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Documenting Pornography Use in America: A Comparative Analysis of Methodological Approaches

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Estimates of pornography use in the United States range widely. We explore the reasons for the variation in such estimates among U.S. adults using data from four different recent nationally representative samples—each of which asked a different type of question about pornography use. We attribute the notable variation in estimates to differences in question wording and answer options, and assert that a survey question asking respondents about their most recent use of pornography minimizes recall bias and is better poised to assess the overall prevalence of pornography in a population than is the more common approach of asking respondents about their historical general-use pattern. When we privileged the most-recent-use approach, survey data from 2014 reveal that 46% of men and 16% of women between the ages of 18 and 39 intentionally viewed pornography in a given week. These numbers are notably higher than most previous population estimates employing different types of questions. The results have ramifications for methods of surveying sensitive self-reported behaviors and for contextualizing scholars' claims as well as popular conversations about the reach and implications of pornography use in the United States.

Scholars of human sexuality acknowledge that the accessibility, affordability, and anonymity of online erotic and pornographic materials have made this domain a significant one for the study of sexual behavior. Indeed, demand for increased Internet speed is reportedly connected to demand for more realistic digital pornography (Anthony, 2012). Debate continues and likely will for some time about the consequences of pornography use. Much of the research on the consequences of pornography use highlights negative effects, including heightened risk of sexually aggressive behavior and more numerous sexual partners—and with it, heightened likelihood of sexually transmitted infections (STIs), as well as elevated substance abuse and difficulty in fashioning emotionally intimate relationships (e.g., Carroll et al., 2008; Hald, Seaman, & Linz, 2014; Paul, 2006; Wingood et al., 2001; Ybarra & Mitchell, 2005). Others hold that such fears are unfounded and the possible positive consequences of pornography—such as a liberalizing effect of new sexual positions, conversations, and scripts—are too often discounted in favor of public health concerns (McKee, 2007; Weinberg, Williams, Kleiner, & Irizarry, 2010).

Meanwhile, valid and reliable estimates of actual pornography use in the population remain challenging to discern. Without them, however, positioning the importance of debates about the effects of pornography remains difficult to accomplish. Are positive or negative effects limited to a modest group of mostly infrequent users, a small group of frequent users, or do they apply to a much larger group of Americans with quite disparate usage patterns?

We compared four nationally representative samples of adults in the United States to assess the strengths and weaknesses of different types of survey questions about pornography use. We employed a novel method in this area of research that allowed us to convert different types of pornography use questions into a prevalence measure that could be compared across surveys. We did this to answer several questions about pornography use estimates derived from surveys:

1. Do population-based estimates of pornography use vary considerably across distinctive survey approaches?
2. Are such estimates so variable as to call into question the validity of particular measurement approaches? (And if so, why?)

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3. Is it possible to discern an ideal approach for estimating pornography use in a social survey?

These questions motivated this methodological study. And after close evaluation of different survey methods—and a standardized comparison between their estimates—we make a case for a distinctive way of asking about pornography use to best estimate its prevalence in a population.

Background

While we do not consider its results here—given it is more than 20 years old now—the cross-sectional 1992 National Health and Social Life Survey was one of the earliest population-based surveys to query Americans extensively on sexual matters. It did not, however, ask a straightforward question about pornography use (Michael, Gagnon, Laumann, & Kolata, 1994). Instead, it posed a series of questions about whether respondents had purchased (or in the case of video, rented) various materials in the past 12 months, including “any X-rated videos or movies” (23% versus 11% for men and women, respectively) and “any sexually explicit magazines or books” (16% versus 4% for men and women, respectively). The focus on purchase makes sense, given the survey took place before widespread Internet access, but it serves to remind scholars of both the shifting language around pornography (e.g., *X-rated*, *sexually explicit*) and the evolution in technology that has altered the ways in which most consumers access pornography.

The times have changed, though. Ease of access, perceived interest, and broadband Internet has contributed to the conventional wisdom that contemporary young adults are more likely to consume pornography than previous generations, and more likely to do so than older adults. In one of the more wide-ranging studies of online porn use and norms surrounding it, researchers interviewed 813 young adults—students from six colleges and universities ranging in age from 18 to 26 (Carroll et al., 2008). Two out of three men agreed that porn use was generally acceptable, while the same was true of half of women. In all, 87% of the nonrandom sample’s men and 31% of women reported viewing pornographic material within the past year, contributing to popular references to the “Porn Generation” or “Generation XXX” (Carroll et al., 2008; Shapiro, 2005). The gender distinction widely noted in pornographic uptake is not new; men are more likely than women to have ever used pornography, as well as to report having “done so within the last 6 months, 1 month, 1 week, and 24 hr(s)” (Hald & Malamuth, 2008; Hald, 2006; Morgan, 2011).

But when it comes to change in pornography use, the story becomes far more subtle. Wright (2013) examined the growth in pornography consumption in men and women over time using the General Social Survey (GSS)—data we employed herein as well—and found only modest evidence of increases in annual use rates. The Internet, he held,

has stabilized fluctuating women’s (lower) use rates (Wright, Bae, & Funk, 2013).

Measuring Pornography Use: Methodological Challenges

Therefore, just how much exposure and consumption is occurring in a population at a given point in time remains disputed, in part because (a) it is challenging to document, (b) the language around pornography use has shifted, and (c) no “gold standard” approach to quickly assessing pornography use on a social survey has yet emerged. Health surveys seldom include it, given little conceptual link between pornography and physical health markers. In addition, the subject remains a sensitive and moral one, lending itself to greater-than-average concern about social desirability bias, or the tendency of individuals to make themselves appear more socially acceptable than they actually are, either by way of self-deception (the unconscious tendency to give inaccurate but honestly held descriptions of oneself and one’s behavior) or other-deception (the tendency to convey a more favorable self-description to a researcher) (Paulhus, 1984; Regnerus & Uecker, 2007).

Just how much of a problem either form of social desirability bias is for survey questions on pornography is not well understood, and its effect on population estimates for pornography use has been unclear. Given that U.S. adults express strong opinions about the morality of pornography, with about 20% of men and 35% of women in the General Social Survey reporting that pornography should be illegal for everyone (Price, Patterson, & Regnerus, 2015), it is likely that some individuals may underreport their pornography use (Hald et al., 2014; Johansson & Hammaré, 2007; Regnerus & Uecker, 2011; Sherkat & Ellison, 1997).

In the case of pornography use, recall bias may be acute as well. That is, users may underestimate their self-reported porn use or discount recent (e.g., heavier) usage as uncharacteristic of their long-term “common use” pattern. More to the point, recall bias tends to diminish respondents’ ability to accurately remember events in the distant past, rendering such self-reports as less valid than self-reported recent events (Graham, Catania, Brand, Duong, & Canchola, 2003; Huttly, Barros, Victoria, Beria, & Vaughan, 1990). As a result, surveys that ask respondents to recall pornography usage over a shorter time period should be less prone to recall bias than those that inquire about a more distant (or longer) period of time.

Data and Methods

Measures

So how do common surveys ask about pornography use? Table 1 displays four different types of question wording and answer options from the four nationally

Table 1. *Text of Survey Questions and Possible Answers in Each Data Collection Effort on Pornography Use*

Text	RIA	NFSS	NSYR	GSS
Question Wording	“When did you last intentionally look at pornography?”	“During the past year, how often did you: view pornographic material (such as Internet sites, magazines, or movies)?”	“About how many, if any, X-rated pornographic movies, videos, or cable programs have you watched in the last year?”	“Have you seen an X-rated movie in the past year?”
Answer Options	Today Yesterday 2–4 days ago 5–6 days ago 1 to 2 weeks ago 3–4 weeks ago Over 1 month ago Over 6 months ago Over a year ago Never	Never Once a month or less 2–3 days a month 1 or 2 days a week 3 to 5 days a week Every day or almost every day	Values of 0–300	Yes/No

representative surveys we evaluated in detail. We highlight them here to note the unique approaches to querying about pornography use.

The GSS is unique here among such surveys in that it reaches back well beyond the Internet era. The GSS has consistently asked about pornography use since 1973, querying respondents for a simple yes-or-no response to the question “Have you seen an X-rated movie in the past year?” This is admittedly a rather blunt instrument for measuring what is for many a much more frequent behavior. In addition, the term *X-rated* may be less relevant today as a comprehensive indicator of pornography. Hence the measure itself is arguably declining in validity over time and with younger cohorts. On the other hand, the standard of what constitutes an “X-rated” video is made by an external group (the Motion Picture Association of America) and avoids the problem of individuals employing subjective standards of what constitutes pornography. And although technological advances have changed the delivery system by which individuals access X-rated movies (theaters, videotapes, cable television, Internet), the basic nature of watching pornography videos has remained. But it is difficult to say whether today’s respondents consider explicit photographs or shorter pornographic clips to constitute “movies.”

The National Study of Youth and Religion (NSYR) is a population-based, longitudinal, nationally representative sample of youth and adults. Wave 3 asked young adults this question: “About how many, if any, X-rated pornographic movies, videos, or cable programs have you watched in the last year?” Respondents were then allowed to answer any integer with responses top coded at 300 occurrences. While expanding the scope of pornographic mediums that are included, this approach still suffers from the same limitations that plague several GSS questions, including the absence of photographic (i.e., still-shot) pornography and risk of significant recall bias, especially when asking about acts that span a year’s time.

The New Family Structures Study (NFSS) completed surveys with just under 3,000 Americans between the ages of 18 and 39 in 2011 and early 2012. The NFSS is a weighted probability sample whose respondents were asked “During the past year, how often did you ... view pornographic material (such as Internet sites, magazines, or movies)?” Unlike the NSYR, the NFSS offered a fixed set of ranges for its answer options, including *Every day or almost every day*, *3 to 5 days a week*, *1 or 2 days a week*, *2 or 3 days a month*, *Once a month or less*, and *Never*, enabling respondents to disclose a pattern of general use.

The Relationships in America (RIA) project surveyed 15,738 American adults between the ages of 18 and 60 in the early months of 2014. The RIA constitutes a weighted probability sample for adults in that age range. In an unusual break from measurement precedence, RIA respondents were asked about their most recent instance of use. All respondents were asked the following as the final question of the survey: “When did you last intentionally look at pornography?” The answer choices offered were *Today*, *Yesterday*, *2–4 days ago*, *3–5 days ago*, *1 to 2 weeks ago*, *3–4 weeks ago*, *Over one month ago*, *Over six months ago*, *Over a year ago*, and *I’ve never intentionally looked at pornography*. Nor did the question specify the type of pornographic material (e.g., videos versus photographs). To our knowledge this is the only major, nationally representative survey that asked respondents to indicate the last time they viewed pornography. Hence it offers a unique opportunity to compare responses.

Another distinction is the survey delivery system: The GSS and NSYR involved human interviewers, while the NFSS and RIA both administered the survey anonymously via computer. If social desirability bias is at work in questions about pornography use—and we suspect it is—we might expect surveys involving a human interviewer to generate lower estimates of pornography use and higher refusal rates than surveys collected via web-based self-interviews (Abma, Chandra, Mosher, Peterson, & Piccinino, 1997).

Table 2. *Summary Statistics and Comparison of Survey Data Sources*

	RIA (2014)	NFSS (2012)	NSYR Wave 3 (2008)	GSS (2008–2014)
Question type	Last use	Frequency, categorical	Frequency, continuous	Past year use (y/n)
Age range	18–39	18–39	18–23	18–39
Years	2014	2012	2008	2008–2014
<i>N</i> (ages 18–23)	751	926	2,499	384
<i>N</i> (ages 18–39)	5,165	2,922	0	2037
Summary statistics, ages 18–23				
Age	20.6	20.4	20.0	20.8
Non-White	39%	46%	31%	35%
Married	5%	8%	5%	6%
< High school	18%	13%	—	20%
High school	36%	46%	—	31%
Some college	38%	35%	—	43%
College degree	7%	5%	—	7%
Summary statistics, ages 18–39				
Age	28.8	28.2	—	29.0
Non-White	41%	42%	—	32%
Married	41%	41%	—	38%
< High school	11%	9%	—	17%
High school	27%	31%	—	25%
Some college	31%	33%	—	32%
College degree	31%	26%	—	26%

Participants

Our analyses are based on data from the 2008–2014 waves of the GSS, the 2008 wave of the NSYR, the 2011–2012 NFSS, and the 2014 RIA. The analytic sample size (of 18- to 39-year-olds) utilized in the GSS analysis is 2,037 cases drawn from the 2008–2014 waves of the GSS. Although pornography use questions in the GSS extend back to the 1970s, we chose these years so that they would overlap with the years available in the other data sets that we used.

We evaluated data from Wave 3 of the NSYR, conducted in 2007–2008, the only wave of the study where participants were asked about the frequency of pornography usage as adults.¹ At the time of data collection respondents ranged from 17 to 24 years of age. Very few respondents were ages 17 or 24 at the time of the interview, and thus for purposes of comparison to other data sets we restricted our analyses to those respondents ages 18 to 23. Valid responses were collected from 2,487 young adults ages 18 to 23.

The NFSS yielded valid responses from 2,921 participants ages 18 to 39. The data collection for both the NFSS and RIA were conducted by GfK Knowledge Networks, a research firm with a strong record of generating high-quality data for academic projects.²

The RIA survey, which features the only most-recent-use question among the four data collection projects, included 5,165 cases of respondents under age 40 (and thus employed in these analyses). Importantly, 907 respondents to the RIA project were also interviewed in the NFSS (approximately 2 to 2.5 years earlier), enabling comparisons across different types of pornography use questions.

Table 2 provides a demographic summary of each of the data sets, as well as compares them on question type, age range, year, and sample size. Although the NSYR is limited to only those ages 18 to 23, the other three samples have sizable populations of adults such that we still have a reasonable sample size in each data set even for the subsamples of men and women ages 18 to 23.

Analytic Approach

We begin our analyses by comparing the raw estimates of the four different data collection projects, a process which illustrates the ramifications of very different approaches to asking questions about personal pornography use. Because the GSS asked only about annual use, it is only there that we are able to compare it with the other three data sets. Because usage is commonly more frequent than annual, thereafter we move forward with the other three. But to directly compare survey estimates

¹ The National Study of Youth and Religion, whose data were used by permission here, was funded by Lilly Endowment Inc., under the direction of Christian Smith, of the Department of Sociology at the University of Notre Dame, and Lisa Pearce, of the Department of Sociology at the University of North Carolina at Chapel Hill.

² Knowledge Networks (KN) recruited the first online research panel (the KnowledgePanel) that is representative of the U.S. population. Its members are randomly recruited by telephone and mail surveys, and households are provided with access to the Internet and computer hardware if needed. More information about it, including panel recruitment, connection,

retention, completion, and total response rates, are available directly from KN. The typical within-survey response rate for a survey using its panel is 65%. Each case in the NFSS and RIA samples was assigned a weight based on the sampling design and their probability of being selected, ensuring a sample that is nationally representative of American adults within the age range of each survey (18 to 39 for the NFSS; 18 to 60 for the RIA).

from these different data collection efforts and their distinctive questions and answers, we converted data from the NFSS and NSYR to probabilities of usage within a discrete time interval. The RIA survey is the only survey evaluated here that was *designed* to provide usage rates over a specific time interval; hence no conversion is necessary. The NFSS asked respondents to report *how often* they used pornography, while the NSYR asked respondents to estimate the *number of times* they had viewed pornography during the past year. Because both of these questions yield frequency measures, both can be used to obtain estimates of past-week and past-month pornography usage to compare to estimates from the RIA.

We employed two different approaches to modeling how these occurrences are spaced in time. In the first approach, we assumed that occurrences of pornography use follow a Poisson distribution.³ A Poisson distribution function assumes that occurrences of an event have some known average frequency and that the occurrence of an event is independent of the timing of the last event. In other words, under this assumption we assumed that the probability of a respondent using pornography within a given time period does not depend on the timing of previous usage. The average frequency of pornography use is rather straightforward to calculate with the types of questions used in the NFSS and the NSYR. However, if pornography use events tend to cluster together, with recent pornography use predicting higher than average propensities to use pornography again soon, then estimates obtained using Poisson distributions would be biased upward.

In the second approach, we assumed that pornography usage was distributed evenly across time. Pornography use (with masturbation) induces sexual release, and this sexual release may function much like the appetite for food, decreasing immediately after the most recent event and then slowly increasing over time. Under these assumptions, pornography use events would *not* be independent of one another and hence may reflect the likelihood of user satiation for a period of time. This pattern would lead the occurrence of pornography use to be more evenly spaced out over time. Under this assumption, someone who used pornography 26 times in the past year would do so every 14 days. The probability that the respondent had used pornography within the last week would be exactly 0.5. This assumption that events are spread equidistant in the temporal space we will call the periodic event assumption. Results employing the periodic event assumption represent an upper limit of the probability of all possible event distributions given an average frequency of event occurrence.

³The Poisson distribution is used in similar applications and has been employed in past research to model the frequency of occurrences of an event within a specified time period, such as the number of visitors to a website in a given time period (Sharpie, De Veaux, & Velleman, 2010); the number of births, deaths, suicides, and homicides in a given period of time (Weiers, 2008); or the number of customers who call to complain about a service problem in a month (Donnelly, 2012).

Under either assumption, we then calculated the probability that a specific individual uses pornography on a particular day based on the average frequency they report. This arises from the probability density function of the assumed distribution. We can also use the cumulative distribution function to estimate the probability that the individual has used pornography in the past week or past month. While any prediction we make about a specific individual is likely to be incorrect, by aggregating the probabilities across all respondents, we can still make accurate assessments of the population prevalence of pornography use that is measured in distinctive ways. For the NFSS we report upper-bound and lower-bound estimates, because unlike the other surveys' answers the NFSS's are in ranges (e.g., two to three times per month). More information about the method used to calculate time-specific use probabilities is found in the appendix.

Results

Table 3 displays raw percentages of self-reported frequency of pornography use (in the NFSS, GSS, and NSYR) and of most-recent pornography use (in the RIA). All four data sets can be directly compared only on yearly usage, an admittedly unsatisfactory benchmark. Nevertheless, only moderate differences exist among data sets on this count, with slightly lower rates reported in the GSS. Among men and women in the GSS ages 18 to 39, annual (or more frequent) use is characteristic of twice as many men (54%) as women (27%). In the RIA data, the identical percentages are 69% among men and 40% among women. The other surveys' point estimates of annual use, regardless of age group, fall in between those figures.

Pornography use, of course, is often more frequent, and thus a yearly estimate is not very informative. At this point the GSS drops out of our analyses, since an annual use

Table 3. Raw Percentages of Pornography Use Measures Across Data Sets

	Ages 18–23				Ages 18–39		
	RIA	NFSS	NSYR	GSS	RIA	NFSS	GSS
Men							
Past week	40%	—	—	—	46%	—	—
Past month	50%	—	—	—	56%	—	—
Past year	63%	68%	66%	59%	69%	64%	54%
Within past year							
Once/month or less	—	21%	52%	—	—	26%	—
> Once a month	—	47%	14%	—	—	38%	—
Women							
Past week	19%	—	—	—	16%	—	—
Past month	29%	—	—	—	26%	—	—
Past year	42%	38%	33%	27%	40%	32%	27%
Within past year							
Once/month or less	—	16%	30%	—	—	19%	—
> Once a month	—	21%	3%	—	—	13%	—

Table 4. *Standardized Comparisons of Pornography Use Across Data Sets*

	Age	RIA (2014)	Poisson Estimates			Periodic Event Estimates		
			NFSS–Upper (2012)	NFSS–Lower (2012)	NSYR (2008)	NFSS–Upper (2012)	NFSS–Lower (2012)	NSYR (2008)
Men								
Past week	18–23	40% (365)	41%(285)	32% (285)	12% (1,198)	47% (285)	40% (285)	14% (1,198)
	18–39	46% (2,424)	36% (942)	27% (942)	—	40% (942)	34% (942)	—
Past month	18–23	50% (365)	59% (285)	53% (285)	28% (1,198)	68% (285)	57% (285)	33% (1,198)
	18–39	56% (2,424)	54% (942)	46% (942)	—	64% (942)	51%(942)	—
Women								
Past week	18–23	19% (386)	19% (641)	14% (641)	3% (1,289)	22% (641)	18% (641)	4% (1,289)
	18–39	16% (2,741)	13% (1,979)	9% (1,979)	—	16% (1,979)	12% (1,979)	—
Past month	18–23	29% (386)	31% (641)	26% (641)	9% (1,289)	38% (641)	30% (641)	11% (1,289)
	18–39	26% (2,741)	25% (1,979)	20% (1,979)	—	33% (1,979)	23% (1,979)	—

Note. Numbers in brackets indicate the number of observations in each age and gender group for that data set used to derive estimates of the percent of this group that viewed pornography within the given time period.

estimate is the best it can offer. When we compare frequency estimates between the NFSS and NSYR we see larger disparities. For example, men ages 18 to 23 in the NFSS were more than three times as likely to say their average frequency of pornography use exceeded once a month as same-age men in the NSYR (47% versus 14%, respectively). For women the disparity was even greater. Women in the NFSS were seven times as likely to say they viewed pornography more than once a month, on average, than were women in the NSYR (21% versus 3%). Why? It is impossible to confirm, but it is likely the product of recall bias in the NSYR, where respondents were asked to enumerate instances of pornographic use over the past year. By contrast, NFSS users were asked to estimate a general-use rate. Recalling quickly the correct number of times users have looked at pornography *in one year* is—when combined with concerns about social desirability—a combination that appears to make the NSYR prone to underestimating pornography use. What about the NFSS when compared with the RIA?

In the simple (weighted) NFSS raw estimates, 5%, 8%, and 11% of men reported viewing porn “Every day or almost every day,” “3–5 days a week,” and “1–2 days a week,” respectively. When asked about their last usage—in the RIA survey—we see numbers consistently exceeding these. Among men, 14% reported “today,” 13% reported “yesterday,” 14% said “2–4 days ago,” and 5% said “5–6 days ago.”

A close examination of the two basic types of question wording—the NFSS’s general-pattern question and the RIA’s most-recent-use question—reveals some evidence of nonresponse bias (raising concerns about social desirability) when RIA respondents are asked about their most recent use. In the RIA, 7.2% of respondents refused to answer the most-recent-use question, compared with 3.9% of respondents who refused the NFSS’s general-use question. By comparison with other questions in the RIA this nonresponse rate was elevated; for example, only 3% refused to

answer a question about their weight, and 2.8% about their religious service attendance habits. These differences suggest that pornography use questions—especially frank ones about most-recent usage—mildly elevate nonresponse (by about three percentage points), indicating the elevated sensitivity of the question.⁴ On the other hand, the increase is not a profound one.

Table 4 provides a *standardized* estimate of pornography use across three different data sets, employing the methodology we described previously (and in the appendix). We assessed weekly and monthly pornography use. We generated estimates under both sets of competing assumptions (independent and periodic events) for the NFSS and NSYR. We compared those results to the estimates generated from the last-event estimates from the previous week and month in the RIA survey. Table 4 highlights the wide disparity in possible pornography use estimates under a pair of reasonable assumptions. Among women ages 18 to 23, the NSYR estimates past-week usage rates at 3% to 4%, compared with the RIA’s 19% and the NFSS’s range from 14% (in the Poisson lower-bound estimate) to 22% (in the periodic event upper-bound estimate). The stark contrast is present for men as well. The NSYR estimates among men ages 18 to 23 that 12% to 14% of them accessed pornography within the past week, while in the RIA survey 40% so report, and the NFSS estimates that between 32% and 47% did so. Past-month estimates follow a similar pattern, with wide disparities between data sets for both men and women.

When we expand to the wider age range (18 to 39, thus excluding the NSYR data), the results still vary considerably

⁴ As noted earlier, the RIA reinterviewed 907 respondents who completed the NFSS, enabling us to compare their responses to different questions. Of the 275 persons who said that they had “never” viewed pornography in the 2014 RIA, 17 (or 6%) had reported *some* pornography usage within the past year in the 2011–2012 NFSS. Although this does not constitute strong evidence for significant social desirability bias associated with pornography usage questions, it is suggestive of its presence.

across the different data sets. The NFSS estimates that 9% to 16% of women and 27% to 40% of men ages 18 to 39 use pornography in an average week, while the RIA reports that 16% of women and 46% of men in the same age range do so. There are also age-group distinctions in the RIA (not shown in Table 4) that are worth mentioning. When 18- to 23-year-old men were asked about their most recent experience, 40% reported past-week pornography use, compared with 49% of 24- to 32-year-old men and 48% of 33- to 39-year-olds. For women, the parallel figures were 19%, 19%, and 9%, respectively.

The NFSS's periodic-event estimates track more closely with the RIA estimates for women's use rates than do its Poisson estimates. That is, the RIA's estimates are more apt to fall in between the periodic event's upper and lower bounds than the Poisson's. However, the periodic events estimates add 12 to 19 percentage points to the monthly use estimates when compared with its weekly use estimates, while the RIA data adds approximately 10 percentage points. While it is empirically impossible to confirm here, it suggests that the assumption of independent (pornography use) events—the Poisson estimates—may not fit both men or women very well, while the satiation assumption (in periodic events) better fits women than men. It also suggests that an altogether different assumption may be called for: that use events are not simply dependent upon one another but are apt to follow upon each other more regularly (as measured in days) rather than less (as measured in weeks). If use events were more evenly distributed, past-month rates in the RIA and NFSS would appear more comparable than they do. As it stands, most-recent-use events in the RIA are clustered within the previous week rather than the previous month. This is the case for both men and women, and whether we employ the youngest or the widest age range.

Discussion

The wide span of estimates produced by different surveys and distinctive questions makes it challenging to know just how often American adults use pornography. If the low estimates from the NSYR—a mere 6 years earlier than the RIA—are to be believed, then pornography use is an infrequent experience among men and very rare among women. That seems unlikely, given comparisons with other study estimates listed at the outset. If estimates generated from the RIA or NFSS are more valid, then pornography use is—or perhaps has become—a common and frequent experience among men, with just under half of all men using pornography in an average week. It is also not an uncommon or infrequent occurrence for women, with nearly one in five reporting pornography use in the past week.

Might pornography use in the United States have changed so dramatically over a 6 year span between the NSYR's Wave 3 (2008) and the administration of the RIA survey (2014)? While the increase in Internet speed and the explosion of use of mobile devices may facilitate an increase, such

dramatic change over six years is very unlikely and is not confirmed in trend analyses of the GSS. Indeed, the rates of past-year pornography use have remained largely stable (Wright, 2013). What is more probable is that the manner in which surveys inquire about pornography use matters, and that general-use patterns and annual-use estimates are prone to undercounts and/or are weighted with a significant number of more-regular users. Hence American adults—especially but not exclusively men—who already used pornography occasionally (and thus would have shown up as at least annual users) have either increased the frequency with which they access pornography or simply went undercounted in previous surveys because a general-use pattern employing dated language (e.g., *X-rated movie*) will tend to underestimate personal frequency of use. An increase in personal pornography use is a plausible hypothesis but one that cannot be confirmed by any data we have evaluated.

While change is impossible to assess in our analyses, the results certainly indicate that different population estimates of pornography use will result from different survey methodologies and that a best-practices approach may be discernable. What have we learned? First, computer-assisted interviews will yield higher estimates. With only one exception, in both age ranges and among both men and women the rates for web-based self-administered surveys (RIA and NFSS) yield higher estimates of pornography use than do the interviewer-administered surveys (NSYR and GSS). This finding is consonant with a study that compared in-person interviews with self-completed sex questionnaires, which noted persistent divergence in sexual-partner counts when comparing the two methods of data collection (Abma et al., 1997). We hypothesize that at least part of this disparity is accounted for by social desirability bias, which may be more prevalent in interviewer-administered surveys.

Second, general pornography use estimates in the NFSS suffer, just like the GSS and NSYR, from imprecision. While the NFSS seems to offer sensible general ranges, the estimates of past-week or past-month usage are not precise and so prone to assumptions that the range in estimates—across different estimating methods—is around 15 percentage points among men. When the differences between upper- and lower-bound estimates are compounded with some margin of error due to sample size, the plausible range of true values offered by this procedure increases.

Third, assumptions about pornography use matter. As noted in the results, asking about most-recent-use elicits past-week and past-month estimates in the RIA that are not dramatically different from each other, signaling that the Poisson and periodic-event estimation methods employed to generate comparable estimates in the NFSS rely on assumptions that may not fit. While the assumption of independence of events appears to make the least sense, even the assumption of a predictable, spaced satiation period (in periodic events) results in past-month NFSS estimates that consistently—and sometimes dramatically—exceed those reported in the RIA.

These three observations suggest that asking about the last time a respondent viewed pornography—when cases are pooled across a large sample—is apt to yield the most accurate and precise population estimates of pornography use in an average week or month. Respondents who view pornography regularly are asked to recall behavior over a shorter period of time, which is easier to do than estimating a general frequency of pornography usage pooled over a longer period of time (Bradburn, Rips, & Shevell, 1987). While asking the question in this manner notably reduces recall bias, evidence from comparing the NFSS and RIA suggest it may also modestly raise nonresponse rates by two to three percentage points. Although individuals' own use patterns may be subject to measurement error, such errors should not affect the population average, which is what we were seeking to estimate here. Thus, survey instruments that ask respondents about the last time they engaged in sensitive behaviors seem optimal for determining prevalence of such behaviors in the aggregate. They are less ideal for assessing individuals' use frequency.

These findings have implications for investigations of other sensitive behaviors subject to social desirability bias. Surveys designed to query respondents about their general frequency of engagement in sensitive behaviors are prone to underestimating the actual prevalence of such behaviors within the population. This may be true for behaviors as diverse as pornography, masturbation, church attendance, voting behavior, interpersonal violence, and drug use.

Conclusion

Our results suggest that questions that ask about general patterns of pornography use are apt to slightly diminish nonresponse bias—resulting in more survey completions—but provide notably less precise measures of actual use patterns, because respondents may be tempted to discount their most recent usage as being “off pattern” when in fact it may or may not be. When assessing large numbers of cases together, we hold that a “most-recent event” self-report is apt to generate the most valid estimate of typical use patterns. Utilizing such an approach—from the 2014 Relationships in America survey—suggests that 46% of American men between ages 18 and 39 use or view pornography in a given week, 56% in a month, and 69% in a year. Among women, those figures are 16%, 26%, and 40%, respectively. Whether these constitute genuine increases over time is not possible to discern from these data, because the 2014 survey from which it came is cross-sectional. The estimates, however, are not modest, indicating frequent and prevalent pornography use among young adults in America today. Hence scholarly studies of the effects of pornography use on other domains of human flourishing are not simply assessments pertaining to a modest minority of American adults but instead are relevant to a significant share of them.

Declaration of Interest

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Appendix. Methods of Calculating Estimates

Calculating probabilities of usage in a period for the periodic events assumption is relatively straightforward. We used the usage frequency categories in the NFSS (e.g., 2 or 3 days a month) and converted them to a total number of yearly uses number (e.g., 24 times a year as a lower bound and 36 times a year as an upper bound). The NSYR already gives estimates as total number of yearly uses, so such a conversion was unnecessary in this instance. For both the NSYR and NFSS we then find the average number of uses in a given time period (e.g., a

week) by dividing yearly frequency of use by the number of time periods that make up a year. For example, to find the average number of uses in a week, we divide total uses in a year by 52. Under an assumption that events are evenly spaced, this average number of events in a week also gives the probability that the respondent will have viewed pornography in a given week. These probabilities are capped at 100% for those whose average frequency is greater than once in the time period. To find an estimate of the total percentage of respondents using pornography in a week, we then take an average of the probabilities for all respondents in the age range and gender grouping for each data set.

Estimating the percentage of respondents viewing pornography in a given time period under the independent events assumption is a bit more complicated. We begin by doing the same steps as with the periodic events assumption estimates, in that we obtain yearly frequency numbers in the same manner, and then we obtain an average number of occurrences within a given time period of interest (a week or a month) by dividing the yearly frequency number by the number of periods in a year. From there the calculations become more technical. Under this set of assumptions we assume that pornography use can be modeled using a Poisson random variable y with a probability mass function equal to:

$$f(y) = \frac{\mu^y}{y!} e^{-\mu}, y = 0, 1, 2 \dots$$

Where μ is the average number of uses of pornography per unit of time, in this case average number of times a respondent used pornography per week or per month, and y is the number of uses of pornography within that time period. The cumulative distribution function can be found by taking the sum given:

$$F(y) = \sum_{i=0}^y \frac{\mu^i e^{-\mu}}{i!}, i = 0, 1 \dots y$$

Thus the probability that a respondent viewed pornography at least y times in the time interval is:

$$P(Y \geq y) = 1 - F(y - 1)$$

And the probability that a person has viewed porn at least once is:

$$P(Y \geq 1) = 1 - F(0)$$

$P(Y \geq 1)$ denotes the probability that the respondent viewed pornography one or more times in the given time period, which is equivalent to the probability that the respondent used any pornography within the time period. The average of these probabilities for all of the respondents within a particular age and gender group is equivalent to our final estimate of the percentage of respondents in that group who viewed pornography within the given time period.