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Short communication

Response rate of bricklayers and supervisors on an internet or a paper-and-pencil questionnaire☆

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ABSTRACT

It is unclear whether or not internet surveys yield response rates comparable to paper-and-pencil surveys for specific occupational groups, such as construction workers. The objective of this study was to examine the differences in response rates between a paper-and-pencil questionnaire and an internet questionnaire for two construction-related occupations: bricklayers and supervisors. In total 600 participants were randomly assigned to the internet questionnaire survey or to the conventional paper-and-pencil questionnaire survey. Undeliverable postal was excluded from the response rate. A total of 237/590 subjects responded, leading to a response rate of 40% across both arms of the study. Total response rate in the paper-and-pencil questionnaire group (45%, 131/293) was significantly higher (Chi-Square = 4.99, $p = 0.025$) than in the internet questionnaire arm (36%, 106/297). Among bricklayers, the response rate on the paper-and-pencil questionnaire (44%, 64/147) was significantly higher (Chi-Square 7.36, $p = 0.007$) than on the internet questionnaire (28%, 42/148). For construction supervisors response rates were not different for both arms of the study, 46% (67/146) on the paper-and-pencil questionnaire and 43% (64/149) on the internet questionnaire. Overall, a paper-and-pencil questionnaire is more effective in terms of response rate than an internet questionnaire in a random sample of two construction professions.

Relevance to industry: Questionnaire surveys play an important role in gathering information on interventions aimed at reducing occupational risks and health effects for construction workers. The most effective survey mode should be explored before a large scale survey is carried out.

1. Introduction

Traditionally, written questionnaire surveys play an important role in occupational health care research. Potentially, electronic health care surveys using the internet could reduce time and costs (Kaplowitz et al., 2004) and could enhance response rates (Cobanoglu et al., 2001). However, a lack of access to an internet-connected computer might negatively influence the response rate of internet surveys (Eysenbach and Wyatt, 2002). In the Netherlands, this problem has been rapidly resolved: in October 2009 93% of all Dutch residents had access to the internet (Statistics Netherlands, 2009).

Therefore, it is obvious that in modern, efficient occupational health care the use of information and communications technology (ICT) should be considered (Smith et al., 2007). But whether or not an internet survey is the right method for examining employee populations is unclear. On the one hand, a meta-analysis has shown that internet surveys in general yield a lower response rate (Manfreda et al., 2008; Schonlau, 2004), but employees are actually found to be more willing to respond to internet surveys (Fan and Yan, 2010). On the other hand, socio-demographic factors that relate to respondents' internet resources such as computer skills and age, can affect respondents willingness to do an internet survey (Couper et al., 2007; Fan and Yan, 2010). Intuitively it makes sense to assume that there might be differences in response rate among various occupations in which those factors may play a role.

In order to explore this assumption in more detail, we examined a branch which has often been the focus of occupational health care and intervention research: the construction industry (Burdorf et al., 2007; Chung and Kee, 2000). Surveys of construction workers have

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traditionally relied on paper-and-pencil questionnaires and thus far – as far as the authors know – no attempts have been made to compare internet and paper-and-pencil questionnaires for construction workers (Fricker and Schonlau, 2002; Schonlau et al., 2002). It could be argued that several barriers might affect the response rate on an internet questionnaire. For example, most construction workers have had a professional training, but no higher education. Their familiarity with computers and internet usage is likely to be lower than for the general population. Nevertheless, the typical "construction worker" does not exist because of the wide variety of occupations with different levels of education. Physically demanding occupations, such as bricklaying are widely represented, but more manager-like and higher educated occupations, such as construction supervisor, also exist. This diversity in workers within the construction industry should be taken into account when evaluating the most effective way of administering occupational health questionnaires in this field.

The present study therefore examines differences in response rates concerning a paper-and-pencil questionnaire and an internet questionnaire for two construction occupations: bricklayers and supervisors. As age is a known factor affecting response rate, we also examined differences in age of the respondents of the two different survey methods. We hypothesized that there would be no differences in response rate, between both questionnaire modalities or between both occupations.

The present study is part of a larger research effort in which the main objective is to survey physical, environmental and psychosocial factors among 3000 construction workers and possibly related health effects. Based on this information, preventive measures can be selected that are most likely to tackle job-specific risk factors and health effects. When evaluating the effectiveness of these preventive measures, offered to the workers in a workers' health surveillance, questionnaire surveys will be used in order to monitor the workers.

2. Methods

2.1. Design

We performed a parallel group randomized experiment in a Dutch population of bricklayers and construction supervisors. In October 2009, we randomly selected 600 construction workers, 300 bricklayers and 300 construction supervisors, from a Dutch registry comprised of all employed Dutch construction workers. Home addresses were taken from the registry. Half of the participants (150 bricklayers and 150 construction supervisors) were randomized to the internet questionnaire survey, and half to the standard paper-and-pencil questionnaire survey. Participants were blinded to the randomized nature of the study. No further criteria of randomization were imposed. The study was powered to 80% to detect a 10% difference in response rates (35–45%) at an alpha level of 0.05 among both occupations. The survey was performed from November to December 2009.

2.2. Paper-and-pencil

All participants in the paper-and-pencil group received a sealed envelope at their home address containing the following items: a postal card with the invitation to participate in the questionnaire survey, a 24-page coded questionnaire and a stamped, self-addressed envelope. The questionnaire contained an introductory page with more extensive information concerning the study. The questionnaire contained questions on personal and job characteristics, such as occupation during the last year and age, work ability, recovery from workdays, fatigue during work, safety issues, psychosocial work characteristics and psychosocial well-being. On the last page, we asked the paper-and-pencil group whether or not they would have liked to fill in the questionnaire by using a computer and the internet ("Would you have liked to fill in this questionnaire by using a computer and the internet?"). This question could be answered with a "yes" or a "no". Completing the questionnaire took approximately 15 min. Participants were asked to fully complete and return the questionnaire within two weeks. All participants received a lottery ticket. One reminder containing a postal card was sent to all participants after one week.

2.3. Internet

All participants in the internet questionnaire group received a sealed envelope at their home address containing a postal card with an invitation to participate in the questionnaire survey, the web-address of the link to the questionnaire, a login name (one letter and 3 digits) and password (two digits and one letter). The content for both questionnaires was identical, but in the last section of the internet questionnaire participants were asked whether or not they would have liked to fill in the questionnaire by using paper-and-pencil ("Would you have liked to fill in this questionnaire by using paper-and-pencil?"). Furthermore, we asked the internet group for experienced drawbacks of the internet questionnaire. Questions were presented screen-by-screen. Completing the questionnaire took approximately 15 min. Participants were asked to fully complete the questionnaire within two weeks. All participants received a lottery ticket and one postal card reminder containing each potential participant's login name and password after one week.

A website was created from which the participants could easily access the questionnaire. The internet survey application was purchased from a commercial company. This company provided the tailored online questionnaire application and the hosting. Identity of respondents was ascertained through login and password.

2.4. Statistical methods

The primary analysis was concerned with comparing response rates between both types of questionnaires using Chi-squared tests. Secondary, we tested i) for differences in age between responders on the questionnaire modalities using a Mann–Whitney *U* test and ii) for differences in age across all four groups using a Kruskal–Wallis test. Furthermore, we compared respondents' opinions on the internet questionnaire between both occupations. Undeliverable postal was excluded from the response rate. Statistical significance was set to an alpha level of 0.05.

3. Results

In Fig. 1, the inclusion and exclusion of participants is shown. From the 600 postal items that were initially sent, 10 were returned as undeliverable. Participants who had not worked as either a bricklayer or construction supervisor during the last year, were excluded. In Table 1, the respondents' characteristics are shown. All respondents were male.

3.1. Paper-and-pencil surveys versus internet surveys

After three weeks 40% (237/590) of the potential respondents completed the questionnaire. The total response rate was 45% (131/293) in the paper-and-pencil questionnaire arm and 36% (106/297) in the internet questionnaire arm. The difference in response rates between both arms was statistically significant (Chi-Square = 4.99,