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HINTS & KINKS

How important are paper copies of questionnaires? Testing invitations modes when studying social inequalities in smoking among young adults

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Introduction

Using the internet to administer questionnaires for data collection has triggered interest in the past decade of survey research (Israel 2009). In Canada, the general population with access to the internet has grown from 60 % in 2005 to 80 % (Statistics Canada 2011), with young adults following the same trend (Lenhart et al. 2010). However, this trend is not evident across population subgroups as only 54 % of households in the lowest income quartile have access to the internet (Statistics Canada 2011).

It is thought that web questionnaire administration can help in countering low response rates and growing research costs, but we were concerned that it should not create socio-economic selection bias problems. Researchers have questioned the influence of invitations that promote access to web versions of questionnaires only, hereby defined as "Web-only" invitations (Kwak and Radler 2002). Indeed, "Mixed-mode" invitations, hereby defined as invitations promoting additional modes of response (paper copy, phone or face-to-face interviews, etc.), have had relative success in increasing response rates (Shih and Fan 2007; Zuidgeest et al. 2011; Van den Berg et al. 2011). With the internet use trends changing rapidly, few recent studies have examined whether response rate and socio-economic status are associated with invitation methods in a population of young adults.

In this paper, we report results from a study in which we tested whether adding a paper version of a questionnaire to a mailed invitation (a Mixed-mode invitation) will leads to a sample with different modes of response (i.e. telephone, mail or web), rates of response and socio-demographic characteristics when compared with a Web-only mailed invitation. This study was undertaken within the purview of a larger study entitled the Interdisciplinary Study of Inequalities in Smoking (ISIS), whose goal is to better understand the effects of neighbourhood and individual characteristics in the inequitable socio-economic distribution of smoking across Montreal neighbourhoods.

Methods

Sampling and recruitment

Recruitment of the ISIS sample in Montreal, Canada took place between November 2011 and August 2012. We sought a representative sample of individuals aged 18–25 residing in Montreal, Canada who spoke either French or English and who had been living at their current address for a year or more (recent residential mobility was important for our main hypotheses). After approval from the institutional review board and the provincial information access committee (CAIQ), we requested that the provincial public health insurance programme (RAMQ) sample from their database of 6,020 individuals (by name and residential address) who corresponded to our eligibility criteria. We

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also requested that they be stratified by sex and the 35 regional healthcare territories in Montreal given that smoking varies by gender (Greaves and Jategaonkar 2006) and aggregate level socio-economic status (Ellaway and Macintyre 2009).

Given our research team's somewhat limited manpower, we did not feel we could adequately recruit and follow-up 6,020 persons in one wave of invitations. Therefore, we chose to split our initial sample into two groups ($n = 3{,}010$), accounting for the initial stratifications by sex and territory, to be contacted at a three-month interval (please see Fig. 1). In November 2011, we sent out a Web-only invitation by mail to the first half of the sample, hereby called Wave 1. In this mail-out we provided information about our project and requested that participants complete a questionnaire online. Recipients were also given the option to contact the research team to complete the questionnaire over the telephone, to be mailed a paper copy or to schedule a face-to-face interview. A $10 incentive was offered for completing the questionnaire. A first reminder letter was sent to non-respondents by mail 3 weeks later.

For the second reminder phase 4 weeks after the first reminder, we removed the individuals who had already participated or refused and randomly divided the remaining sample ($n = 2{,}223$) into two groups, those to receive Web-only and those to receive Mixed-mode invitations. Between the mode of invitation assignment and the actual mail-out, 29 respondents were removed from the initial 2,223 as they had either refused or been categorized as ineligible in that period. This led to a sample of 2,194 mail-outs (1,106 for the Web-only group and 1,088 for the Mixed-mode group). The Mixed-mode version was sent in a larger envelope and included the printed questionnaire, an introduction form, two copies of a consent form and a pre-addressed and pre-paid postal envelope, while also giving the instructions for filling out the questionnaire online or by other means.

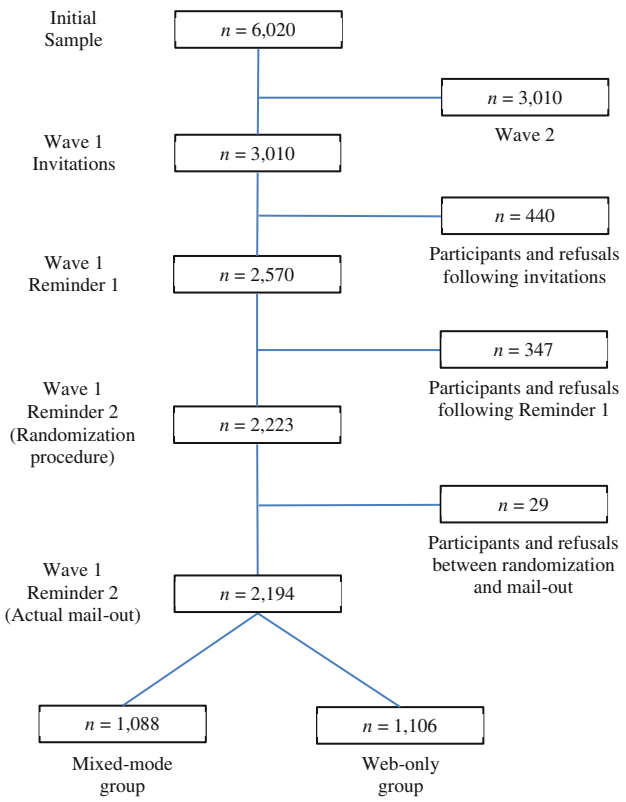

Fig. 1 Flowchart of the recruitment process

Measures and analysis

Education was measured with the question "What is the highest level of education you have completed?" with response options ranging from "No school, or only kindergarten" to "Earned doctorate", which was collapsed into three categories: completed high school and lower, completed CEGEP (Quebec's post-secondary institution required for university) and some university degree. Income was measured with the question "Approximately what was your total personal income last year, before tax deductions?" with response options ranging from "No personal income" to "$100,000 and more", which was collapsed into four categories: no income, $4,999 or less, between $5,000 and $14,999 and $15,000 or more. Using Student's t test for age and χ^2 tests for response rate, education, income, sex and response modes, we compared the characteristics of respondents from the Web-only group with the Mixed-mode group. We also used standardized Pearson residuals to observe the association within categories of response mode in our χ^2 results (Agresti 2002).

Results

By the end of our recruitment phase in August 2012, we had received 188 completed questionnaires from the Web-only group and 177 from the Mixed-mode group. Among the completed questionnaires, a total of 43 questionnaires (22 for the Web-only group and 21 for the Mixed-mode group) were then excluded from our analysis due to missing data in either education and/or income variables. Our final n for each group is $n = 166$ for the Web-only group and $n = 156$ for the Mixed-mode group.

Table 1 presents the comparison of response rates by invitation mode. Using the American Association for Public Opinion Research (AAPOR 2011) definition of minimum response rate (RR1), response rates were 17 %

Table 1 Comparison of response rates between Web-only and Mixed-mode invitations

Invitation mode	Mail-outs (*n*)	Eligible respondents[a](*n*)	Valid completed questionnaires (*n*)	Response rate[b](%)
Web-only	1,106	989	166	16.78
Mixed-mode	1,088	1,004	156	15.53

Differences between both groups did not differ significantly, χ^2 (1, N = 1,993) = 0.65, p = 0.419

[a] Ineligibility criteria were age (>25), less than 1 year residency at current address, lack of language proficiency, presence of mental disorder or death

[b] Following the AAPOR definition of minimum response rate (RR1) (AAPOR 2011)

for the Web-only group and 16 % for the Mixed-mode group and did not differ significantly.

Table 2 presents the comparison of sample characteristics by invitation mode. There were no statistically significant differences in age, sex, income or education between the two groups. We found a statistically significant difference ($p < .001$) in response mode between Web-only and Mixed-mode groups. In the Web-only group 16 % answered by phone, 83 % answered online and 1 % by mail. In the Mixed-mode group, 10 % answered by phone, 50 % answered online and 40 % answered by mail. Based on standardized Pearson residuals, the significant result is mainly due to the differential use of paper and internet response options between the two groups.

Discussion

As the internet becomes more present in the lives of people, web-based questionnaires are becoming an essential tool in research. This was certainly the case in our study as, almost half of the individuals who were given a paper copy

Table 2 Comparison of response modes and socio-demographic variables between Web-only and Mixed-mode invitations

Variable	Invitation modes		t(320)		p
	Web-only *N* = 166	Mixed-mode *N* = 156			
Age					
Mean (SD)	21.14 (2.07)	21.22 (2.18)	−0.363		0.717
Variable	**Invitation modes**				
	Web-only *N* = 166	Mixed-mode *N* = 156	χ^2	*df*	*p*
Response modes			75.004	2	<0.001
Internet (%)	138 (83.1)	79 (50.6)			
Mail (%)	2 (1.2)	62 (39.7)			
Phone (%)	26 (15.7)	15 (9.6)			
Sex			0.404	1	0.525
Male (%)	75 (45.2)	76 (48.7)			
Female (%)	91 (54.8)	80 (51.3)			
Income			2.447	3	0.485
No income (%)	18 (10.8)	18 (11.5)			
Less than 4,999$ (%)	36 (21.7)	25 (16.0)			
5,000 to 14,999$ (%)	66 (39.8)	73 (46.8)			
15,000$ and more (%)	46 (27.7)	40 (25.6)			
Education			0.861	2	0.650
Completed high school or less (%)	62 (37.3)	66 (42.3)			
Completed CEGEP[a] (%)	75 (45.2)	66 (42.3)			
University degree (%)	29 (17.5)	24 (15.4)			

[a] CEGEP refers to the post-secondary education institutions in Quebec, Canada which provide the programs required for entry to university (Statistics Canada 2008)

still completed the questionnaire online. Also, we found that both Web-only and Mixed-mode invitations yielded comparable results when examining response rates and socio-demographic variables.

A caveat to our study is that the sample used here is subject to other potential selection bias, given that our respondents answered after having received two reminder letters. This sample may have a different socio-demographic profile than those who answered immediately, but generally speaking these differences have been found to be small in similar studies (Selmer et al. 2003). Even if the results observed from a sample after a second reminder can be generalized to whole populations in terms of representativeness (Selmer et al. 2003), one should not hasten to generalize internet use behavior among young adults to other populations.

Despite these limitations to potential generalizability, we argue that the use of Web-only invitations alone should not change the overall response rate or socio-economic distribution of a sample among young adults when invited to complete a questionnaire online. Future studies with larger and different populations would help to further test this issue.

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