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Web-Based Research: Strengths, Weaknesses, and JSAD's Guidance for Authors

THERE IS A LARGE LITERATURE on the effectiveness of various research methods, covering a variety of topics such as recruitment, interviewing, sampling, representativeness, and response rates. The pros and cons of web-based research, the focus of this editorial, have been a relatively common topic in these articles over the past 20 years (see Couper et al., 2000). There are two primary types of research where web-based methods are used: (a) general population and community surveys designed to provide prevalence estimates and requiring external validity; and (b) cohort, case-control, and experimental studies requiring internal validity.

Surveys

Web-based population surveys have become a permanent fixture in academic research. Whether they will fully replace face-to-face computer-assisted interviews (CAPI) or samples based on random digit dialing (RDD) and computer-assisted telephone interview (CATI) methods remains to be seen. But they certainly provide an inexpensive and rapid means to reach many potential respondents. From a scientific viewpoint, the increased costs of face-to-face household surveys in the United States makes web-based surveys more attractive, and some types of RDDs cannot be conducted given NIH budget restrictions. Further, the decline in telephone survey response rates (see Curtin et al., 2005; American Association for Public Opinion Research, 2017; Keeter et al., 2017) is also making these surveys harder to conduct. However, the advantages of web-based surveys need to be considered in relation to their application and potential limitations.¹

Web survey methodology is limited by errors associated with population representation and non-observation (Couper & Miller, 2008). In other words, there are challenges in ensuring web surveys' external validity related to defining the target population, the sampling methods used, and achieving

¹See WebSM (<http://www.websm.org/c/1888/About/>, accessed on 6/27/2018), a website maintained by the University of Ljubljana, Faculty of Social Sciences, Centre for Methodology and Informatics. Also available is a 2010 Report on Online Panels by a task force of the American Association for Public Opinion Research (2010).

adequate response rates. Because of these and additional concerns regarding non-coverage of the complete residential population, the results of web-based surveys should be used with caution. To begin with, not all U.S. households have access to a computer. According to the U.S. Census' Current Population Survey (CPS), in 2015 about 79% of households had a computer (Ryan & Lewis, 2017). In the American Community Survey (ACS), that percentage was 87% (Ryan & Lewis, 2017). Regarding internet use, 2015 CPS data showed that 73% of U.S. households had such access, whereas in the ACS the percentage was 77% (Ryan & Lewis, 2017). Thus, any web survey that is exclusively based on a sample of computer owners with internet access is likely to miss a significant proportion of U.S. households.

Further, those with a computer and internet access are different from those without. Internet users earn a higher income, are more educated, are younger, and have a higher employment rate than non-users (Estabrook & Rainie, 2007; Rookey et al., 2008; Ryan & Lewis, 2017). Others have noted differences in sociodemographic and behavioral variables (Bartneck et al., 2015, Harding et al., 2015; Nagelhout et al., 2010). These disparities threaten the representativeness of the sample and the generalizability of the results. Some web-based panels created for commercial and academic research have gone to great lengths to create representative samples that can produce statistically valid rates (e.g., GfK's KnowledgePanel; <http://www.knowledgenetworks.com/ganp>), but the resources required to do so, such as providing laptops and internet access to unconnected homes, limit the wider adoption of such methods.

Nonprobability recruitment methods, such as those used in most web surveys, are sometimes justified in scientific surveys because there is no adequate frame from which the population of interest can be sampled. This is frequently the case with hard-to-reach populations such as intravenous drug users, sexual minorities, religious minorities, and other groups that are difficult to find and recruit in household samples and from other lists. Recruiting members of these groups for research can be done through websites, forums, and social media pages oriented toward these subpopulations, although numerous caveats to these sampling proce-

dures apply. An experimental study conducted by the Pew Research Center (Kennedy et al., 2016) compared results from 10 different nonprobability web surveys to benchmark results (e.g., political attitudes, recreational interests) obtained from federal surveys. The average estimated bias across all results in these surveys ranged from 5.8 to 10.1 percentage points. Of special interest to JSAD readers is that two of the benchmarks compared pertained to alcohol: in how many days in the past 30 days a drink of any alcoholic beverage was consumed; and what was the largest number of drinks consumed on any occasion in the past 30 days. The proportion of respondents who had not consumed any alcohol ranged from 36% to 57% across surveys. The percentage of respondents who had consumed 7 or more drinks in the past 30 days varied from 4% to 11% across surveys. Clearly, a considerable amount of variation across surveys is present in these estimates, and although it is possible that a similar number of probability surveys would have provided percentages with an equal spread, these surveys allow confidence limits to be established and statistical significance to be assessed.

Web-based cohort, case-control, and experimental studies

Despite the limitations, web-based research, more generally, may have sufficient internal validity to be used in cohort, case-control, and experimental studies. For example, Facebook can be a successful medium to recruit adolescents and young adults into health and substance use research (Amon et al., 2014; Ramo & Prochaska, 2012; Ramo et al., 2014). Numerous health intervention studies have been conducted online (Lane et al., 2015), and several countries involved in the International Tobacco Control (ITC) study use both telephone and web-based survey methods (ITC Project, 2011).

Despite the potential, there are several pitfalls to using web-based research that should be considered before study initiation. It is difficult to evaluate the quality of web-based data because the frame of subjects from which respondents were drawn is not known and it is often impossible to objectively verify the results because of the anonymous nature of the internet. Response rates are often not an indication of data quality or representativeness, although other indicators of quality besides the response rate can be estimated for nonprobability surveys, such as monitoring responses for speeding (i.e., answering questions rapidly without reading them), identifying “straightlining” (i.e., selecting the same response for each question), and the use of trap questions (Kennedy et al., 2016). Finally, there seems to be an unstated assumption among some authors that if the survey *N* is large, results will be accurate regardless of how subjects were selected or the response rate. Obviously, nothing could be farther from the truth. The use of poststratification weights to approximate nonprobability sample sociodemographic profiles to the

general population or other special populations also appears to be an inadequate way to improve the accuracy of results with these samples (Yeager et al., 2011).

Several strategies have been proposed to ensure sample validity when implementing web-based research (Kramer et al., 2014). Procedural efforts include limiting access to data collection websites, asking participants about how they found out about the research study, not advertising the study compensation, collecting the same information at multiple points, and developing a plan to re-contact suspicious respondents. Technical strategies include tracking the IP addresses of study participants, collecting date and time stamps, using software that reduces the risk of “bots,” and restricting enrollment to only through pre-approved links. Finally, data analysis strategies to ensure sample validity include comparing similar items for consistency, comparing current findings with reported findings from samples recruited through traditional means, and determining if suspicious respondents differ in meaningful ways from the rest of the sample.

Additional efforts include limiting the sample to those in a restricted target population (Couper, 2000). Among the studies submitted to the JSAD, those on college drinking are perhaps the best example of this method. These studies usually restrict the target population to students registered, for example, in a particular semester or academic year, obtain email addresses from academic administrations, and use the list to invite students to participate in the study. Another method is to begin with a method such as RDD to recruit sample respondents and then collect data using an online questionnaire. However, this combination of RDD and web-based panels to recruit households can also create challenges such as low response rates. For instance, in November 2006, the response rate of the initial telephone contact to recruit members for a Gallup panel was 26%, and only 55% of those who completed the telephone interview joined the panel, for an overall 14% response rate (Rookey et al., 2008).

Conclusion

Web-based research is a new reality, frequently present in articles submitted to JSAD, that will likely remain a permanent fixture in this journal and the larger academic literature. At this point, JSAD has not adopted a standard for reporting methods and quality metrics for web-based research. Other journals (e.g., *Public Opinion Quarterly*) suggest the use of the standard definitions put forward by the American Association of Public Opinion Research (2016). For the JSAD editorial team it is essential that authors reporting analyses of web research familiarize themselves with the advantages and disadvantages of different approaches, select them carefully, and inform readers of the methods used. This may, at times, also require a critical assessment of the success and

limitations of the approach taken. Importantly, researchers must ask themselves whether they expect the study findings to differ based on recruitment method, and methodological decisions cannot be justified by simply referring the reader to an existing publication that may have a more detailed description of the methods used.

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