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Brief Report

Agreement Between Self-reports and On-Site Inspections of Compliance With a Workplace Smoking Ban

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Abstract

Introduction: This study compares self-reports on compliance with a workplace smoking ban with on-site inspections of the same workplace, in the Netherlands, to assess the validity of self-reported compliance by employees.

Methods: A total of 360 companies had participated in the telephone survey (in October and November 2006) and were also visited by inspectors directly after the survey to establish compliance. The sampling frame included companies with 5 or more employees, stratified according to the number of employees and type of economic activity. We calculated the agreement, the under- or overestimation and the predictive values, and explored nonresponse research.

Results: The percent agreement on compliance between the two measures was 77.5%, the McNemar test was not significant, and the agreement coefficient with first order correction was .68, indicating moderately strong agreement. Furthermore, the results indicate a slight overestimation of compliance. Concerning the predictive values, we found most variance among the self-reported noncompliance: 55.2% of those reporting noncompliance did in fact comply.

Conclusions: This study allows to conclude that self-reports on compliance with a workplace smoking ban are largely valid and that social desirability is negligible. For agencies enforcing the workplace smoking ban, these results indicate that a strategy to identify noncompliance among responding companies might be useful. Moreover, such a strategy reduces the burden of inspecting among complying companies.

Introduction

In the Netherlands, the workplace smoking ban was implemented on January 1, 2004, with the exception of the hospitality

sector. The act banned smoking inside but allowed to provide designated smoking rooms. The Dutch Food and Consumer Product Safety Authority (FCPSA) became legally responsible to monitor compliance. The FCPSA has the authority to impose fines in case of noncompliance. These fines start at 300 euro and increase to a maximum of 2,400 euro in case of continued noncompliance.

For an effective enforcement program, it is necessary to have insight in compliance rates. Although use of self-report is a common method when examining compliance (Borland et al., 2006; Gilpin, Farkas, Emery, Ake, & Pierce, 2002; Heloma & Jaakkola, 2003; Hyland et al., 2009), this method can be biased by “social desirability” (Holbrook, Green, & Krosnick, 2003), which is defined as the tendency of respondents to reply in a manner that will be viewed favorably by others. In this case, the avoidance of legal consequences (in case of noncompliance) is a part of social desirability. In general, social desirability will take the form of overreporting good behavior or underreporting bad behavior. The present study compares self-reports on compliance with a workplace smoking ban with on-site inspections of the same workplace.

In 2006, a telephone interview was held with employees responsible for implementation of the workplace smoking ban regulation. Independent of this survey, inspectors of the FCPSA organization conducted on-site inspections of the workplace smoking ban. The present study uses the outcomes of the on-site inspections to assess the validity of self-reported compliance by employees.

Methods

The sampling frame for the telephone survey included Dutch companies with five or more employees. For the telephone survey, a random sample of 4,634 companies stratified according to the number of employees (5–9, 10–99, >100) and type of

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economic activity (i.e., agriculture, industry, education) was taken from the Netherlands database of registered companies. From the telephone survey sample, a second random sample was taken for on-site inspections, with the exception of companies in the hospitality industry as that sector was, at that time, excluded from the workplace smoking ban. This second sample was smaller than the first because nonresponse was not expected, since companies are obliged to cooperate with the inspections performed by the FCPSA. During October and November 2006, the telephone survey was performed by a commercial market research organization. Directly after this survey, the FCPSA conducted on-site inspections up to February 2007. Anonymity of the companies that participated in the telephone survey was guaranteed, and it was unknown to the FCPSA, which companies had participated in the telephone survey. Of the 4,634 companies, 3,925 companies were reached by telephone and 2,201 (56.1%) were willing to complete an interview; this was reduced to 2,018 (55.0%) companies after excluding the hospitality industry. Those companies not willing to participate were asked the same question about their smoking policy. Of the 2,018 companies which completed an interview, 360 were also visited by inspectors to establish compliance with the workplace smoking ban. For the present study, we made three categories of companies: public sector (e.g., schools, hospitals, public administration, social services), service sector, and industry. We use the general term "company" to cover both public and for-profit enterprises. This sample of 360 companies shows a similar distribution in terms of the size of the company, that is, 31.9% (5–9 employees), 54.7% (10–99 employees), and 13.3% (>100 employees), and economic activity, that is, 17.2% (public sector), 50.3% (service sector), and 32.5% (industry sector), to the companies selected for on-site inspections ($n = 1,389$), that is, 35.4% (5–9 employees), 54.8% (10–99 employees), and 9.8% (>100 employees), and 22.6% (public sector), 46.6% (service sector), and 30.8% (industry sector), as well as to the companies which completed an interview ($n = 2,018$), 33.9% (5–9 employees), 54.1% (10–99 employees), and 12.0% (>100 employees), and 24.3% (public sector), 44.7% (service sector), and 31.0% (industry sector).

In the telephone interview, compliance with the workplace smoking ban was measured by the question "Which of the following descriptions reflect the current smoking policy in your company?" The answers "complete smoking ban" and "general smoking ban with lockable smoking rooms, avoidable for nonsmokers" indicate compliance with the legislation and all other answers (i.e., "general smoking ban with nonlockable smoking areas," "limited smoking ban, whereby smoking is prohibited in some places within the company," and "no smoking regulation") indicate noncompliance. The inspectors used systematic observation, which includes control of the smoking policy (such as having no-smoking rules and having no-smoking signs) and checks on nonsmoking (such as there being no smokers and no ashtrays) to classify the workplaces into those complying and not complying with the smoking ban.

To validate the accuracy of self-reported compliance, we used the combined dataset of 360 companies. First, we calculated the percent agreement, McNemar's test, and the agreement coefficient with first order correction (AC_1) for the whole group and stratified according to company size (5–9 employees, 10–99 employees, and >100 employees) and economic activity (public sector, service sector, and industry). The AC_1 coefficient expresses

the agreement between the two collection methods but, contrary to the percent agreement, corrects for agreement due to chance. Furthermore, compared with the traditional kappa measure, which also corrects for agreement due to chance, the AC_1 coefficient gives less biased estimates of the true intermethod agreement when the prevalence of an event is high or low (Gwet, 2008). In these cases, the kappa clearly underestimates the true agreement. Since we expected the compliance to be much more than 50%, we preferred to calculate the AC_1 coefficient instead of the kappa. For the AC_1 coefficient, the following cutoffs were used: A score of .8 or more is very strong agreement, .6–.8 indicates moderately strong agreement, .3–.6 is fair agreement, and a score of .3 or less is poor agreement (Chan, 2003). To test whether the percent agreement was different for companies of different size and for companies categorized according to economic activity, chi-square tests were performed, each time comparing two types of companies in terms of agreement.

Second, we compared the compliance based on the self-reports and compliance based on the on-site inspections to determine under- or overestimation. Finally, we calculated the predictive values, indicating the probability that self-reported compliance or noncompliance has been confirmed by on-site inspections (Altman & Bland, 1994). The predictive values also allow to estimate whether the error of overreporting compliance or underreporting compliance dominates nonagreement.

In relation to the nonresponse research, we used the companies willing to answer only one question as a proxy for nonresponders. Differences in compliance according to self-report and on-site inspection between companies answering all questions and those answering only one question are presented. Furthermore, we analyzed differences in on-site inspections between companies that participated in the whole interview and companies that did not. We also calculated the percent agreement, McNemar's test, the AC_1 and the predictive values for those companies ($n = 120$) that answered only the question about their smoking policy. Data were analyzed using SPSS 16.0 for Windows.

Results

Table 1 presents the results of the 360 companies: The raw percent agreement between the two data collection methods was 77.5%. In 70.3% of the cases, self-reported compliance matched with compliance based on the on-site inspections, and in 7.2% of the cases self-reported noncompliance matched with on-site inspection. The McNemar test was not significant ($p > .05$), which indicates no difference between the self-reported and observed compliance by on-site inspections. The AC_1 is .68, indicating moderately strong agreement (Chan, 2003). When focusing on companies of different size (Table 1), there is no significant difference in percent agreement. The McNemar test found no differences between self-reported compliance and compliance assessed by the FCPSA. For a stratification of companies according to the type of economic activity, we assessed a significantly higher percent agreement among the public sector compared with the industry. Only for the service sector did McNemar's test turn out to be significant, which indicates that the self-reported compliance is higher than the observed compliance for this type of company.

Table 1. Data on Agreement Between Compliance Ratings, *n* (%)

	Self-reports	Inspection		Percent agreement	McNemar's test <i>p</i> value	AC ₁ ^a
		Compliance (%)	Noncompliance (%)			
Overall (<i>n</i> = 360)	Compliance	70.3	13.6	83.9	77.5	.075
	Noncompliance	8.9	7.2	16.1		
		79.2	20.8	100		
Size of the companies						
5–9 employees (<i>n</i> = 115)	Compliance	67.0	14.8	81.7	75.7	.345
	Noncompliance	9.6	8.7	18.3		
		76.5	23.5	100		
10–99 employees (<i>n</i> = 197)	Compliance	71.6	13.2	84.8	79.2	.118
	Noncompliance	7.6	7.6	15.2		
		79.2	20.8	100		
>100 employees (<i>n</i> = 48)	Compliance	72.9	12.5	85.4	75.0	1.000
	Noncompliance	12.5	2.1	14.6		
		85.4	14.6	100		
Sector						
Public sector (<i>n</i> = 62)	Compliance	87.1	8.1	95.2	87.1	.727
	Noncompliance	4.8	0.0	4.8		
		91.9	8.1	100		
Service sector (<i>n</i> = 181)	Compliance	65.7	16.6	82.3	76.7	.009*
	Noncompliance	6.6	11.0	17.7		
		72.4	27.6	100		
Industry (<i>n</i> = 117)	Compliance	68.4	12.0	80.3	73.5	.719
	Noncompliance	14.5	5.1	19.7		
		82.9	17.1	100		

Note. AC₁ = the agreement coefficient with first order correction.

^aCutoffs for AC₁: .8 or more = very strong agreement, .6–.8 = moderately strong agreement, .3–.6 = fair agreement, .3 or less = poor agreement (Chan, 2003).

**p* < .01.

In the telephone survey, 83.9% reported compliance with the smoke-free workplace legislation, whereas during the on-site inspection, the FCPSA established compliance for 79.2% of the companies. This result indicates a slight overestimation of compliance by 4.7% if one uses self-reports rather than on-site inspections.

Finally, we calculated the predictive values. The positive predictive value, the chance that self-reported compliance is confirmed by on-site inspections, is 0.838, indicating that 83.8% of the companies that reported compliance did indeed comply with the workplace smoking ban legislation and 16.2% did not. The negative predictive value, the chance that self-reported non-compliance is confirmed by on-site inspections, is 0.448, which means that for 44.8% of the companies that reported noncompliance, this was confirmed by on-site inspections. However, 55.2% of the companies reporting noncompliance did in fact comply according to the on-site inspections. This indicates that a higher proportion of reported noncompliance was not confirmed compared with the proportion of reported compliance.

Nonresponse analysis showed that there were no significant differences in self-reported compliance between responding companies (83%; *n* = 2,018) and companies willing to answer only one question (80.7%; *n* = 576) nor in reported compliance according to on-site inspections for responding companies

(79.2%; *n* = 360) and for companies willing to answer only one question (76.7%; *n* = 120). Comparing on-site inspections between the groups of full responders and the group of partial and nonresponders showed no significant differences between companies that completed the interview (79.2%; *n* = 360) and companies that did not (77.0%; *n* = 1,029). When focusing on agreement measures among the companies that were willing to answer one question, we found a raw percentage agreement of 70% and an AC₁ of .56 indicating fair agreement (Chan, 2003). The McNemar test was not significant (*p* > .05), which indicates no difference between the self-reported and observed compliance by on-site inspections in this group. The positive predictive value is 0.780 and is in line with the sample of full responders, and the negative predictive value is 0.300, which is lower than that of the full responders.

Discussion

Our main question was to assess the validity of self-reported compliance. The outcomes show that there is large agreement between compliance according to self-reports and on-site inspections. Further, for all companies together, no significant difference in compliance rates was found between both methods (i.e., self-reports and observations by inspectors of the FCPSA) and both yield comparable compliance rates. These results indicate

that self-reported compliance by employees is a valid method to assess compliance of the workplace smoking ban.

However, for companies in the service sector, the results of the self-reported compliance did not agree with the observed compliance. Furthermore, we have to take into account that compared with the original sample of all interviewed companies ($n = 2,018$) and all on-site inspections ($n = 1,389$), companies in the public sector were underrepresented in the sample for which both self-reports and on-site inspections ($n = 360$) were available. As the AC_1 is higher in the public sector (.85) than in the service sector (.64) and industry (.62), this probably means that for the total population of enterprises, the AC_1 is somewhat underestimated.

Finally, nonresponse analysis showed comparable levels of compliance between the responding and partial responding groups and between the responding group and the nonresponding and partial responding groups. Furthermore, McNemar's test of partial responders showed that self-reported compliance did not differ significantly from the observed compliance. These results do not indicate that among nonresponders, differences in compliance according to self-report and on-site inspection are larger than among enterprises fully cooperating with an interview.

We compared the results of our study with two different kinds of studies, one that is methodologically comparable and others related to smoking legislation. In the first comparison, Hurd, Mayer, Woodruff, Belch, & Patel (2006) found similar percent raw agreements for compliance with indoor tanning legislation between measures based on self-reports and based on on-site visits: 71.3% for the frequency allowed to tan and 76.3% for parentally required consent. However, in that study, the AC_1 was lower: .57 and .63, respectively. In the second comparison, we found a validation study of self-reported environmental tobacco smoke, which is used as compliance indicator of worksite smoking policies, indicating a substantial correlation with environmental measures as nicotine ($r = .65$; $p < .001$; Willemsen, Brug, Uges, & Vos, de Wael, 1997).

Taking the results of the on-site inspections as the more objective measure, the results indicate that the (overall) compliance based on self-reports is somewhat overreported (4.7%). This is probably due to answers being based on social desirability. Holbrook et al. (2003) describe that people attempt to construct favorable images of themselves when the reporting circumstances assure anonymity, such as the telephone interviews used in the present study.

Another interesting and surprising outcome concerns the predictive values, whereby most variance was found among the self-reported noncompliance. According to the on-site inspection, 55.2% of the companies reporting noncompliance did in fact comply. A possible reason for this is that there might be another mechanism, which is almost the opposite of social desirability, claiming noncompliance while complying. Respondents who had insufficient knowledge on this subject, or on how the ban was actually implemented, may have "played safe" by giving a negative answer. Another explanation could be that companies started to implement the workplace smoking ban after being reminded by the interview that they did not yet comply. In our nonresponse research, this phenomenon was stronger in companies willing to answer only one question. Up to 70% of

those reporting noncompliance did in fact comply, which suggests that the proposed mechanism, that is, giving a negative answer because they believe they have insufficient knowledge, might work even stronger and might influence nonparticipation in the whole interview.

This study allows to conclude that self-reports on compliance with a workplace smoking ban are largely valid and that social desirability is negligible. For agencies enforcing the workplace smoking ban, these results indicate that a strategy to identify noncompliance among responding companies might be useful. Table 1 shows that concentrating the inspection on those reporting noncompliance increases the possibility to identify noncompliance rather than focusing on companies reporting compliance, of which only a small percentage do not in fact comply. It is clear that preliminary screening reduces the burden of inspection of the large majority of companies in which the likelihood of noncompliance is comparatively low.

The answer to the question as to how such preliminary screening could be implemented probably lies with the innovation programs in the Netherlands aimed at increasing the effectiveness of enforcement agencies. One such innovation is the use of a web-based survey by enforcement agencies to collect data, which helps to increase risk-based supervision (Inspectie voor de Gezondheidszorg, 2010). However, as soon as companies know about such a strategy, they might try to reduce the chance of on-site inspection by reporting compliance. Whether such behavior in fact occurs should be investigated.

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Declaration of Interests

None declared.

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