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Smoke-free bar policies and smokers' alcohol consumption: Findings from the International Tobacco Control Four Country Survey

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ABSTRACT

Background: Cigarette smoking and alcohol consumption are positively correlated, and the concurrent use of tobacco and alcohol exacerbates the health risks associated with the singular use of either product. Indoor smoke-free policies have been effective in reducing smoking, but little is known about any impact of these policies on drinking behavior. The purpose of this study was to evaluate the potential association between the implementation of smoke-free bar policies and smokers' alcohol consumption.
Methods: A prospective, multi-country cohort survey design was utilized. Participants were nationally representative samples of smokers from the United Kingdom, Australia, Canada, and the United States, who were interviewed as part of the International Tobacco Control Four Country Survey (ITC-4) in 2005, 2007, or 2008 ($N = 11{,}914$). Changes in the frequency and amount of alcohol consumption were assessed as functions of change in the presence of smoke-free bar policies over time.
Results: Overall, changes in alcohol consumption were statistically indistinguishable between those whose bars became smoke-free and those whose bars continued to allow smoking. However, implementation of smoke-free policies was associated with small reductions in the amount of alcohol typically consumed by those who were classified as hazardous drinkers, along with small reductions in the frequency of alcohol consumption among heavy smokers.
Conclusions: Smoking bans in public places, which protect millions of non-smokers from the harmful effects of second-hand smoke, do not appear to be associated with sizable reductions in smokers' alcohol consumption in general, but may be associated with small consumption reductions among subgroups.

1. Introduction

Cigarette smokers consume alcohol more frequently and more heavily than nonsmokers (Anthony and Echeagaray-Wagner, 2000; Chiolero et al., 2006; Dawson, 2000; Kahler et al., 2008; Falk et al., 2006), and smoking status is particularly strongly associated with hazardous alcohol consumption and with alcohol use disorders. McKee et al. (2007) found that smokers were more than twice as likely to meet National Institute on Alcohol Abuse and Alcoholism (NIAAA) criteria for hazardous drinking, and were more than three times as likely to meet DSM-IV criteria for alcohol use disorders.

Smokers also tend to smoke more when they are consuming alcohol (Glautier et al., 1996; Griffiths et al., 1976; Mintz et al., 1985), and alcohol consumption increases among smokers when they are smoking (Mello et al., 1987; Barrett and Paschos, 2006). In addition to the health risks caused by smoking (e.g., cardiovascular disease, chronic obstructive pulmonary disease, several cancers, and death, World Bank, 1999), and heavy alcohol consumption (e.g., hemorrhagic stroke, cirrhosis of the liver, hypertension, gastrointestinal bleeding, several cancers, and death, Rehm et al., 2003), the concurrent use of tobacco and alcohol further exacerbates the relative risk of death (Grucza et al., 2007; Rosengren et al., 1988), along with the risk of head and neck cancers, cirrhosis, and pancreatitis (Blot et al., 1988; Klatsky and Armstrong, 1992; Marrero et al., 2005; Pelucchi et al., 2006; Vaillant et al., 1991).

Given the disease burden caused by tobacco use, imposed on both smokers and non-smokers who are exposed to secondhand smoke, the World Health Organization Framework Convention on Tobacco Control, Article 8, calls for the implementation of comprehensive smoke-free indoor air laws (World Health Organization, 2011). Accordingly, smoking in indoor public places has been completely banned in the United Kingdom (UK) and Australia since 2007 (Global Smokefree Partnership, 2009). Smoking bans have been increasingly implemented in Canada, with most of the

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country becoming smoke-free by 2008. The United States (US) has been comparatively slow to implement smoke-free legislation, with only 13 states having such policies as of 2008.

It is well established that smoking bans are effective in protecting non-smokers from second-hand smoke (Heloma et al., 2001; Farrelly et al., 2005; Eisner et al., 1998; Menzies et al., 2006). In addition, such policies may reduce overall levels of smoking (Fitchenberg and Glantz, 2002), may reduce the rate of coronary heart disease (Barnoya and Glantz, 2006; Juster et al., 2007; Sargent et al., 2004), and may motivate smokers to adopt smoke-free policies in their own homes (Borland et al., 2006a,b). Further, given the direct association between smoking and alcohol consumption, theory suggests that the advantages of smoking bans may extend beyond smoking-related benefits to alcohol-related benefits.

Few studies have evaluated the association between smoke-free policies and alcohol consumption. McKee et al. (2009) compared change in alcohol consumption among Scottish smokers before and after Scotland became smoke-free to change in alcohol consumption among smokers in the rest of the UK which did not have smoke-free policies, and found no differences in consumption levels. However, following the implementation of smoke-free policies, moderate and heavy drinking smokers in Scotland did experience greater reductions in the amount of drinks they consumed in bars and pubs relative to smokers in the rest of the UK. Second, Picone et al. (2004), using longitudinal data from the US Health and Retirement Survey (1992–2002), reported that smoking restrictions were associated with reduced alcohol consumption among older adult women. However, smoke-free policies were enacted on a state-by-state basis and measures of alcohol consumption were not specifically tied to the state policies, nor were subgroups of drinkers or smokers evaluated. Lastly, Gallet and Eastman (2007), using economic indicators of alcohol consumption in the US between 1982 and 1998, concluded that smoke-free policies reduced the demand for beer and liquor. They too, however, did not evaluate whether differential associations among subpopulations existed.

Given the limited evidence regarding the association between smoke-free policies and alcohol consumption, particularly among those smokers who stand to gain the most from reduced alcohol consumption (i.e., hazardous drinkers), the purpose of this study was to examine the relationship between change in smoke-free bar policies and change in alcohol consumption using a large-scale, multi-country population survey. Further, we examined this relationship specifically among hazardous drinkers, among heavy smokers, and among those who were both hazardous drinkers and heavy smokers.

2. Methods

2.1. Participants

Nationally representative samples of adult smokers (aged 18+) from the United Kingdom (UK), Australia, Canada, and the United States (US), who were interviewed as part of the International Tobacco Control Four Country Survey (ITC-4), participated in this study. The ITC-4 is an annual cohort survey designed to evaluate the psychosocial and behavioral impacts of national tobacco control policies using standardized data collection methods and measurements. Beginning in 2002, random digit dialing was used to recruit current smokers (i.e. those who smoked at least 100 cigarettes during their lifetimes and reported smoking at least once in the past 30 days) into the study based on strata defined by geographic region and community size. Participants were typically contacted within one week of recruitment to complete the initial survey, and were re-contacted annually to complete follow-up surveys. Response rates ranged from 26% in the US to 50% in Canada, which are comparable with other telephone surveys in these countries. Further, previous analyses have demonstrated good correspondence between the demographic characteristics of those who responded to this survey and the characteristics of respondents from national benchmark surveys, suggesting that non-response is not a source of systematic bias in this study (Hammond et al., 2004). Even so, it is possible that certain subsets of respondents to this survey (e.g. hazardous drinkers) may not be as representative of the corresponding subsets in the general population. Participants were re-contacted in subsequent years to complete follow-up surveys, and those lost to attrition (~30% on average) were replenished each year to maintain a sample size of ~2000 participants per country (International Tobacco Control Policy Evaluation Survey, 2011). Previous analyses of attrition rates have indicated that age, gender, and racial/ethnic groups vary with respect to retention (Thompson et al., 2006), and statistical models used in the present analyses were adjusted for these variables. Extensive descriptions of the survey procedures can be found elsewhere (International Tobacco Control Policy Evaluation Survey, 2011; Fong et al., 2006; Thompson et al., 2006).

The present study used data collected in 2005, 2007 and 2008 (i.e. waves 4, 6, and 7), which were the years when respondents were queried about their alcohol consumption. Respondents who participated in any of these waves were included in cross-sectional descriptive statistics ($N = 11914$). Those who participated in at least two consecutive waves were included in longitudinal analyses ($N = 5786$). The study protocol was approved by the institutional review boards or research ethics boards of the University of Waterloo (Canada), Roswell Park Cancer Institute (United States), University of Strathclyde (UK), University of Stirling (UK), The Open University (UK), and The Cancer Council Victoria (Australia).

2.2. Measures

2.2.1. Smoke-free bar policies. Given the impracticality of identifying documented smoking bans enacted below the national level (e.g., jurisdictional bans, proprietor-initiated bans, case-by-case exemptions to bans), we inferred the presence/absence of smoke-free policies using participants' responses to the following questionnaire item: "Which of the following best describes the rules about smoking in drinking establishments, bars, and pubs where you live?" Response options included: "Smoking is not allowed in any indoor area," "Smoking is allowed only in some indoor areas," and "No rules or restrictions." Response categories were collapsed to indicate whether smoking is allowed at all (i.e. allowed in some indoor areas or no rules/restrictions) or is not allowed. Previous analyses assessing the associates of smoking restrictions when measured with ITC self-reports versus documented reports show results to be consistent and robust regardless of source (Borland et al., 2006a,b).

A categorical variable indicating change in smoke-free bar policy was created by comparing responses in consecutive waves. Since we were unable to pinpoint precisely when during the past year policy change occurred in each respondent's locale, and since the effects of policy change may not be immediate, it is possible that those who reported the presence of smoke-free policies in consecutive waves may have experienced the hypothesized correlates of policy change during that time. Therefore, we considered the following policy group categories in the analyses: smoking allowed in consecutive waves, change to smoke-free, and change to smoke-free + smoke-free in consecutive waves.

In addition, participants who reported visiting a bar in the last 6 months were asked the following: "The last time you visited, were people smoking inside the pub or bar?" Reponses to this item were used as an indication of smoke-free bar policy compliance.

2.2.2. Alcohol consumption. Alcohol consumption was assessed with the following three measures, as recommended by the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2003): frequency of alcohol consumption, amount of alcohol typically consumed, and frequency of binge drinking.

2.2.2.1. Frequency of alcohol consumption. Frequency of alcohol consumption was measured with the item, "During the last 12 months, about how often did you have any kind of drink that contained alcohol?" Response choices included: "Every day," "5–6 days per week," "3–4 days per week," "1–2 days per week," "Less than once a week but at least once a month," "Less than once a month," "Did not drink any alcohol in the past year," and "Don't Know." This variable was treated as continuous using the midpoints of each category and results are presented in days/week units.

2.2.2.2. Amount of alcohol typically consumed. Amount of alcohol typically consumed was measured with the item, "On a typical day when you did drink alcohol, how many alcoholic drinks did you usually have?" Participants were provided the following definitions of a typical drink, which differ between countries: 5 oz wine or 12 oz can of beer (CA and US); 5 oz/150 ml wine or 13 oz can of beer (UK); 150 ml of wine or 375 ml can or stubby of beer (AU). Response choices included categories ranging from "1 drink or less" to "12 or more drinks." This variable was treated as continuous using the midpoints of each category (with .5 used for "1 drink or less" (among those who reported any drinking), and with 13 used for "12 or more drinks") and results are presented in drinks/typical day units.

2.2.2.3. Frequency of binge drinking. Frequency of binge drinking was measured with the following item: "Think about any times in the past year when you had more than [5 (male)/4 (female)] alcoholic drinks within a two-hour period. How often did you do this in the past year?" Response choices included: "Every day," "5–6 days a week," "3–4 days a week," "2 days a week," "1 day a week," "2–3 days a month," "1 day a month," "3–11 days in the past year," "1–2 days in the past year," and "Never." This variable was treated as continuous using the midpoints of each category and results are presented in number of times/year units.