

International Journal of Public Health

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

--Manuscript Draft--

Manuscript Number:	IJPH-D-12-00670R1
Full Title:	How important are paper copies of questionnaires? Testing invitations modes when studying social inequalities in smoking among young adults.
Article Type:	Hints & Kinks
Keywords:	
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How important are paper copies of questionnaires?

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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% (CIUS 2008; 2009), 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 (CIUS 2010).

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 der Berg *et al.* 2011). With the internet use trends changing rapidly, few recent studies have examined if response rate and socio-economic status is 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) 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 6,020 individuals (by name and residential address) who corresponded to our eligibility criteria. We 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 6020 persons in one wave of invitations. We therefore chose to split our initial sample into two groups (n = 3010), accounting for the initial stratifications by sex and territory, to be contacted at a three-month interval (please see Figure 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 three weeks later.

(Please insert Figure 1 somewhere around here)

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5 For the second reminder phase four weeks after the first reminder, we removed the individuals who had
6 already participated or refused and randomly divided the remaining sample ($n = 2,223$) into two groups,
7 those to receive Web-only and those to receive Mixed-mode invitations. Between the mode of invitation
8 assignment and the actual mail-out, 29 respondents were removed from the initial 2,223 as they had either
9 refused or been categorized as ineligible in that period. This led to a sample of 2,194 mail-outs (1,106 for
10 the Web-only group and 1,088 for the Mixed-mode group). The Mixed-mode version was sent in a larger
11 envelope and included the printed questionnaire, an introduction form, two copies of a consent form and a
12 pre-addressed and pre-paid postal envelope, while also giving the instructions for filling out the
13 questionnaire online or by other means.
14

15 **Measures and analysis**

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18 Education was measured with the question “What is the highest level of education you have completed?”
19 with response options ranging from “No school, or only kindergarten” to “Earned doctorate”, which was
20 collapsed into three categories: completed high school and lower, completed CEGEP (Quebec’s post-
21 secondary institution required for university) and some university degree. Income was measured with the
22 question “Approximately what was your total personal income last year, before tax deductions?” with
23 response options ranging from “No personal income” to “\$100,000 and more”, collapsed into four
24 categories: no income, \$4,999 or less, between \$5,000 and \$14,999 and \$15,000 or more. Using Student’s
25 t-test for age and chi-squared tests for response rate, education, income, sex and response modes, we
26 compared the characteristics of respondents from the Web-only group with the Mixed-mode group. We
27 also used standardized Pearson residuals to observe the association within categories of response mode in
28 our chi-squared results (Agresti 2002).
29

30 **Results**

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33 By the end of our recruitment phase in August 2012, we had received 188 completed questionnaires from
34 the Web-only group and 177 from the Mixed-mode group. Among the completed questionnaires, a total of
35 43 questionnaires (22 for the Web-only group and 21 for the Mixed-mode group) were then excluded from
36 our analysis due to missing data in either education and/or income variables. Our final n for each group is
37 $n = 166$ for the Web-only group and $n = 156$ for the Mixed-mode group.
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40 Table 1 presents the comparison of response rates by invitation mode. Using the American Association for
41 Public Opinion Research (AAPOR 2011) definition of minimum response rate (RR1), response rates were
42 17% for the Web-only group and 16% for the Mixed-mode group and did not differ significantly.
43

44 (Please insert Table 1 somewhere around here)

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

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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 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 of 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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4 **Table 1**
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7 Comparison of response rates between Web-only and Mixed-mode invitations
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10 Invitation mode	11 Mail-outs (n)	12 Eligible respondents ¹ (n)	13 Valid completed questionnaires (n)	14 Response rate ² (%)
15 Web-only	1,106	989	166	16.78
16 Mixed-mode	1,088	1,004	156	15.53

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18 ¹ Ineligibility criteria were age (>25), less than one year residency at current address, lack of language
19 proficiency, presence of mental disorder or death.

20 ² Following the AAPOR definition of minimum response rate (RR1) (AAPOR 2011).

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

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

Variable	Invitation modes		<i>t</i> (320)		
	Web-only <i>N</i> = 166	Mixed-mode <i>N</i> = 156			
Age					
Mean (SD)	21.14 (2.07)	21.22 (2.18)	-.363		.717
<hr/>					
Variable	Invitations modes		χ^2	<i>df</i>	<i>p</i>
	Web-only <i>N</i> = 166	Mixed-mode <i>N</i> = 156			
Response modes			75.004	2	.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	.525
Male (%)	75 (45.2)	76 (48.7)			
Female (%)	91 (54.8)	80 (51.3)			
Income			2.447	3	.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	.650
Completed high school or less (%)	62 (37.3)	66 (42.3)			
Completed CEGEP ¹ (%)	75 (45.2)	66 (42.3)			
University degree (%)	29 (17.5)	24 (15.4)			

¹CEGEP refers to the post-secondary education institutions in Quebec, Canada which provide the programs required for entry to university (Statistics Canada, 2008).

Figure 1

Flowchart of the recruitment process

