The Accuracy of Lay Estimates of Abortion Rates and the Demographic, Attitudinal, and Behavioral Sources of Variation in these Estimates

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Abstract

Abortion is a topic and practice with deep socio-political undergirding. While research on attitudes toward abortions is prevalent, less is known about perceptions of the frequency of abortion in the general population. Using primary data gathered from an online survey of students, faculty and staff of two public universities in the U.S., we found that people generally underestimate the percentage of pregnancies that end in abortion. We discuss this finding and the role of demographic, attitudinal, and behavioral variables in the abortion estimates made by respondents. Additionally, we discuss the implications of these findings, taking into consideration the societal effects of a potential correction of the underestimation of abortion rates.

Keywords: abortion, perceptions, social norms, misperceptions, pregnancy, availability heuristic

Introduction

In this study, we identify how often people believe abortions occur and discuss the role of demographic, attitudinal, and behavioral variables in abortion frequency estimates. Additionally, we discuss the societal implications of our findings.

To date, we have found only one other study that assesses how frequently people believe abortions are occurring in the general population (Cowan 2013). While Cowan's work is well done and informative, it measures abortion

frequency using a cohort perspective. Cowan (2013) asks individuals to estimate the proportion of women that will have an abortion in their lifetime. While this study found that individuals underestimate abortion frequency (believing slightly fewer than a quarter of women would have at least one abortion in their lifetime when the most reliable statistics point to around a third of women, Cowan 2013), we wanted to investigate if the same would be true when asked about abortion rates (i.e. the percentage of pregnancies that will end in abortion) in order to substantiate and triangulate Cowan's finding. Knowing how strongly people feel about abortion and how powerful perceptions of the behavior of others can be on our own attitudes and behavior, we felt a need to continue the nascent exploration of this important area of research.

On the one hand, we saw that abortion was made salient to the public by emotionally charged pro-life advertisements (e.g. those showing aborted fetuses or citing that an abortion occurs every so many seconds); its depiction in popular news, TV shows, and movies; and the religious and political attention afforded to them¹. Given these factors only, it seemed likely that people would overestimate the percentage of pregnancies that end in abortion, just as people generally overestimate their chances of being killed by a terrorist attack (Glassner 2010) or the percentage of teenage girls that become pregnant (Ipsos MORI 2013), both of which are also very salient in contemporary culture.

On the other hand, whereas terrorism's goal is to cause public havoc and fear and teenage pregnancy is difficult to hide, especially when it goes to term and ends with the birth of an infant, abortion is a largely hidden and secretive process. It is often taboo, even where and when it is legal. Moreover, even in places and under conditions where the majority of people are supportive of an individual's ability to get an abortion, the occurrence of abortions is hardly ever publically declared. While social media is rife with new baby photos and news reports of terrorist attacks or threats, we hardly ever hear of abortions this way.

Abortion Views and Arguments

Two of the major arguments made by those in favor of abortion rights are that women should have the freedom to control what happens with their own bodies (Shaw 2010) and that outlawing abortion will only lead to an increase in dangerous and hurried illegal abortions (Cates et al. 2007). Other less common lines of reasoning in support of abortion rights are that an unwanted child should not be forced into life; that a gravely sick child should not be forced to live a life of anguish; that a fetus only enters personhood when it is able to live outside of the mother; and that having the option to abort helps close the income gap between men and women (See well-known feminist Katha Pollitt's 2014 book

¹ Republican Rick Santorum, a 2012 presidential candidate, incorrectly declared during his campaign "a third of all the young people in America are not in America today because of abortion, because one in three pregnancies end in abortion." See <http://www.politifact.com/truth-o-meter/statements/2011/mar/31/rick-santorum/rick-santorum-says-one-every-three-pregnancies-end/>

Pro: Reclaiming Abortion Rights for more on these and other arguments in favor of abortion as a moral right and social good).

Many pro-life advocates believe that abortion is an act of killing, because life starts at conception (e.g. Alcorn 2009). Moreover, they often believe that abortion causes pain and distress to the unborn (e.g. Alcorn 2009). Religious arguments such as prohibition of interfering with the plan of a religious deity and/or supernatural forces are also put forth by pro-life advocates (Wilcox and Gomez 1990). Another pro-life argument is that abortion limits the pool of children available for adoption by those who cannot biologically conceive (Jones 2009). Of course, there is much more complexity to this viewpoint than could possibly be covered here. For an illuminating account of the motivations and thought patterns of pro-life activists, see Maxwell's (2002) anthropological account.

Religious Identification and Abortion Views

Research suggests that one's views on the legality of abortion are highly correlated with gender and religious affiliation. For example, men have often been found to be less liberal in their views toward abortion than women (Carter, Carter and Dodge 2009). A 2012 Gallup Poll revealed that non-religious Americans were most likely to identify themselves as "pro-choice," with 80% of respondents choosing that option. In the same poll, Catholics (48%) were more likely than Protestants/Other Christians (40%) to self-identify as "pro-choice" (Saad 2013). An earlier study noted that 84% of Americans practicing Judaism, 81% of Americans practicing Buddhism, 69% of Americans practicing Hinduism, and 48% of Americans practicing Islam felt that abortion should be legal in all or most cases (Pew Forum on Religion & Public Life 2008).

Even at the official level of individual churches within the large Protestant community in the United States, variability in attitudes toward abortion exists. The official stance of the *United Methodist Church*, which accounted for 5.1% of the U.S. adult population in 2007, is that abortion should be legal. However, the *Southern Baptist Convention*, which claimed 6.7% of the adult population, is officially against the legality of abortion. Of course, official doctrine and individual views are not necessarily congruent (ProCon.org 2011).

Strength of Abortion Views

Not only are people's views on abortion inextricably linked to their other major defining characteristics such as gender and religious identification, but people also feel strongly about their abortion stance. Over 20% of those polled in *National Election Studies* in 2000 rated the abortion issue as "extremely important" (the highest rating allowed), while 36% of respondents ranked it as "very important." Perhaps the most significant indicator of the importance of abortion to the citizenry is that 98% of respondents expressed an opinion in the 2000 poll (Jelen and Wilcox 2003).

These prevalent, powerful, and polarizing views on abortion also affect people's political endorsements and voting behavior. Indeed, people claim to find a political candidate's views on abortion extremely influential in crystallizing

their view of the candidate. Moreover, Jelen and Wilcox (2003:2) report that abortion is “one of the few issues that consistently appears to influence voting behavior at all levels of government.” Abortion is a divisive enough issue that it can even cause people to change political affiliations (Jelen and Wilcox 2003) rather than just creating and/or bolstering their existing political dispositions. Just before the 2012 presidential election, *Gallup* found that almost 20% of registered voters said they would vote only for a candidate who was on their side of the abortion debate (Saad 2012). The *Pew Research Center* also found the abortion issue to be a powerful variable in influencing voting attitudes, with over 60% of their sample who were against legal abortion stating the issue would be “very important” to their vote. For those favoring the legality of abortion, around 30% responded with the “very important” option (Pew Research Center for the People and the Press 2012).

Nuances of Abortion Views

However, we must recognize that the blunt dichotomy of pro-choice versus pro-life overshadows the many people and groups who have nuanced attitudes toward abortions that vary according to factors such as whether or not the mother’s health is in danger, whether or not the pregnancy was the result of rape, or according to the trimester of the pregnancy. The aforementioned *Gallup* study asked respondents if they thought abortion should be legal under any circumstances (28% chose this option), legal only under certain circumstances (52% chose this option), or never legal (18% chose this option). Thus, most Americans feel abortion should be legal in some cases and illegal in others (Saad 2013).

More specifically, a 2012 CNN/ORC poll found that almost 90% of American adults feel that abortion should be legal when the mother’s life is endangered, and over 80% feel that there should be a legal option to abort when the pregnancy was the result of rape or incest (CNN/ORC Poll 2012). In another poll, 19% of American adults said they believed abortion should be legal in all cases, 36% said it should be legal in most cases, 25% said it should be illegal in most cases, and 17% said it should be illegal in all cases (Washington Post/Kaiser Family Foundation Poll 2012). Again, these numbers can be broken down further and tied to religion, gender, or education level, as well as other variables. For example, in 2007, 59% of *Southern Baptists* felt that “abortion should be illegal in all or most cases,” whereas only 35% of *United Methodists* felt this way (ProCon.org 2011).

Studies on public attitudes toward abortion are ubiquitous. Perhaps the most comprehensive data on this subject comes from the *General Social Survey* (GSS) conducted by the *National Opinion Research Center*. Since 1972, the GSS, which seeks to track the opinions, behaviors, and demographic characteristics of Americans, has polled the public on their approval of abortion in different contexts (e.g. if the woman was raped or if the family is poor). GSS data is gathered from a random sample of persons over the age of 18 who are living in the U.S. in non-institutionalized environments. Data is collected using face-to-face interviews, computer-assisted personal interviewing, and in rare cases,

through telephone interviews. In the spring of 2013, Tom W. Smith and Jaesok Son May used decades of GSS data to put together a summary of the nation's attitudes towards the different variants of abortion:

Approval of abortion is highest when the woman's health is seriously endangered (87.0% across all years, 1972-2012), followed by for pregnancies resulting from rape (78.3%), and a serious defect in the fetus (77.1%). But majorities have not approved where the family is too poor to afford another child (45.0%), when a married woman does not want more children (42.1%), when the woman is unmarried and does not want to marry the prospective father (42.0%), and when the woman wants the abortion for "any reason" (38.5% for 1977-2012) (Smith and Son May 2013, 2).

Demographic Predictors of Abortion Views

Smith and Son May (2013) show that demographic characteristics such as age and education are also intertwined with abortion attitudes. Surprisingly, their analysis did not find much difference in attitudes toward abortion between genders. The aforementioned 2012 Gallup poll also did not find much of a gender difference in the percentage of individuals that identify as pro-choice: 50% of women, and 47% of men. However, there were other notable demographic predictors of abortion attitudes. Around two-thirds of Democrats declared that they were pro-choice. Similarly, 61% of those with no college education were pro-choice along with 58% of those with a household income over \$75,000 and 41% of those with a household income less than \$30,000. Just over a quarter of Republicans stated that they were pro-choice (Saad 2013).

The Relationship between Perceptions of the Behaviors of Others and One's Own Behaviors

People's perceptions of others' behavior are a strong predictor of their own attitudes and behaviors, especially perceptions about those who are socially close to them (see Pinkerton et al. 2003, Rimal and Real 2003; Perkins 2002; Cialdini and Trost 1998; Beck and Treiman 1996). Understanding the perceptions that the public has about the frequency of abortion incidence will inform our understanding of abortion attitude formation and the related social, political, and legal connections to these attitudes.

While the perception of the frequency of abortions specifically has not drawn scholarly attention, the existence and importance of inaccurate perceptions of peer behavior has long been documented (see Perkins and Berkowitz 1986; Ross, Greene, and House 1977 for some early authoritative work in the area). Additionally, the sub-field of population innumeracy has documented that people generally overestimate the number of racial minorities, gay people, and welfare recipients, among other things, as well as underestimate the proportion of majorities in the population (Lawrence and Sides 2011).

Research has shown misperceptions of sexual and health-related behavior of others. For example, Scholly et al. (2005) found that undergraduates at four institutions "overestimated their peers' levels of sexual activity, number of

partners, incidence of sexually transmitted infections, and rates of unintended pregnancies, but underestimated rates of condom use.” Lambert, Kahn, and Apple (2010) found that both men and women college students believed, in general, that other students were more comfortable engaging in sex acts with each other without any expectation of commitment than they were themselves. Pinkerton et al. (2003) found that college-age women overestimated the degree to which their male counterparts masturbated, while an earlier study found cross-gender overestimation of masturbation frequency to occur in both directions, with the degree of overestimation being the largest when men were asked to assess the frequency of female masturbation (Clark 1999). Lastly, a 2013 study commissioned by the *Royal Statistical Society* and *King’s College London* shed light on various ways the British people misperceived population demographics and the incidence of social issues. Their top-rated misperception was teenage pregnancy: “on average, we think teenage pregnancy is 25 times higher than official estimates: we think that 15% of girls under 16 get pregnant each year, when official figures suggest it is around 0.6% (Ipsos MORI 2013).”

The documentation of misperceptions of the frequency of engagement in particular activities is not confined to especially private behaviors, like frequency of intercourse or masturbation. There are many studies that exemplify and characterize human misperceptions of the true attitudes and behaviors of others (or even of themselves), even when these attitudes and behaviors are seemingly represented in public. Berkowitz (2004) reports that people systematically misperceive the frequency that others binge drink, use drugs, gamble, engage in bullying behavior, hold homophobic attitudes and behaviors, and engage in gang behavior, among other things.

At times, demographic differences in the perceivers have been linked to the likelihood and extremity of the occurrences of misperceptions. Similar to the aforementioned Clark (1999) study on masturbation, many studies on perceptions of the alcoholic drinking behavior of generic others have found that males and females differ in their assessments. Borsari and Carey (2003) performed a meta-analysis on 23 studies that compared self-reported drinking rates to the perceived drinking rates of others. The researchers discovered that, on average women tended to overestimate drinking norms to a greater extent than did men.

Why Do We Misperceive the Social World?

Popular social psychological concepts like the *bystander effect*, *pluralistic ignorance*, the *fundamental attribution error*, *false consensus*, *false uniqueness* and others explain how humans, given a certain social situation (e.g. being in a crowd of people seemingly disinterested in another’s possible need for help), regularly make judgments about the social situation (e.g. this is not an emergency) and the motives, attitudes, and behaviors of others (e.g. everyone in this crowd feels this is not an emergency) that *consistently* and *predictably* skew our perceptions away from representing the objective reality of the situation.²

² See Behavioral Economist Dan Ariely’s book, fittingly entitled *Predictably Irrational: The Hidden Forces That Shape Our Decisions* which depicts many of

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Berkowitz, the champion of *The Social Norms Approach*, which seeks to correct misperceptions with the ultimate goal of behavioral changes, describes some of the mechanisms that lead to social misperceptions:

For example, the majority who engage in healthy behavior may incorrectly believe they are in the minority (*pluralistic ignorance*). In contrast, the minority of people with unhealthy attitudes and/or behaviors may incorrectly think that they are in the majority (*false consensus*). Finally, an individual may enjoy thinking that her or his behavior is more unique than it really is (*false uniqueness*) (Berkowitz 2004, 7).

Although much of the literature on misperceptions of the social world frames these heuristics and cognitive biases in a negative light, misperceiving social reality can be a useful and economical practice. For example, believing that you are above average in some way—even when an objective analysis would indicate you are not (commonly known as the *Lake Wobegon Effect*³)—may make you less nervous in social situations leading to more dates and job opportunities. Another example is the *availability heuristic*, which states that people use information that is readily available to them (e.g. salient memories) in order to make predictions/judgments about things (Oskamp and Shultz 2005), which is especially useful in situations in which swift actions are needed and/or when additional data is hard to find. However, when a person’s current knowledge of a certain phenomenon is not representative of the larger situation that the person is making a judgment about, this heuristic can lead to misperceptions (e.g. “no one I know has ever told me they had an abortion, therefore abortions never occur,” or “the media and politicians are always talking about abortion, therefore abortions must occur very often”⁴).

Objectives of the Study

Building on prior research, in this paper we argue that understanding the perceptions the public has about the frequency of abortion incidence is crucial to gauge abortion attitude formation and related social, political, and legal connections. We measured people’s perceptions of the likelihood a pregnant

the cognitive short-cuts humans take and highlights the situations where these short-cuts systematically lead to misperceptions about the social world.

³Named after radio personality Garrison Keillor’s fictional town “where all the women are strong, all the men are good-looking, and all the children are above average.”

⁴ The widespread notion that the world is more dangerous than ever and that you can’t be too careful “these days” is often attributed to the salience of violence and its prominence in “if it bleeds, it leads” newsrooms. Most scholarship shows, however, that the world may be enjoying its least violent time in human history. See Harvard psychologist Steven Pinker’s 2011 book *The Better Angels of Our Nature: Why Violence Has Declined* for a review of this literature and a voluminous scholarly depiction of the lessening of murders and rapes per capita over time.

women will have an abortion in the U.S. and in their state (i.e., Michigan). We identified how these perceptions differ based on a range of demographic, attitudinal, and behavioral characteristics. Ultimately, we are interested in finding out how accurately people estimate abortion rates and if these estimates meaningfully vary according to the demographic, attitudinal, and/or behavioral differences among the estimators.

Data and Methods

Primary data for our study comes from an online survey developed on SurveyMonkey and distributed via email listservs to students, faculty, and staff of two U.S. universities to which the authors had access. Upon gaining IRB approval from the primary research institution, we collected data during the period January – May 2013. We initially distributed the survey link through available email listservs, following which a snowball sample was generated through self-selection and redistribution of the link by respondents' to their own networks. In the five-to-ten minute survey, we asked respondents questions on how they feel about abortion. We explained in the consent form that since "abortion is a hot-button issue, it is important that we understand peoples' opinions about abortions as accurately as possible." Hence, we asked respondents to indicate their estimates of the prevalence of abortions in the U.S. and in their state. At the end of the data collection period, we received 157 total responses. After cleaning the data and removing missing values, we retained 155 usable observations.

The convenience sample generated through email listservs does raise questions about generalizability because we have used a non-probability sample that is not representative of the general population of the U.S. or that of Michigan. The survey respondents were limited to those with literacy and access to web resources. Respondents were not representative of the population of the country or a particular geographic location (Couper 2011; Bhutta 2012). Additionally, online convenience samples from prior research have reported biases where respondents tend to be disproportionately young, female, and well educated, which we also encountered in our own research (Bhutta 2012; Hampton et al. 2011). Due to these data limitations, our results cannot be generalized beyond the population defined by the sample that we have used (largely female, young, and comparatively highly educated). However, we believe that our research findings provide an exploration of an important, understudied aspect of an issue of critical societal and family health value. While considering this as an initial exploratory study, we hope future studies will look for replications of the findings using multiple, larger, and representative samples, as well as multiple methods.

Table 1 summarizes the relevant questionnaire items, proportions, and frequencies for the main independent and dependent variables used in our study. The survey measured several independent variables including demographic characteristics (gender, age, race, education, strength of religious affiliation, political orientation), attitudinal and behavioral measures, as well as four main dependent variables. For demographic variables, including strength of religious affiliation and political orientation, we used the same question stems and categorizations of the GSS, as a way of gauging external validity.

Our main dependent variables are respondent estimations of the (a) percentage of all unwanted pregnancies in the U.S. that end in abortion, (b) percentage of all unwanted pregnancies in the respondent's state that end in abortion, (c) percentage of all pregnancies (both wanted and unwanted) in the U.S. that end in abortion, and (d) percentage of all pregnancies (both wanted and unwanted) in the respondent's state that end in abortion. The specific questionnaire wording for the dependent variables is stated below:

The next few questions deal with percentages. Percentages are ways of measuring how many times out of a 100 something is likely to happen. Thus, if a coin lands on heads half the time and on tails half the time, it has a 50 percent chance to land on heads and a 50 percent chance to land on tails.

Q1: To the best of your knowledge, what percentage of all unwanted pregnancies in the U.S. end in abortion?

Q2: To the best of your knowledge, what percentage of all unwanted pregnancies in your state end in abortion?

Q3: To the best of your knowledge, what percent of all pregnancies (both wanted and unwanted) in the U.S. end in abortion?

Q4: To the best of your knowledge, what percent of all pregnancies (both wanted and unwanted) in your state end in abortion?

Responses to these four dependent variables were collected on scales ranging from 0% to 100%, with 10% increments. We recoded the dependent variable to "underestimate," "accurate estimate" and "overestimate," within the 10% incremental scale. This recoding allowed for Chi-square analysis of estimation accuracy. Recoding was done by comparing the respondents' abortion estimates to a baseline of existing estimates of abortions from governmental records (i.e. CDC) and NGO records (i.e. Guttmacher Institute). These are the selected baseline data points: (a) 43% of all unwanted pregnancies in the U.S. end in abortion (Guttmacher 2013), (b) 34% of all unwanted pregnancies in Michigan end in abortion (Guttmacher 2012), (c) 22.8% of all pregnancies (both wanted and unwanted) in the U.S. end in abortion (CDC 2013), and (d) 20.2% of all pregnancies in Michigan (both wanted and unwanted) end in abortion (CDC 2013). In addition to the four main dependent variables, the coding scheme for independent variables is shown in Table 1 below, along with the corresponding percentages and N values for the different answer categories.

In the results presented below, we restricted the "state level" analysis to Michigan, where approximately 80% of the respondents in the sample indicated living at age 16. Thirty-two respondents were living outside of Michigan and their responses were not included in the state-level analysis. All responses (for those living in and outside of Michigan) were included in the country-level analysis. We used Chi square analysis to identify any possible associations between

respondents' demographic characteristics, attitudes toward abortion, behavioral characteristics, and their abortion estimates. We also report some exploratory univariate findings on respondents' attitudes towards circumstances under which abortion should be allowed.

Results

Descriptive Statistics

Descriptive statistics for the variables used in the study are reported in Table 1. The frequencies and percentages displayed reveal that the sample consisted mainly of young adults aged 18 to 35 with considerably high levels of education compared to the general population of the U.S. (Over 60% of the respondents had at least an associate's degree; however, according to the 2010 U.S. Census report, only 36% of the general population over 25 years of age have at least an associates-level educational attainment). Approximately 71% of the respondents were female, which is not surprising as prior studies have reported instances where women are more expressive of their attitudes towards abortion and considered abortion as a relevant and/or "hot topic" as opposed to men (e.g., Salmon 1990). There was some diversity among religious affiliations and political orientations in the sample. Twenty-five percent of the respondents indicated that the strength of their religious affiliation is very strong as opposed to 34% who indicated that their affiliation is "not strong at all." Fifty-eight percent of the respondents were politically liberal. Eighty-seven percent of the respondents were white. Eighty-four percent of the respondents reported having received some form of sex education in their grade 5 through 12 education. About 50% of the individuals received safe sex education, while approximately 25% received abstinence-only education. Ninety-seven percent of the participants indicated that they are in favor of sex education in public schools, and the majority preferred safe sex (79.5%) as opposed to abstinence-only sex education (10.3%). In terms of sexual health behaviors, 87% reported having had at least one sex partner over the last 5 years. More than 50% of the individuals in the sample reported having used some form of birth control the last time they engaged in vaginal intercourse. Furthermore, as seen in Table 1, exploratory findings on attitudes toward abortion indicate that nearly half of the survey sample believed that abortion is a "very important" issue to them. Twenty percent of the respondents indicated that they think about topics related to abortion "often," while 49.3% indicated that they think about topics related to abortion "sometimes."

Table 1: Descriptive statistics for survey sample (N=155)

Variable	Coding	Percent	N
Age	18-25	35.0	54
	26-35	44.8	69
	> 36	20.1	31
Gender	Female	71.6	111
	Male	28.8	44
Education	High school/GED	36.9	58
	Associates	20.4	32

	Bachelors	27.4	43
	Masters/PhD/MD/DO	15.3	24
Strength of religious affiliation	Very strong	25.0	39
	Moderate	23.7	37
	Not strong or slightly	49.4	77
Political orientation	Extremely liberal	13.8	21
	Somewhat liberal	44.1	67
	Somewhat conservative	33.5	51
	Extremely conservative	8.5	13
State/Country person was living at age 16	Michigan	79.2	122
	Other	20.8	32
Race	Caucasian	87.4	132
	Other	11.9	18
How important is abortion issue to the participant	Very important	42.7	67
	Somewhat important	51.6	81
	Not important	7.0	11
	N/A	1.9	3
How often participant think about topics related to abortion	Often	20.5	32
	Sometimes	49.4	77
	Seldom	26.9	42
	Never	3.2	5
In favor of sex education in public schools	Yes	97.4	152
	No	1.3	2
	Don't know	1.3	2
Type of sex education participant prefer	Abstinence only	10.3	16
	Safe sex	79.5	124
	Other	8.9	14
	Not applicable	1.2	2
Received sex education in grade 5-12	No	13.4	21
	Yes	84.1	132
	Don't know	2.5	4
Type of sex education received	Abstinence only	24.8	39
	Safe sex	50.3	79
	Not applicable	13.4	21
	Other	11.5	18
Used birth control last time person had vaginal sex	Yes	52.5	82
	No	30.1	47
	Not applicable	17.3	27
Presence of sex partners in last 5 years	Yes	87.0	134
	No	12.9	20
Percentage estimates for all unwanted pregnancies in US end in abortion	Underestimate	73.7	115
	Accurate estimate	6.4	10
	Overestimate	19.9	31
Percentage estimates for all unwanted pregnancies in your state that end in abortion	Underestimate	58.4	73
	Accurate estimate	17.6	25
	Overestimate	24.0	30

Percentage estimates for all pregnancies (both wanted and unwanted) in US end in abortion	Underestimate	49.0	76
	Accurate estimate	21.9	34
	Overestimate	29.0	45
Percentage estimates for all pregnancies (both wanted and unwanted) in your state end in abortion	Underestimate	30.9	48
	Accurate estimate	44.5	69
	Overestimate	24.5	38

Frequency distributions of the 4 dependent variables, presented in Figures 1- 4 below, allow for further visual comparisons of participants' estimates of abortion rates to the official estimates. These figures reiterate that most respondents in our sample under-estimate the abortion rates, both for the U.S. and for Michigan.

FIGURE 1: Percentage estimates for all unwanted pregnancies in U.S. that end in abortion

FIGURE 2: Percentage estimates for all unwanted pregnancies in Michigan that end in abortion

FIGURE 3: Percentage estimates for all pregnancies (both wanted and unwanted) in U.S. that end in abortion

FIGURE 4: Percentage estimates for all pregnancies (both wanted and unwanted) in Michigan that end in abortion

Table 2 summarizes participants' perceptions of scenarios under which abortion should be allowed. These perceptions were variable with an overwhelming percentage agreeing that abortion should be allowed if a woman's own health is endangered due to pregnancy or if a woman becomes pregnant as a result of rape (80.8% and 74.4% respectively). Consistent with previous literature, considerable support was also seen for abortion when there is a strong chance of a serious defect in the baby (56.7%). Significantly less support is expressed for abortion when the pregnancy has passed the first trimester (31.4%), and even less support is exhibited after the second trimester (15.9%). Only 39.1% of the survey respondents agreed that abortion should be allowed if a woman wants it for any reason.

TABLE 2: Scenarios in which abortion should be allowed, affirmative percent, (N=155)

	Percent in the affirmative
Family has low income and cannot afford more children	51.2 (yes)
Woman becomes pregnant as a result of rape	74.4 (yes)
Pregnancy has passed first trimester	31.4 (yes)
Pregnancy has passed second trimester	15.9 (yes)
Father is aware of pregnancy and want the baby to be born	28.8 (yes)
Father is unaware of pregnancy	37.8 (yes)
Woman's own health is endangered due to pregnancy	80.9 (yes)
Woman is not married and does not want to marry the father	39.7 (yes)
Father aware of pregnancy and wants to terminate pregnancy	27.4 (yes)
There is a strong chance of a serious defect in the baby	56.7 (yes)
Woman wants it for any reason	39.2 (yes)
Woman is married and does not want any more children	43.9 (yes)

As seen in Table 1, the respondents' abortion estimates vary significantly and were often inaccurate in comparison to the most reliable data available to us at the current time. Only 6.4% of the respondents were able to accurately estimate the percentage of all unwanted pregnancies in the U.S. that end in abortion. This is significantly lower than the percentage that accurately estimated the percentage of all pregnancies (both wanted and unwanted) in U.S. that end in abortion (21.9%). When considering state-level (Michigan) estimates, 17.6% of respondents were able to accurately estimate the percentage of all unwanted pregnancies in their state that end in abortion. Additionally, a considerably higher percentage of respondents accurately estimated the percent of all pregnancies (both wanted and unwanted) in Michigan that end in abortion (44.5%).

Associations between Abortions Estimates and Demographic Characteristics

We used Chi square analysis to determine if there were any associations between accuracy of estimations of abortion rates and demographic characteristics as well as attitudes toward abortion. The percentage of participants that accurately determined the abortion rate for all pregnancies in the U.S. (both wanted and unwanted) differed by gender, $X^2 (2, N=153) = 5.67, p < .05$. Women were significantly more likely to overestimate the abortion rate for all pregnancies in U.S. (33.9% of women as opposed to 18.1% of men), while men were significantly more likely to underestimate the abortion rate (63.6% men as opposed to 43.1% women) (Table 3).

TABLE 3: Association between gender and abortion estimates for all pregnancies in US that end in abortion (percentage and count)

Abortion estimate	Gender	
	Female	Male
Under estimate	43.12% (47)	63.64% (28)
Accurate estimate	22.94% (25)	18.18% (8)
Over estimate	33.94% (37)	18.18% (8)
Total	100% (109)	100% (44)

$\chi^2 = 5.67$; $df=2$; $p<.05$

We found that the percentage of participants that accurately determined the abortion rate for all pregnancies in the U.S. differed by age as well, such that $X^2 (4, N=152) = 9.79, p < .05$. In the 26-to-35 age category, most individuals underestimated the abortion rate for the U.S. (61.8%), whereas the highest percentage of accurate estimates was seen amongst people over 35 years of age (26.7%) (Table 4).

TABLE 4: Association between age and abortion estimates for all pregnancies in US that end in abortion (percentage and count)

Abortion estimate	Age		
	18-25	26-35	>35
Under estimate	40.74% (22)	61.76% (42)	36.67% (11)
Accurate estimate	20.37% (11)	20.59% (14)	26.67% (8)
Over estimate	38.89% (21)	17.65% (12)	36.67% (11)
Total	100% (54)	100% (68)	100% (30)

$$\chi^2 = 9.79; df=4; p<.05$$

The percentage of participants that accurately determined the abortion rate for unwanted pregnancies in the U.S., both wanted and unwanted pregnancies in Michigan, and unwanted pregnancies in Michigan did not differ by education, race, gender, age, religious affiliation, or political orientation. Furthermore, we did not find any significant associations between the abortion estimates and the attitudinal and behavioral measures tested in this study. Overall results indicate that some significant associations do exist between people's estimates of abortion rates and their demographic characteristics that need to be further investigated through causal analysis.

Discussion

Respondents were more likely to underestimate than accurately estimate or overestimate the percentage of pregnancies that ended in abortion in three of the four estimates about which we asked: all pregnancies in the U.S., unwanted pregnancies in the U.S., and unwanted pregnancies in Michigan (the most popular estimate for all pregnancies in Michigan being accurate). The idea that humans do not possess perfect knowledge about the behaviors of others has been well established (e.g. Berkowitz 2004; Gilens 1996; Prentice and Miller 1993). We must pay attention to these, often inaccurate, subjective perceptions because "people act on their perceptions of their world in addition to acting within a real world" (Perkins and Wechsler 1996:962).

Our misperceptions about the social world are usually attributed to any number of judgmental heuristics. Many of these were introduced to the scientific world by Daniel Kahneman and Amos Tversky in a 1974 article in *Science* (Tversky and Kahneman 1974).⁵ The *availability heuristic* could be a reason why we found a general underestimation of the degree to which pregnancies end in abortion. The availability heuristics states that there is a relationship between the

⁵ Since a seemingly endless number of heuristics have sprouted up from rigorous and not-so rigorous research and interpretation, many of these have been used in an ad-hoc fashion to explain researchers' findings of perceptual errors and mis-estimations (and can even be used in ways that seem to offset each other, e.g. what is rare makes a big impact, but what is usual also makes a big impact).

ease with which examples of a certain phenomenon come to mind and the likelihood we attribute to that event occurring in the larger social world and its importance in that larger social world (Tversky and Kahneman 1973). Researchers have found evidence of this heuristic influencing the way we judge whether or not we think a product will succeed (Folkes 1988), our perceptions of the prevalence of depression (An 2008), our perception of the quality of lives others lead (Chou and Edge 2011), among many other applications.

Perhaps due to the strong stigma surrounding abortion, women are unlikely to disclose to others that they have had an abortion. Cowan (2013) found that individuals knew more people who had had miscarriages than abortions, even though abortions actually occur more frequently. She argues that abortion stigma is much greater than miscarriage stigma and that this leads to less people divulging that they have had an abortion. Clearly, more studies are needed to not only replicate what we have found here but also to investigate the mechanisms contributing to the overall underestimation.

Still, the mere presence of this general underestimation has several societal implications. Most basically, scholars have established that there is a strong correlation between how often people think their peers act in a certain manner and the likelihood that they will act in a similar way, (i.e. we do as we think others do). Moreover, social norms campaigns have succeeded in demonstrating that a change in the perception of the behavior of others leads to a behavioral change in the same direction (Berkowitz 2004). Longitudinal studies in this area provide good evidence for establishing the causal influence of perceived peer behavior (see Perkins 2003 for some of these).

So, the underestimation may have the ultimate effect of producing less abortions in the population than would occur if people accurately perceived the abortion likelihood. Of course, unlike many existing studies on the effects of misestimations on behavior (e.g. those on alcohol consumption), this topic is unique because only a portion of the population (and our sample) have even the slightest potential of receiving an abortion. Only females of reproductive age receive abortions and those two variables, age and sex, are extremely difficult to change. Perhaps if we are concerned with the behavioral effects of the perception of the behavior of others in this realm, we should limit our analysis to the perceptions of those who have the basic potential to receive an abortion. Both gender and age had some effect in some of our study conditions, but overall, gender and age effects did not negate the tendency towards underestimation.

Likewise, we did not find a relationship between questions regarding sexual frequency and abortion estimates. Despite the relevance of limiting the sample of perceptions we measure if we wish to determine perceptions effects on behaviors, we must remember that abortions occur in social contexts. The opinion of partners, parents, social workers, doctors, religious leaders –all of whom have their own perceptions about the likelihood of abortions ending in pregnancies –stand to influence abortion decisions. Future studies should consider these nuances in study designs and interpretations.

In addition to its role in lessening the number of abortions in the population, the underestimation may play a causal role in determining the

frequency with which people have sexual intercourse, have sexual intercourse with the goal of procreating, and have sexual intercourse without birth control. Individuals who wish to have sex without creating a fetus are probably more likely to engage in sexual intercourse when they think the likelihood of pregnancy is low. All other things being equal, believing abortions occur less than they actually do translates into believing pregnancies happen less frequently than they actually do. Still, if people who do not wish to have a baby believe that very few others are having abortions, they might also be compelled to engage in less pregnancy-inducing behavior.

It might be easier to articulate these points if we frame them as what might happen if the underestimation was corrected to an accurate estimation. Here are two logically and generally empirically-supported, albeit opposite, outcomes of a correction of the mis-estimation of abortion rates: 1) People not wishing to conceive may engage in less vaginal intercourse, especially sans birth control, out of an increased fear of becoming pregnant (i.e. more abortions are more evidence of pregnancies); 2) conversely, these same people may engage in *more* vaginal intercourse, even with birth control, as they feel more justified, able, or are more willing to have a potential pregnancy aborted.

However, sometimes when people come to find that something is occurring much more frequently than they previously thought, this compels them not to join in committing the same act, or standing idly by, or believing it to be more moral. Instead, this awakening serves to compel the person to act out against the issue, a phenomenon known as the boomerang effect (e.g. see Shultz et al. 2007). So, finding out that no one in your city recycles might just be the tipping point that causes you to start recycling, or finding out that most people do not intervene when someone is getting bullied might spur you to be extra ready to step up to bullies.

In addition to the general finding of underestimation, we found a gender difference in one of the four conditions—all pregnancies in the U.S. Although our sample underestimated as a whole, women were more likely than men to *overestimate* the abortion rate. On the other end, men were more likely than women to underestimate the abortion rate in the same condition. This may be because only women get abortions and the issue is more salient among women's social circles and women's everyday lives. Furthermore, the evidence that women's estimates were more likely to center around the true statistic is congruent with the pervasive finding in other studies that social distance is directly correlated with the size of mis-estimation (e.g. Beasley 2010, Berkowitz 2004, Borsari and Carey 2003); the closer one is to the people he/she is asked about, the more accurate his or her answers will be. In this case, women may be more apt to accurately gauge abortion frequency than men. Of course, it is important to note that we did not find a significant gender effect in our other conditions.

In two of our conditions, age was also significantly related to abortion estimates. In the condition regarding all abortions in the U.S., younger individuals were more likely than other age groups to underestimate, while older individuals were more likely than other age groups to accurately estimate the true statistic of

22.8%. When we asked about all pregnancies in Michigan, the youngest group was more accurate compared to the older groups –the true statistic is 20.2%. This may have been a result of our methods for the “Michigan” conditions, where we asked people about abortion “in their state” and included responses of those that said they were living in Michigan at the age of 16. It stands to reason that younger people who were in Michigan at the age of 16 would still be in Michigan and would have a less obscured view of abortion frequency in Michigan than older individuals who may live in a different state.

Gender and age were not significantly associated with abortion estimates in the other conditions. Moreover, none of the other demographic, behavioral, or attitudinal variables were significantly associated with any of the conditions. More research is needed to determine if factors such as religious and political affiliation, sexual activity, and educational level truly do not influence abortion rate estimates.

Limitations

As we used a convenience sample in this study, extreme caution should be used in generalizing our findings. The percentage of women and people with advanced degrees were higher in our sample than they are in Michigan or the U.S. as a whole. More than that, in order for an individual to respond to the survey, he or she had to see our invitation (those socially close to us were the most likely), and have sufficient time, know-how, and motivation to fill it out. Those that self-selected into our sample most likely differed in meaningful ways (including their perceptions towards abortion) from some general populations of interest (e.g. U.S. adult citizens, Michigan college students, likely voters). As mentioned before, this sampling bias does raise significant issues of generalizability. However, we argue that our study is useful, albeit preliminary, in that it draws attention to a phenomenon that has not been addressed sufficiently in existing literature.

Our subjects may have also been affected by social desirability bias, even though we assured them that their responses would be anonymous. After all, we asked about highly sensitive topics (e.g. sexual behavior, religion, politics, and abortion). Furthermore, respondents’ understanding and interpretation of the questions may have differed from one another and from our intention. For example, people certainly think of different things when asked about abortion (e.g. whether the abortion is induced or spontaneous, legal or illegal, done in the first-trimester-only or any trimester, regarding a viable fetus, whether the mother’s health is in danger, or if the likely quality of life for the fetus is significant in any way). Still, we did ask a basic question about what respondents think of when asked about abortion to gain some idea of the mental frames with which they were operating.

When comparing our subjects’ estimations of abortion rates to official statistics, we must be aware that the official statistics do not necessarily represent an objective and accurate representation of the true incidence of abortion. For example, the CDC statistics we used are tracking only those abortions that occur as interventions “performed by a licensed clinician (e.g., a physician, nurse-midwife, nurse practitioner, or physician assistant) that [are] intended to terminate

a suspected or known ongoing intrauterine pregnancy and produce a nonviable fetus at any gestational age (Pazol et al. 2011).” Furthermore, the CDC is at the mercy of the compliance of reporting agencies which may voluntarily choose not to report cases or limit the types of cases they do report. Meanwhile, the Guttmacher Institute’s statistics come from surveys of legal abortion providers. While the institute uses a variety of methodologies (e.g. extensive follow-ups including interviews) to counteract the usual pitfalls of survey research (e.g. response bias), the data produced is still describing only the number of legal abortions. The incidence of illegal and/or “unsafe” abortions are difficult for researchers to determine (Ahman and Shah 2010).

We do know, however, that some number of abortions occur outside the scope of the CDC’s and Guttmacher Institute’s standard tabulating procedures because of lack of access to abortions, the stigma surrounding them (Cockrill and Nack 2013; Shellenberg et al. 2011), or other reasons (Singh, Remez, and Tartaglione 2011). In April 2014, the Huffington Post ran a story that claimed that pregnant Americans “once again find themselves crossing the border to Mexico and haunting back-alleys in search of medical care” and/or are “attempting risky self-abortion procedures (Bassett 2014, http://www.huffingtonpost.com/2014/04/03/back-alley-abortions_n_5065301.html).

Similarly, according to *Ibis Reproductive Health* researcher Dan Grossman, with the implementation of stiffer regulations in Texas, there have been reports of women taking herbs or other substances or intentionally getting punched in the stomach or beaten up, i.e. the same kinds of things they did before abortion was legal. “There also seems to be a lot of illegal obtainment and use of the prescription abortion pill misoprostol or of other substances masquerading as the drug. However, many pro-life advocates see work like that of Grossman as nothing more than inflationary political scare tactics (Bassett 2014, http://www.huffingtonpost.com/2014/04/03/back-alley-abortions_n_5065301.html).

Regardless, we do not know for sure how many abortions take place outside of the legalized medical domain.

Still, since we found an underestimation of abortion rates, the discovery or tabulation of additional abortions will only increase the degree of the underestimations. So while this limitation certainly affects the precision of our calculations, it should not invalidate our general argument and findings.

We also encountered a data limitation due to collecting respondents’ abortion estimates on a 0-100% scale with 10% increments. We are unable to pinpoint whether the intended estimates are closer to the lower boundary or the upper boundary of the incremental category. This may have caused some errors of our recoding of the abortion estimates. As a result, we must reiterate that our operationalization of “accurate estimate” is an approximation, along with the “underestimate” and “overestimate” categories. Future research may consider using open ended questions to gauge the abortion estimates, while keeping in mind that they too may cause data collection issues such as higher percentages of missing values.

Conclusion

Although such a powerful and divisive issue, little research has been done to determine people's perceptions of the frequency of abortion in the population. With other similar issues, people have been found to, on average, mis-estimate the degree to which others do or believe something. These misperceptions are important because they have been shown to be related to personal behaviors; we are influenced by the perceptions of the thoughts and behaviors of others. Our sample, as a whole, underestimated how many pregnancies end in abortion. Following the logic and evidence of earlier studies on similar issues and principles, this underestimation likely causes different abortion and sexual behavior than would occur if people accurately estimated the prevalence of abortions.

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