About Research: Conducting Online Surveys

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Abstract

There is an established methodology for conducting survey research that aims to ensure

rigorous research and robust outputs. With the advent of easy-to-use online survey platforms,

however, the quality of survey studies has declined. This article summarises the pros and

cons of online surveys and emphasises the key principles of survey research, for example

questionnaire validation and sample selection. Numerous texts are available to guide

researchers in conducting robust survey research online, however this is neither a quick nor

easy undertaking. While online survey websites and software are useful for assisting in

questionnaire design and delivery, they can also introduce sources of bias. Researchers

considering conducting online surveys are encouraged to read carefully about how the

principles of survey research can be applied to online formats in order to reduce bias and

enhance rigour. In addition to alerting researchers to the pitfalls of online surveys this article

also aims to equip readers of this journal with knowledge to critically appraise publications

based on online surveys.

Keywords: sampling, reliability, validity, internet survey, web-based survey.

About Research: Online Surveys

Once upon a time conducting survey research was a laborious process involving paper questionnaires that had to be sent via mail to targeted samples of prospective respondents, carefully selected from electoral rolls or customised data-bases. This was followed by a period of hopeful waiting for responses to be returned in order that they could be processed by hand into a database or spreadsheet for analysis. Nowadays survey data can be generated rapidly and in massive quantities thanks to automated survey software on online platforms, and the use of email and social media to reach respondents. These developments have made surveys so easy to make, complete, and analyse that their use as a research tool has exploded. Everyone from high school students to professional bodies are conducting online surveys. However, just because it is now very easy to use surveys as a methodological tool, doesn't mean you should do so lightly!

There are rigorous conventions for survey methodology, developed over many decades, that should be observed in order to produce data that are valid, robust, and meaningful; many books have been written on this topic and a selection of useful guides cited throughout this article are provided in the bibliography below. Two important components of survey methodology (sample selection and question validation) are frequently overlooked by both casual and research users of online survey methodology. As a consequence, the data generated via online surveys can be extremely biased, and the results may not be replicable nor robust (Callegaro et al. 2015, Sue & Ritter 2012).

Survey techniques are often used to describe and explore human behaviour (Ponto 2015) and are frequently used in social and psychological research, with lactation and breastfeeding

being no exception, however Bennet et al. (2011) found that fewer than 7% of 165 medical journals reviewed provided guidance to authors on the standards expected for publishing survey research, despite a majority having published survey-based studies. As *Journal of Human Lactation* regularly receives these manuscripts for review this 'About Research' article will discuss the benefits and pitfalls of online surveys for breastfeeding and lactation research and consider how to ensure online survey research is as rigorous and replicable as possible. As a useful rule of thumb, before deciding to conduct an online survey ask yourself 'Do I know how to design and implement a survey that will produce valid and appropriate data for answering my research question?' Even if you are never likely to be designing or implementing an online survey, it is useful to know how one *should* be conducted in order to evaluate the strength of studies you may read.

Advantages

The advantages of online surveys include speed and reach, ease, cost, flexibility, and automation. An online survey can be rapidly deployed and completed by participants, particularly when disseminated via social media and/or email, or where an incentive is offered for completion. There are minimal costs involved as delivery of the survey questions and capture of the responses is automated, reducing the need for paid researchers to ask face-to-face questions or enter data, reducing data entry errors (Callegaro et al 2015) and making the coding and cleaning of data almost obsolete (Alessi & Martin 2010). Data can be downloaded in a variety of formats and imported into analytical software packages.

Completion of survey questionnaires online is often preferred by respondents, who can answer at their convenience and at their own pace, which may increase response rates

(Callegaro et al. 2015). Online survey construction is also flexible, involving different question-types and automated skip-logic that may be cumbersome to implement with paper-based surveys, and allowing the inclusion of video or audio clips. The lack of an interviewer also reduces social desirability bias (the tendency of respondents to provide answers that they assume the interviewer will expect to hear) (Phillips & Clancy 1972) and ensures that each respondent receives the survey questions in exactly the same way (Bernard 2011). Complex questions or questions that involve a long list of response categories can be hard to follow orally but when delivered in a self-administered survey can be presented simply and in more interesting and engaging ways (ibid).

Disadvantages

The lack of an interviewer can be a disadvantage in online surveys as open-ended question responses cannot be explored with immediate follow-up questions and there is no scope for respondents to seek clarification of unfamiliar or ambiguous terms. Accumulation of biased or non-representative responses is also a pitfall of online surveys as the responses of those who lack access to the internet will not be captured (e.g. the elderly, those with lower incomes, or those who reside in remote locations) (Andrews et al 2010; Bernard 2011). Self-administered questionnaires are not useful tools for studying nonliterate or illiterate populations, or those who cannot proficiently use technology (Bernard 2011).

The use of virtual internet communities, social media and email to distribute invitations to participate in a survey may also leads to problems of sample bias (Alessi & Martin 2010). On the one hand respondents will share the survey with their friends and colleagues with similar interests or perspectives, which will lead to the over-representation of a particular view point.

On the other hand, deceptive practices, e.g. participants providing duplicate responses, submitting fraudulent information, or deliberately making erroneous responses (known as Survey Fraud) may occur, particularly when the survey is on a topic where respondents have strong feelings that they wish to see represented: detecting fraud in online surveys is extremely difficult (e.g. Bohannon 2016). The anonymity inherent in online surveys is therefore both a strength and a drawback.

Given the widespread use of online surveys in research, and the wide range in rigour possible, readers of survey research should be aware of and alert to the potential for bias in this kind of research, and the techniques that should be used for reducing bias, so that they may draw appropriate conclusions about the reported information (Ponto 2015).

Conducting a survey

Survey research may involve a variety of data collection methods, most commonly the use of questionnaires. The survey method has been used by researchers since the introduction of the survey as a research tool in the 1930s when rigorous guidelines for the creation of a survey instrument and component questions, sampling and administration procedures and analytical tools were devised and publicised. These begin with the principles of survey research which cover data gathering, processing, analysis and interpretation; key among them are validity and reliability (Callegaro et al 2015, Reynolds et al. 2007, Sue & Ritter 2012).

    Design of an online survey.

Before asking participants to answer any questions the first component of an online survey that should be presented is an introductory page explaining the purpose of the research, the

identity and affiliations of the researchers, details of what participation will entail, and confirmation of ethical approval by a legitimate review board or ethics committee (Alessi & Martin 2010). It should be made clear to participants that the entering of information to survey questions and submission of their response signifies consent for their data to be used by the researchers. Any inclusion or exclusion criteria should be made clear. It is possible with online survey software to set up screening questions to ensure only participants who confirm they meet certain criteria gain access to the remainder of the survey.

There is an extensive literature on the wording of questions and design of questionnaires that will be covered by any good survey methodology textbook (e.g. Callegaro et al 2015, Sue & Ritter 2012). Bernard (2011) described 15 well-understood rules that should be followed when constructing survey items which include: be unambiguous; use vocabulary that your respondents understand; pay careful attention to contingencies and filter questions; offer respondents a 'don't know' option; and avoid loaded and double-barrelled questions. Question validation is a crucial step before a survey is issued but is often overlooked in online research. Often referred to as 'truthfulness' or 'accuracy' it seeks to confirm that the questions capture the anticipated data and are not interpreted differently by researchers and participants.

Validity and reliability.

Validity refers to the accuracy of a survey assessed by determining the representativeness of the sample and the precision of the questions being posed in an effort to ensure that what we are aiming to measure is being measured. Four types of validity are typically included in survey research:

1. Face validity, which determines whether the questions appear reasonable for acquiring the necessary data;

2. Content validity, which ensures the questions are all focussed on the issue to be addressed and related areas;

3. Internal validity, which assesses whether the questions posed imply the desired outcome to be achieved by the survey;

4. External validity, which addresses whether the questions posed elicit answers that are generalisable (i.e. reflects the response of the entire target population). In this case results using the proposed questionnaire may be compared with results previously obtained using other methods.

The principle of reliability refers to whether the questions posed elicit similar information from respondents, even if the wordings or questions structures are changed. Reliability of the survey therefore relates to the consistency of the questions and statements in a questionnaire. In breastfeeding research the issue of reliability often appears when survey respondents interpret concepts (e.g. 'exclusivity of breastfeeding') differently to one another, or differently to the researcher's intention (e.g. a respondent might interpret 'exclusively breastfed' to mean a baby that is currently fed only human milk, while a researcher may wish to know whether the baby has received only human milk from birth).

Examples of these principles in action can be found in Emmanuel & Clow's (2017) paper demonstrating the process of validating a survey questionnaire for assessing breastfeeding intentions and practices in Nigeria based on the modification of an Irish questionnaire, and in Aydin and Pasinlioglu's (2018) paper demonstrating reliability and validity testing of a Turkish version of the 'Prenatal Breastfeeding Self-Efficacy Scale'. If researchers are unable

or unwilling to undertake appropriate pre-survey piloting and testing of their online

questionnaire, they are strongly advised to consider using an existing robust research tool

(Kelley et al 2003).

Sample and sampling.

It is not feasible in most research studies to collect data from every person in a given

population, therefore it is necessary to select a sample. The method used for selecting the

sample is integral to the external validity of the survey – it must be representative of the

larger sample and be of an optimal size to minimise sampling error. The two approaches for

sampling are known as random and non-random sampling, with a number of selection

techniques contained within the two categories (Kelley et al 2003).

Random sampling is employed when researchers wish to apply quantitative methods to their

data as it allows the results to be generalised to the larger population and for statistical

analyses to be performed. In simple random sampling each individual within a population is

selected by chance using a random-number table or computerised random-number generator.

Alternatively, systematic samples can be used where potential participants are chosen at

equal intervals from the population to be studied, e.g. every 10th patient admitted to a given

hospital, or the 2nd of every 3 mother-infant pairs in a village (e.g. Hunegnaw et al 2017).

It is not easy to use random sampling techniques with online surveys as there is no systematic

way to collect a traditional probability sample of the general population using the internet

(Pew Research Center 2019); there is no national list of email addresses, for instance, from

which people could be sampled, and no standard convention for email addresses as there is

for phone numbers, that allows random sampling. These limitations lead researchers to use

two other main approaches for surveying the general population online. One technique is to randomly sample and contact people via another method (telephone, mail etc) and ask them to complete the survey online. Another is to identify a defined population of interest, for instance health-care workers in a defined geographical area and invite all members of this group to complete an online survey (e.g. Pol-Pons et al. (2016) used a self-administered online survey to assess breastfeeding basic competence among the total population of primary care health workers in the Girona Region of northeast Spain).

The other main technique, used frequently in poor quality research studies, relies on convenience samples of internet users – inviting participation from whoever sees the survey online, and recruiting respondents from those who volunteer. In the latter scenario there is no way to compute sampling error or for estimating how representative a sample is of a population as a whole. With the advent of computerised survey software distributed via email and social media it is increasingly common to see published quantitative studies where data have been generated via convenience and other non-random sampling methods which do not result in a representative sample.

Sample size needed for a particular study will depend on the purpose of the survey and the type of data to be collected; large samples with rigorous collection are more powerful and accurate, but proportionately more time-consuming and expensive (Kelley et al 2003). If statistical analyses are to be performed using the data, then sample size calculations should be conducted to determine how many responses are needed to adequately examine the question posed. A statistician should be consulted if necessary.

Data collection.

In standard survey research where a pre-determined sample has been defined in terms of size and recruitment strategy, a researcher should clearly record:

1. How many times, where, and by whom were potential respondents contacted?

2. How many people were approached and how many of those agreed to participate?

3. How did those who agreed to participate differ from those who refused?

4. What was the response rate i.e. number of usable data sets as a proportion of the number of people approached (Kelley et al 2003)?

This information should be reported in study publications so that the reader can assess how successful the researchers were in obtaining data from a robust and representative sample. Because it is impossible to track how many people view a website, social media, or forwarded email announcement and choose not to participate it can be impossible to compute overall response rates for online surveys, or to assess how participants vary from non-responders (Alessi & Martin 2010).

Data analysis.

Many volumes have been written about the analysis of survey data that cannot be summarised here, but a few key points will be highlighted. Firstly, the purpose of data analysis is to summarise the data that have been collected in a way that a) provides answers to the original research questions and b) is easily understood. Secondly, partitioning responses into participant subgroups based on demographic characteristics gathered on the respondents is often helpful.

Analysis should not include any questions that were not answered by most respondents – this will bias the results. Most online survey platforms provide automatic data analysis (summary) outputs, but these may be fairly basic (e.g. proportions and averages) and will

compute outcomes for everything, whether it is meaningful to do so or not! Some thought

and common sense on the part of the researcher is needed if using these automated outputs,

however it is preferable to download the raw data and conduct the analyses oneself in order

to become familiar with the nuances in the data and to identify any problems in responses to

questions that may not have been anticipated.

One principle emphasised in all survey guides is that researchers must not engage in what is

sometimes called data dredging (Kelley et al 2003), also known as 'fishing expeditions'.

When large numbers of analyses are conducted on the same data set, one in 20 of the

associations found between variables will appear statistically significant by chance, leading

to reported findings being false positive outcomes (Davey Smith & Ebrahim 2002). Where

researchers conduct multiple analyses and publish numerous papers from the same data-set it

is reasonable to suspect that the data have been over-analysed.

Reporting survey data.

In a review of 117 published survey studies Bennet et al (2011) found that many were poorly

reported, with few authors reporting the survey questions, reporting the validity or reliability

of the instrument, defining the response rate, discussing the representativeness of the sample,

or identifying how missing data were handled. In an effort to improve the quality of online

survey reports being submitted for publication the *Journal of Medical Internet Research*

published the Checklist for Reporting Results of Internet E-Surveys (CHERRIES), a

statement of recommendations analogous to the CONSORT statement for reporting

randomised trials, or the QUORUM statement for reporting systematic reviews (Eysenbach

2004). The checklist ensures that all of the issues highlighted above that might produce

biased results are considered by researchers and are discussed transparently in the report,

ranging from survey design and sample selection, through ethical approval and data protection, to pre-testing, survey administration, and data analysis. The CHERRIES checklist is therefore a useful tool for researchers to use at the outset of their study to ensure they consider all of the issues that might arise in the conduct of online research, and thus prevent publication. Eysenbach (2004) advises that many journals routinely reject reports of online surveys due to their lack of rigour, however a balanced discussion with appropriate qualification of the results obtained may be publishable depending on why the survey was done, and whether the results are useful in generating hypotheses that could be confirmed in a more controlled environment.

Conclusions

When conducted rigorously, online surveys can be useful tools to rapidly gain large amounts of data on specific questions from targeted samples, however many researchers are seduced by the apparent ease of conducting online surveys without a good understanding of the key principles of survey research. The *Journal of Human Lactation* editors wish to see authors of manuscripts reporting online surveys attending to the key principles, reporting their research according to the CHERRIES checklist or similar, and being cautious in the claims made for their findings.

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