



RESEARCH NOTE

Web-based questionnaires: Lessons learned from practical implementation of a pharmacoepidemiological study [version 1; peer review: peer review discontinued]

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Abstract

Web-based questionnaires may offer advantages over traditional methods of data collection, including a less administrative workload and reduced respondent burden. However, the implementation of this mode of data collection carries other challenges and may demand more technical expertise to be designed and delivered. Here, we use the preliminary data from a survey developed to estimate the prevalence of methylphenidate use for cognitive enhancement among undergraduate and graduate students, to share the lessons we learned while implementing this online mode of data collection. We show that surveys using a web-based questionnaire should be carried out by a multidisciplinary team with support from Information Science specialists. Limitations to access these resources or budget constraints may demand a considerable effort to assure the success of the survey. Web-questionnaires are usually described as easy to use and economically encouraging. Therefore, we believe our experience, and the lessons we learned, may be a relevant resource for researchers from general backgrounds intending to undertake their first web-questionnaire.

Keywords

data collection, questionnaires, epidemiologic methods, pharmacoepidemiology, cognitive enhancement

Peer review discontinued

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Any reports and responses or comments on the article can be found at the end of the article.

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Introduction

A pharmacoepidemiological study using a web-based questionnaire has similar characteristics regarding reliability and validity of traditional modes of data collection, such as postal questionnaires¹⁻⁵. With the advance of the Internet, web-based questionnaires are also believed to convey many benefits over traditional methods^{6,7}. They are easier to manage and wide-reaching in comparison to traditional recruitment methods and may be returned more rapidly than postal questionnaires. Anonymity is also fairly well preserved^{7,8}. Web-based questionnaires can also embed context logic and forced-choice formats, which allows the researcher to adjust the questionnaire based on a previous response. This may significantly improve the quality of the data collected.

Internet-based surveys are supposed to be less costly than performing face-to-face interviews or delivering postal questionnaires to participants, and since the data is automatically stored, errors due to the manual entry of the data in a database are minimised. Nevertheless, the advantages of the online methods depend on factors such as the age of the target population and their familiarity with the Internet^{8,9}.

In 2015, we developed a pharmacoepidemiological study to estimate the prevalence of methylphenidate use for cognitive enhancement among undergraduate and graduate students attending a major Brazilian university situated in the southeast of the country, the *Universidade Federal de Minas Gerais* (UFMG) (unpublished study; Candido R, Perini E, Menezes de Pádua C, Junqueira DRJ). We hypothesised that using a web-based questionnaire would offer a practical approach to the research and have greater acceptability among the youth and young adults that were our target audience.

Our experience in this research suggests that researchers designing pharmacoepidemiological studies may be unaware of methodological challenges surrounding the design and implementation of web-based questionnaires. From choosing an online service to design and host the questionnaire, to the delivery of the email invitation and analysis, we faced numerous challenges that could not be fully anticipated, which are discussed in this article. The challenges were not related to any of our research fields or common areas of expertise (epidemiology, pharmacoepidemiology, and statistics) and they could significantly impact any research plans. Scientists from developing countries, or limited access to financial and other kinds of support, may benefit from exercising special care when planning a web-based survey.

Methods

We evaluated five platforms to host our electronic questionnaire: Wuffo[®] (<https://www.wufoo.com/>), KwikSurveys[®] (<https://kwik-surveys.com/>), Survs[®] (<https://survs.com/>), SurveyMonkey[®] (<https://www.surveymonkey.co.uk/>) and Google Forms[®] (<https://www.google.co.uk/forms/about/>). Our assessment considered costs and functionalities to export the database to other programs (eg. Excel[®]), availability of logic resources for setting the questions, and resources to set character limits to the open answers. Only KwikSurveys[®] and SurveyMonkey[®] platforms allowed us to build a structured questionnaire with forced-answer formats and unlimited context logic, but SurveyMonkey[®] presented a better cost-benefit. The Platinum modality of SurveyMonkey[®] (current renamed

to Gold plan) also allowed us to track the respondent email, and this feature was essential to avoid multiple answers from the same participant.

Students enrolled in undergraduate, postgraduate and residency courses were selected through random sampling (using a number generator software) and invited to answer the survey through their electronic addresses (email), which was provided by the university. The invitation email contained an explanation of the research and a link to access the questionnaire hosted at SurveyMonkey[®]. Informed consent was obtained from all participants answering the survey. Reminder messages were directed to the email of non-respondents in scheduled periods of 15 days, and after two reminder messages, non-respondents were replaced.

We calculated a sample size of 365 students considering a prevalence of consumption of methylphenidate for cognitive enhancement equal to 7%^{10,11}, a sampling error of 4%, a significance of 95%, and power of 80%.

Results and Discussion

Choosing the online platform among the many available was the first challenging aspect we faced. There are several platforms available and they can offer many modalities of plans with diverse functionalities (Table 1). Researchers not familiar with Information Science may face hard and confusing decisions. For instance, some plans may limit the amount of questions included in a survey, not offer advanced survey logic (e.g., advanced branching, advanced piping, and other functionalities to enhance data collection), or even limit the number of people in a team to access the survey dashboard or the number of responses per survey. We suggest researchers carefully revise these aspects to ensure they are choosing an online platform suitable to what they need to build and deliver in their survey.

Our questionnaire was fairly straightforward and comprised 29 questions. Nevertheless, setting up the navigation flow and questions structure was time-consuming, requiring several pilot phases and numerous adjustments. Although all online platforms may appear user-friendly, setting up multiple-choice questions, skipping rules and piping the questionnaire is not a straightforward task for a person with regular software skills. We realised that having in our team the support of an Information Science specialist would allow us to build a questionnaire faster and with a better structure and design. However, budget constraints prevented us from accessing this kind of support, and our university did not offer this service.

We collected answers from 378 students; therefore, we achieved our estimated sample size. Our sample was also representative of the university population. However, we had to invite 2,384 students due to recruitment attrition, yielding a response rate of 15.8%. Considering that our target population can be regarded as a selected one, generally easy to reach and fairly collaborative, the response rate was poor. We later learned that spam filters of the university email system and other email providers identified our invitation email as spam because it included the link to the web-based questionnaire. To overcome this problem, we contacted the students' departments of all faculties asking them to advertise the research

Table 1. Characteristics of the five survey platforms evaluated to host an electronic questionnaire^a.

Survey platform	URL	Plan	Main functionalities	Annual price ^{b,c}
SurveyMonkey	https://www.surveymonkey.co.uk/	Platinum (current renamed to Gold plan)	<ul style="list-style-type: none"> - Unlimited questions - Unlimited answers - Advanced survey logic - Text analysis for open questions - Export to SPSS - E-mail and phone support 	US\$764.00 (R\$1,599.00)
Wufoo	http://www.wufoo.com/	Ad Infinitum	<ul style="list-style-type: none"> - Access to 60 users^d - Unlimited questions - Unlimited answers - 100,000 entries/month - 10GB of storage space 	US\$1,799.00 (R\$3,763.60)
Kwik Surveys	http://kwiksurveys.com/	Enterprise	<ul style="list-style-type: none"> - Unlimited questions - Unlimited answers - Unlimited reports - Multiple Choice Questions - Export results to multiple formats (e.g.: xls, csv, spss) - Phone support 	US\$21,250.00 (R\$2,615.06)
Survs	http://www.survs.com	Premium	<ul style="list-style-type: none"> - Unlimited questions per survey - Unlimited answers - Unlimited reports - Access to 24 users^d - Priority support 	US\$1,190.00 R\$2,489.54
Google Forms ^e	https://www.google.com/forms/about/	Forms	<ul style="list-style-type: none"> - Unlimited questions - Unlimited answers - Export results to multiple formats (e.g.: xls, csv) 	Free

^a Functionalities and quotation were assessed in May 2013 when the research was planned.

^b Prices are in U.S. Dollars and Brazilian Real (R\$) and refer to quotation carried out in 2013 for funding purposes.

^c Conversion rates to Brazilian Real are according to exchange rates of 29th May 2013.

^d Some platforms/plans allow only one user to access the questionnaire dashboard, and to invite people to your SurveyMonkey team for an additional fee.

^e Google Forms[®] has evolved since the time we assessed its functionalities.

and encourage the participation of the students. The encouragement message also asked students to check their spam box to notice the survey invitation. We also advertised the research on the university website. We considered the possibility of using a dedicated website or emailing the invitations through the university server to all students; however, we did not have the budget nor expert support to develop a dedicated website, and emailing the invitations to all students would impact our random sampling procedure.

The analytical processing of the data was also an unexpected problematic issue. All export file formats required excessive data cleaning. Remarkably, answers to multiple-choice questions and questions built with context logic would be broken in different lines and columns in a way that required an overall revision of the entries to aggregate data from each single respondent and allow analysis. This process demanded a significant amount of effort and time. Our experience suggests that studies with a larger number of responses would become unviable if facing similar problems. To avoid these problems, researchers may be aware, in advance, that although user-friendly, the platforms available to host web-based surveys require some expert knowledge in the development, manipulation, and retrieval of electronic data and intelligent systems. Basic and even advanced skills in epidemiology, sociology, statistics, and related disciplines may not be sufficient in this context.

Conclusions

The design and implementation of a web-based questionnaire may carry several challenges, and pharmacoepidemiologists may not be familiar with them. Moreover, although more economically viable, the availability of resources to ensure access to an appropriate platform and to specialised support is essential to the success of the survey. The lessons we learned urge us to strongly recommend that this mode of data collection may be carried out by multidisciplinary teams and with the appropriate support

from a team of specialists in Information Science. Our experience can also be promptly generalised to other research fields where the features of the web-based questionnaire may be of interest.

Ethical approval and informed consent

Our study received ethical approval from the *Universidade Federal de Minas Gerais* (approval number, 441.603). Informed consent was obtained from all individual participants included in the study.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Author contributions

RC, EP, CMP and DJ designed the survey. RC carried out the survey with the support of EP, CMP and DJ. RC and DJ analysed the data and interpreted the results. RC and DJ wrote the manuscript. All authors were involved in the revision of the draft manuscript and have agreed to the final content.

Competing interests

The authors have no competing interests to disclose.

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