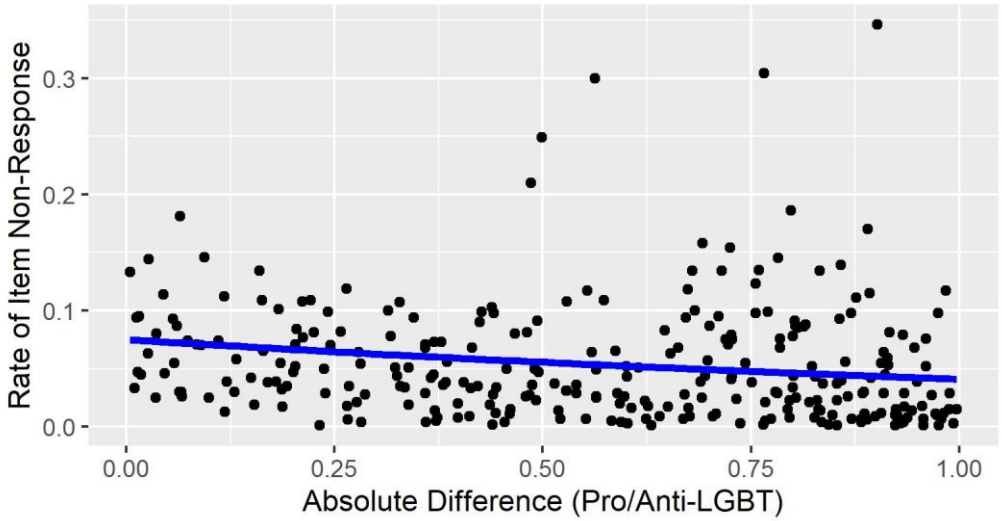
Using Data from Pew Surveys



Using data from Model 2

Figure 2- Expected Non-Response Rate

Using Data from the World Values Survey



In order to verify the validity of the analysis, I conducted three robustness checks. For the first, intended to verify that observations with the highest uniformity of responses aren't responsible for the downward trend of the correlation, I eliminated all observations that had a greater than ninety-point difference between positive and negative LGBT opinions.

Table 3- Beta Regression Models of Item Nonresponse			
	Dependent variable:		
	Nonresponse (Pew)		
	(1)	(2)	(3)
Absolute Difference	-1.257***	-0.994***	-0.337**
	(0.231)	(0.222)	(0.171)
In-Person Interview		0.566***	
		(0.134)	
Constant	-1.848***	-2.364***	-2.612***
	(0.116)	(0.164)	(0.103)
Observations	113	113	260
Pseudo-R^2	0.218	0.365	0.012
Log Likelihood	191.259	200.136	486.368
Note:	With all Absolute Differences Over 90 Percent Removed		

With the ten percent of observations with the highest absolute difference removed, the results are still statistically significant. In all cases, however, the p-values have increased, with the World Value Survey Data now only significant at the five percent, rather than the one percent, level. The values do all still point in the theorized direction, though. This largely serves to uphold my hypothesis, in my opinion. The fact that significance levels were lowered somewhat, however, does lead me to believe that the results might partially be due to the connected nature of the absolute value and nonresponse. This would take place in any question, not only one where social desirability bias is a factor influencing responses.

The next robustness check I conducted on the data was an outlier removal check. In order to verify that the effect seen was not caused by influential outliers, I removed all observations that had a Cook's Distance on the variables larger than four divided by the number of observations. I conducted this particular robustness check due to the data from the World Value Survey, in particular. It included several observations with high nonresponse rates and relatively low absolute differences, which could potentially affect the results of the regression analysis.

Table 4- Beta Regression Models of Item Nonresponse			
	Dependent variable:		
	Nonresponse		
	(1)	(2)	(3)
Absolute Difference	-1.450***	-1.279***	-0.748***
	(0.215)	(0.206)	(0.153)
In-Person Interview		0.447***	
		(0.123)	
Constant	-1.927***	-2.277***	-2.597***
	(0.111)	(0.148)	(0.093)
Observations	107	111	274
Pseudo-R^2	0.320	0.388	0.073
Log Likelihood	211.989	217.898	576.852
Note:			With Outliers Removed

Table 4 shows, however, that that does not seem to have occurred. With outliers removed, the results are still statistically significant at the one percent level and point in the hypothesized direction. The values of the variables, additionally, have hardly changed.

The first two robustness checks I chose to conduct were mathematical in nature, aiming to ensure that the results of the regression were due to outliers or the nature of the data. The final check is a test of the theory. I hypothesized that item nonresponse rates on a sensitive question would increase as the absolute difference between the number supporting and opposing one side of the issue decreases due to social desirability bias. Correspondingly, if a question is not sensitive, and there is no one answer that is more socially desirable than any other, the same pattern would not occur. To test this, I conducted a placebo test using data from the sixth and seventh waves of the World Value Survey. The question I chose to use asked respondents how often they read a daily newspaper, with the options daily, weekly, monthly, less than monthly, or never. I chose this question for two reasons. Firstly, it, to a degree, resembled the World Value Survey data on homosexuality. There was a mean nonresponse rate (don't knows and refusals combined) of 0.77%, higher than for many other non-sensitive

questions. Additionally, like for questions about homosexuality, where some countries reported broadly supportive attitudes and others negative, there were country-years in which reading a newspaper was common and others where it was uncommon. The second reason for choosing this question was its non-sensitivity. There might be some social desirability bias at play in how people answered the question- they may want to seem intelligent and well-informed, and therefore report reading the newspaper more often than they actually do- but the question is fairly low-stakes and not something many people have strong opinions about, unlike homosexuality.

To analyze the data, I first found the absolute difference between those who read newspapers often (daily and weekly readers) and those who read it less often (less than monthly, never) and manipulated it in the same way as in the prior World Values Survey research question. Monthly was left as a neutral option. At this point, I performed a beta regression of the absolute difference on the item nonresponse rate, the results of which can be seen in Table 5.

Table 5- Beta Regression Model of Item Nonresponse- Newspaper Consumption

	Dependent variable
	Nonresponse
Absolute Difference	-0.446
	(0.415)
Constant	-4.257***
	(0.180)
Observations	78
R^2	0.018
Log Likelihood	268.007
Note:	**p<0.1;**p<0.05;***p<0.01*

The results of the placebo test show that a similar relationship likely does not exist when social desirability bias is not a factor. The absolute difference is not statistically significant- the standard error is almost as large as the coefficient. This provides an additional piece of evidence that is the existence of a sensitive question that causes nonresponse, not the absolute difference in and of itself.

Overall, the analysis of both data sets and the three robustness checks all point in the same direction- in country-years when public opinion of a sensitive issue is closely divided, nonresponse rates were higher. There are some shortcomings and possibilities of areas of further investigation. To begin with, the World Value Survey results, in particular, show quite low predictive power. It is possible that including other variables that researchers have found are associated with cross-national item nonresponse rates, like culture and system of government, could increase its predictive power. Additionally, there is the open question of how influential the center option for respondents on the World Value Survey was. By comparing the results of this question with other topics, it may be possible to discern what fraction, if any, of the responses there represent social desirability bias.

Conclusion

Due to different histories, cultures, and current events, it is entirely logical that different countries will show different rates of item nonresponse, particularly around topics that are controversial in one place and settled in another. It seems like homosexuality is one of these issues. Countries where the population is more evenly divided on the subject show higher rates of item nonresponse, possibly out of social desirability bias.

Appendix- Code

```
---
output:
  pdf_document:
    toc: yes
  html_document:
    toc: no
---


```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
 p_needed <-
  c("viridis", "stargazer", "MASS", "optimx", "foreign", "dplyr", "readxl", "stringr", "ggplot2", "splines", "janitor", "betareg", "here")
packages <- rownames(installed.packages())

p_to_install <- p_needed[!(p_needed %in% packages)]

if (length(p_to_install) > 0) {
  install.packages(p_to_install)
}

sapply(p_needed, require, character.only = TRUE)

# This is an option for stargazer tables
# It automatically adapts the output to html or latex,
# depending on whether we want a html or pdf file
```
```

```
stargazer_opt <- ifelse(knitr::is_latex_output(), "latex", "html")
```

```{r}
#Importing the Pew data set
topline <- read_excel(here("raw-data","topline.xlsx"))
#Now I'm creating the variables I'll need for later analysis.
topline$diff <- topline$pro_LGBT-topline$anti_LBGT
topline$abs_diff <- abs(topline$pro_LGBT-topline$anti_LBGT)
topline$sqr_diff <- (topline$pro_LGBT-topline$anti_LBGT)^2
#Plus cleaning it up a bit. NAs were present in the non-1 spaces of the dummy variables.
topline = subset(topline, select = -c(...6))
topline[is.na(topline)] <- 0

#Another variable.
topline <- topline %>%
  dplyr::mutate(anti = ifelse(anti_LBGT >= pro_LGBT, 1, 0))
```

```{r}
#And now we need to import the World Values Survey Data
wave6 <- read_excel(here("raw-data", "wave6.xlsx"))
```

```
#Everything that follows is clearing it up

wave6 <- t(wave6) #Transpose

wave6 <- cbind(rownames(wave6), data.frame(wave6, row.names=NULL)) #Setting row names

wave6 <- wave6 %>% row_to_names(row_number = 1) #Setting column names

wave6 <- clean_names(wave6) #zactly what you think

wave6 <- wave6[-c(1),] #Eliminating a column

wave6 <- rename(wave6, "country" = "x0")

wave6[,2:18] <- sapply(wave6[,2:18],as.numeric) #They're chars by default


#And now it's time to create our variables

wave6$base_refused <- round(wave6$don_t_know + wave6$no_answer)


wave6$diff <- (wave6$always_justifiable + wave6$x9 + wave6$x8)-
(wave6$never_justifiable+wave6$x2+wave6$x3)

wave6$abs_diff <- abs((wave6$always_justifiable + wave6$x9 + wave6$x8)-
(wave6$never_justifiable+wave6$x2+wave6$x3))
```


```{r}
#Beta regression time!

#We'll start with Pew. First, putting it into a format that beta regression can use (between, but not including 0 and 1 in the DV)

topline$perc_refused <- topline$refused/100

topline$perc_abs_diff <- topline$abs_diff/100

topline_no_zero <- topline %>%

  filter(perc_refused >0)

#Now I'll set up the independent variable

topline_no_zero$perc_answered <- 100 - topline_no_zero$refused
```

```
topline_no_zero$rel_abs_diff <- abs((topline_no_zero$pro_LGBT-
topline_no_zero$anti_LBGT)/topline_no_zero$perc_answered)

#And run the two regressions

beta_pew <- betareg(perc_refused ~ rel_abs_diff + in_person, data = topline_no_zero)


beta_pew_small <- betareg(perc_refused ~ rel_abs_diff, data = topline_no_zero)

#Now for WVS data

#First, putting it into a format that beta regression can use (between, but not including 0 and 1
in the DV)

wave6$base_refused2 <- wave6$don_t_know + wave6$no_answer

wave6$perc_refused <- wave6$base_refused2/100

wave6$perc_abs_diff <- wave6$abs_diff/100

wave6_no_zero <- wave6 %>%

  filter(perc_refused >0)


#And again creating the independent variable

wave6_no_zero$perc_answered <- 100 - wave6_no_zero$base_refused

wave6_no_zero$pro_LGBT <- wave6_no_zero$always_justifiable +
wave6_no_zero$x9+wave6_no_zero$x8

wave6_no_zero$anti_LGBT <- wave6_no_zero$never_justifiable +
wave6_no_zero$x2+wave6_no_zero$x3


wave6_no_zero$rel_abs_diff <-
abs((wave6_no_zero$pro_LGBT/wave6_no_zero$perc_answered)-
(wave6_no_zero$anti_LGBT/wave6_no_zero$perc_answered))


#And running the regression

beta_wvs <- betareg(perc_refused ~ rel_abs_diff, data = wave6_no_zero)
```

```

```{r}
#Now I'll create plots of this data.
#First up, with Pew
pew_plot <- ggplot(data = topline_no_zero, aes(x=rel_abs_diff, y = perc_refused))+
  geom_point()+
  geom_smooth(aes(y=predict(beta_pew, topline_no_zero, color = in_person)))+
  xlab("Absolute Difference (Pro/Anti-LGBT)")+
  ylab("Rate of Item Non-Response")+
  ggtitle(label = "Figure 1- Expected Non-Response Rate", subtitle = "Using Data from Pew Surveys")+
  labs(caption = "Using data from Model 2")
pew_plot
ggsave("basic PEW plot.jpeg")

#Now I'll do the WVS plot
wvs_plot <- ggplot(data = wave6_no_zero, aes(x=rel_abs_diff, y = perc_refused))+
  geom_point()+
  geom_line(aes(y=predict(beta_wvs)),col="blue", size=1.3)+
  xlab("Absolute Difference (Pro/Anti-LGBT)")+
  ylab("Rate of Item Non-Response")+
  ggtitle(label = "Figure 2- Expected Non-Response Rate", subtitle = "Using Data from the World Values Survey")
wvs_plot
```
```

```
ggsave("basic WVS plot.jpeg")
```

```{r, results='asis'}
#Now the first stargazer table
stargazer(beta_pew_small, beta_pew, type="html", title=
          "Beta Binomial Regression Model of Item Non-Response- Pew Data",
        out = "table.tex",
        column.sep.width = "3pt",
        no.space = TRUE,
        font.size = "small",
        covariate.labels = c("Absolute Difference", "In-Person Interview"),
        dep.var.labels = c("Non-Response"),
        header = FALSE)

#Now the second stargazer table
stargazer(beta_wvs, type=stargazer_opt, title=
          "Beta Regression Model of Item Non-Response- World Value Survey Data",
        out = "table.tex",
        column.sep.width = "3pt",
        no.space = TRUE,
        font.size = "small",
        covariate.labels = c("Absolute Difference"),
        dep.var.labels = c("Non-Response"),
```

```
        header = FALSE)
```

```
```

```{r}
#First residual check
#I'm getting rid of the top 10% of the independent variable for mathematical reasons
wave6_no_zero2 <- wave6_no_zero %>%
  filter(wave6_no_zero$abs_diff <= 90)
topline_no_zero2 <- topline_no_zero %>%
  filter(topline_no_zero$abs_diff <= 90)

#Pew Data Regressed again
beta_pew_r1 <- betareg(perc_refused ~ rel_abs_diff + in_person, data = topline_no_zero2)
beta_pew_small_r1 <- betareg(perc_refused ~ rel_abs_diff, data = topline_no_zero2)

#WVS Data Analysis


beta_wvs_r1 <- betareg(perc_refused ~ rel_abs_diff, data = wave6_no_zero2)

stargazer(beta_pew_small_r1, beta_pew_r1, beta_wvs_r1, type="html", title=
          "Beta Regression Models of Item Non-Response",
        out = "table.tex",
        column.sep.width = "3pt",
        notes = "With all Absolute Differences Over 90 Percent Removed",
```

```
        no.space = TRUE,
        font.size = "small",
        covariate.labels = c("Absolute Difference", "In-Person Interview"),
        dep.var.labels = c("Non-Response (Pew)", "Non-Response (WVS)"),
        header = FALSE)
```

```{r}
#Second robustness check- Outlier removal
#Pew to start
beta_pew_r2 <- betareg(perc_refused ~ rel_abs_diff + in_person, data =
beta_pew$model[!cooks.distance(beta_pew)> (4/length(topline_no_zero$country)),])
beta_pew_small_r2 <- betareg(perc_refused ~ rel_abs_diff, data =
beta_pew_small$model[!cooks.distance(beta_pew_small)>
(4/length(topline_no_zero$country)),])

summary(beta_pew_small_r2)
#Then WVS
beta_wvs_r2 <- betareg(perc_refused ~ rel_abs_diff, data =
beta_wvs$model[!cooks.distance(beta_wvs)> (4/length(wave6_no_zero$country)),])
summary(beta_wvs_r2)



stargazer(beta_pew_small_r2, beta_pew_r2, beta_wvs_r2, type="html", title=
          "Table 4- Beta Regression Models of Item Non-Response",
        out = "table.tex",
        column.sep.width = "3pt",
```

```
        notes = "With Outliers Removed",
        no.space = TRUE,
        font.size = "small",
        covariate.labels = c("Absolute Difference", "In-Person Interview"),
        dep.var.labels = c("Non-Response (Pew)", "Non-Response (WVS)"),
        header = FALSE)
```

```{r}
#This is the third robustness check, a placebo test
#And now we need to import the World Values Survey Data
newspaper <- read_excel(here("raw-data", "newspaper.xlsx"))
#Everything that follows is clearing it up
newspaper <- t(newspaper) #Transpose
newspaper <- cbind(rownames(newspaper), data.frame(newspaper, row.names=NULL)) #Setting row names
newspaper <- newspaper %>% row_to_names(row_number = 1) #Setting column names
newspaper <- clean_names(newspaper) #zactly what you think
newspaper <- rename(newspaper, "country" = "x0")
newspaper[,2:10] <- sapply(newspaper[,2:10],as.numeric) #They're chars by default

#And now it's time to create our variables
newspaper$perc_refused <- (newspaper$don_t_know + newspaper$no_answer)/100
newspaper$diff <- (newspaper$weekly + newspaper$daily)-(newspaper$less_than_monthly+newspaper$never)
newspaper$abs_diff <- abs(newspaper$diff)
newspaper$perc_diff <- newspaper$abs_diff/(100-newspaper$perc_refused)
newspaper <- newspaper %>%
```

```
  filter(perc_refused > 0)

#Now we can run a regression
beta_newspaper <- betareg(perc_refused ~ perc_diff, data = newspaper)
summary(beta_newspaper)



stargazer(beta_newspaper, type="html", title=
          "Beta Regression Models of Item Non-Response- Newspaper Consumption",
          out = "table.tex",
          column.sep.width = "3pt",
          no.space = TRUE,
          font.size = "small",
          covariate.labels = c("Absolute Difference"),
          dep.var.labels = c("Non-Response"),
          header = FALSE)
```

Bibliography

Andreenovka, Anna, and Debra Javeline. 2018. “Sensitive Questions in Comparitive Surveys.” In *Advances in Comparative Survey Methods: Multinational, Multiregional, and Multicultural Contexts (3MC)*, John Wiley & Sons, Ltd.

Blair, Graeme, Alexander Coppock, and Margaret Moor. 2020. “When to Worry about Sensitivity Bias: A Social Reference Theory and Evidence from 30 Years of List Experiments.” *American Political Science Review* 114(4): 1297–1315.

de Leeuw, Edith D, Joop Hox, and Mark Huisman. 2003. “Prevention and Treatment of Item Nonresponse.” *Journal of Official Statistics* 19(2): 24.

Groves, Robert et al. 2009. “Survey Methodology, 2nd Edition | Wiley.” *Wiley.com*. https://www.wiley.com/en-us/Survey+Methodology%2C+2nd+Edition-p-9780470465462 (January 12, 2022).

Inglehart, R., C. Haerpfer, A. Moreno, C. Welzel, K. Kizilova, J. Diez-Medrano, M. Lagos, P. Norris, E. Ponarin & B. Puranen et al. (eds.). 2014. World Values Survey: All Rounds - Country-Pooled Datafile Version: https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp. Madrid: JD Systems Institute.

Kays, Kristina, Kathleen Gathercoal, and William Buhrow. 2012. “Does Survey Format Influence Self-Disclosure on Sensitive Question Items?” *Computers in Human Behavior* 28(1): 251–56.

Kaplowitz, M. D., Lupi, F., Yeboah, F. K., & Thorp, L. G. (2013). Exploring the middle ground between environmental protection and economic growth. Public Understanding of Science, 22(4), 413–426. https://doi.org/10.1177/0963662511424545

Kelly, Christine A., Erica Soler-Hampejsek, Barbara S. Mensch, and Paul C. Hewett. 2013. “Social Desirability Bias in Sexual Behavior Reporting: Evidence from an Interview Mode Experiment in Rural Malawi.” *International perspectives on sexual and reproductive health* 39(1): 14–21.

Krumpal, Ivar. 2013. “Determinants of Social Desirability Bias in Sensitive Surveys: A Literature Review.” *Quality & Quantity* 47(4): 2025–47.

Kupek, Emil. 1998. “Determinants of Item Nonresponse in a Large National Sex Survey.” *Archives of Sexual Behavior* 27(6): 581–94.

Lalwani, Ashok K., Sharon Shavitt, and Timothy Johnson. 2006. "What Is the Relation between Cultural Orientation and Socially Desirable Responding?" *Journal of Personality and Social Psychology* 90(1): 165–78.

Langhaug, Lisa F. et al. 2011. "How You Ask Really Matters: Randomised Comparison of Four Sexual Behaviour Questionnaire Delivery Modes in Zimbabwean Youth." *Sexually Transmitted Infections* 87(2): 165–73.

LEE, RAYMOND M., and CLAIRE M. RENZETTI. 1990. "The Problems of Researching Sensitive Topics: An Overview and Introduction." *American Behavioral Scientist* 33(5): 510–28.

Lüke, Timo, and Michael Grosche. 2018. "What Do I Think about Inclusive Education? It Depends on Who Is Asking. Experimental Evidence for a Social Desirability Bias in Attitudes towards Inclusion." *International Journal of Inclusive Education* 22(1): 38–53.

Moore, Jeffrey, Linda Stinson, and Edward Welniak. "Income Measurement Error in Surveys: A Review." *Census.gov*. https://www.census.gov/library/working-papers/1997/adrm/sm97-05.html (January 12, 2022).

Morin, Rich. 2013. "Study: Opposition to Same-Sex Marriage May Be Understated in Public Opinion Polls." *Pew Research Center*. https://www.pewresearch.org/fact-tank/2013/09/30/opposition-to-same-sex-marriage-may-be-understated-in-public-opinion-polls/ (January 1, 2022).

Ofosu, Eugene K., Michelle K. Chambers, Jacqueline M. Chen, and Eric Hehman. 2019. "Same-Sex Marriage Legalization Associated with Reduced Implicit and Explicit Antigay Bias." *Proceedings of the National Academy of Sciences* 116(18): 8846–51.

Owens, Linda, Timothy P. Johnson, and Diane O'Rourke. 2001. "Culture and Item Nonresponse in Health Surveys." *Seventh Conference on Health Survey Research Methods*: 69–75.

Persson, Mikael, and Maria Solevid. 2013. "Measuring Political Participation--Testing Social Desirability Bias in a Web-Survey Experiment." *International Journal of Public Opinion Research* 26: 98–112.

Pew Research. "Country Specific Methodology" URL: https://www.pewresearch.org/methodology/international-survey-research/international-methodology/all-survey/all-country/all-year Accessed: 1/13/22

"Pew Research Center Global Attitudes & Trends Spring 2019 Questionnaire." 2019.

"Pew Research Center Global Attitudes & Trends Spring 2007 Questionnaire." 2007.

"Pew Research Center Global Attitudes & Trends Spring 2011 Questionnaire." 2011.

"Pew Research Center Global Attitudes & Trends Spring 2013 Questionnaire." 2013.

"Pew Research Center Global Attitudes & Trends Summer 2002 Questionnaire." 2002.

Piekut, Aneta. 2021. "Survey Nonresponse in Attitudes towards Immigration in Europe." *Journal of Ethnic and Migration Studies* 47(5): 1136–61.

Powell, Richard J. 2013. "Social Desirability Bias in Polling on Same-Sex Marriage Ballot Measures." *American Politics Research* 41(6): 1052–70.

Riphahn, Regina T., and Oliver Serfling. 2005. "Item Nonresponse on Income and Wealth Questions." *Empirical Economics* 30(2): 521–38.

Rosenfeld, Bryn, Kosuke Imai, and Jacob N. Shapiro. 2016. "An Empirical Validation Study of Popular Survey Methodologies for Sensitive Questions." *American Journal of Political Science* 60(3): 783–802.

Scholz, Evi, and Cornelia Zuell. 2012. "Item Nonresponse in Open-Ended Questions: Who Does Not Answer on the Meaning of Left and Right?" *Social Science Research* 41(6): 1415–28.

Shoemaker, Pamela J., Martin Eichholz, and Elizabeth A. Skewes. 2002. "Item Nonresponse: Distinguishing between Don't Know and Refuse." *International Journal of Public Opinion Research* 14(2): 193–201.

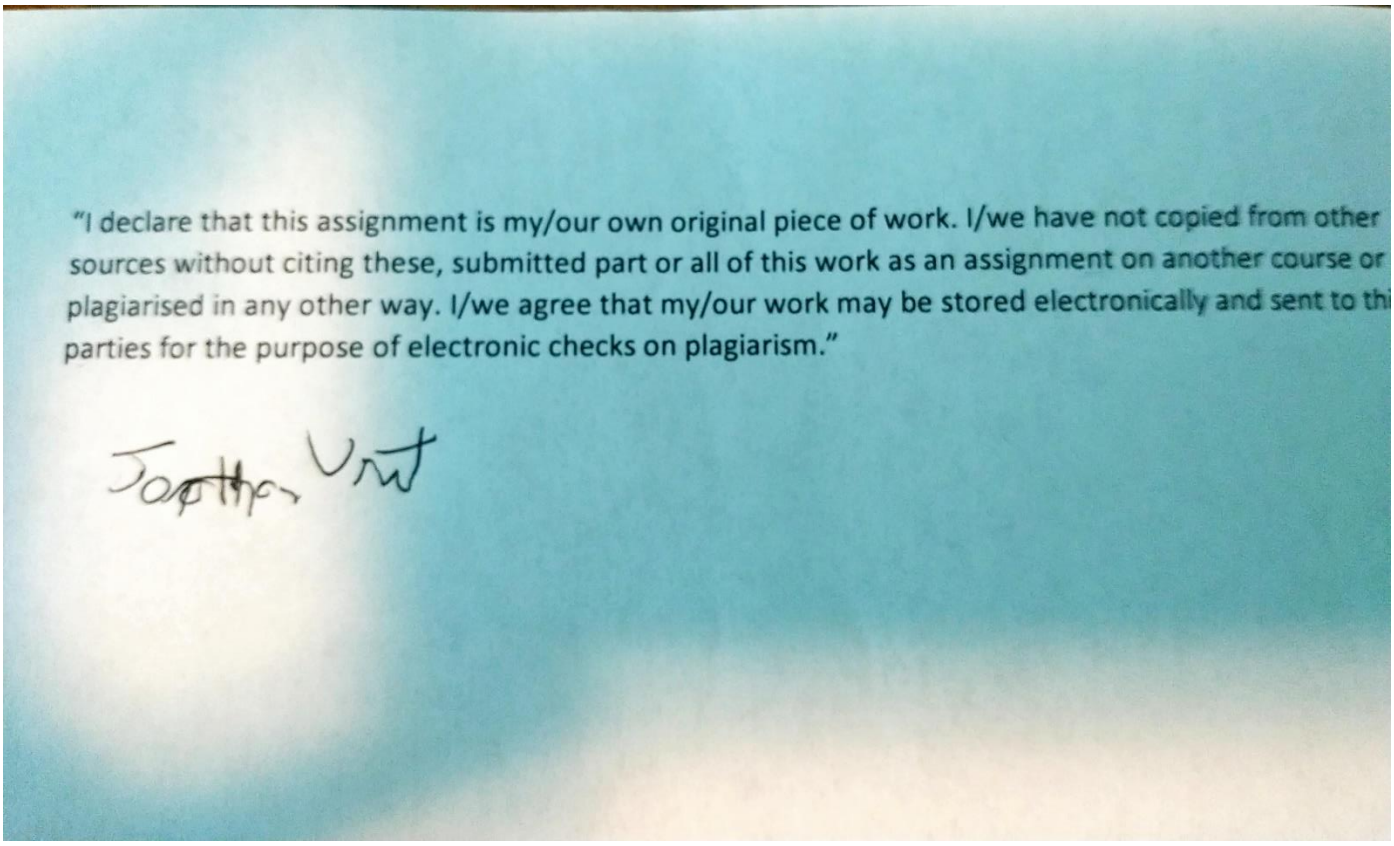
"Tipsheet-Sensitive_Questions.Pdf." https://dism.duke.edu/files/2020/05/Tipsheet-Sensitive_Questions.pdf (January 2, 2022).

Tourangeau, Roger, and Ting Yan. 2007. "Sensitive Questions in Surveys." *Psychological Bulletin* 133(5): 859–83.

Tu, Su-Hao, and Pei-Shan Liao. 2007. "Social Distance, Respondent Cooperation and Item Nonresponse in Sex Survey." *Quality & Quantity* 41(2): 177–99.

VILLARROEL, MARIA A. et al. 2006. "SAME-GENDER SEX IN THE UNITED STATES IMPACT OF T-ACASI ON PREVALENCE ESTIMATES." *Public opinion quarterly* 70(2): 166–96.

Zhu, Jian-Hua. 1996. "'I Don't Know' in Public Opinion Surveys in China: Individual and Contextual Causes of Item Non-response." *Journal of Contemporary China* 5(12): 223–44.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