

South Korean Military Service Promotes Smoking: A Quasi-Experimental Design

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Purpose: The South Korean (SK) government monopolizes the tobacco industry and is accused of pushing smoking on captive military personnel. However, estimating the association between military service and smoking is difficult, since military service is required for all SK men and the few civilian waivers are usually based on smoking determinants, e.g., social status. **Materials and Methods:** Using a quasi-experimental design we validly estimate the association between military service and smoking. Military service was assigned by immigration patterns to the United States, instead of an experimenter, by comparing Korean Americans who happened to immigrate before or after the age(s) of mandated service. Smoking promotion in the military was also described among SK veterans, to identify the probable mechanisms for veterans' smoking tendencies. **Results:** Veterans were 15% [95% confidence interval (CI), 4 to 27] more likely to ever-puff and 10% (95% CI, 0 to 23) more likely to ever-smoke cigarettes, compared to a similar group of civilians. Among veterans, 92% (95% CI, 89 to 95) recalled cigarettes were free, 30% (95% CI, 25 to 35) recalled smokers were given more work breaks and 38% (95% CI, 32 to 43) felt explicit "social pressure" to smoke. Free cigarettes was the strongest mechanism for veterans' smoking tendencies, e.g., veterans recalling free cigarette distribution were 16% (95% CI, 1 to 37) more likely to ever-smoke than veterans not recalling. **Conclusion:** These patterns suggest military service is strongly associated with smoking, and differences between veterans and civilians smoking may carry over long after military service. Given military service remains entirely in government purview, actively changing military smoking policies may prove most efficacious. This highlights the importance of recent bans on military cigarette distribution, but policies eliminating other smoking encouragements described by veterans are necessary and could effectively reduce the smoking prevalence by as much as 10% in SK.

Key Words: South Koreans' health, smoking, military, tobacco control

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INTRODUCTION

Military service is required between age 20 and 30 among South Korean (SK)

men, with rare exception.¹ South Korea's gendered discrepancy in smoking prevalence is among the world's highest, with men, who serve, smoking far more than women, who rarely serve, 57% vs. 7%.² Investigators have long suspected the SK government of using the military to maintain men's high smoking prevalence, as male civilians will eventually buy cigarettes and fill government coffers. Until 2009, soldiers were given free, duty-free, or extra money for cigarettes by the SK government who also controls the tobacco industry,³⁻⁶ although the mechanisms encouraging smoking likely extend to other social dynamics.⁷⁻⁹ However, how military service promotes smoking remains unexplored.^{7,10}

Since military service is mandated, the likely positive association between military service and smoking is difficult to estimate. A simple comparison of veterans with civilians in South Korea is invalid because civilians include individuals granted waivers, e.g., elites who may be less,^{15,16} or the mentally ill who may be more, likely to smoke.¹⁷ An alternative is to compare a naturally occurring subset of men, some of who did or did not serve independent of these special waivers. We used a quasi-experimental design with military service assigned by immigration, instead of an experimenter. Korean Americans (KAs) who immigrated before military service eligibility were compared to those who immigrated after serving.¹⁸ This subset of KAs may yield valid inferences regarding military smoking risks. Veterans also described their smoking histories.

The spread of social norms provides a framework for understanding mechanisms for military-smoking associations.¹¹ Social norms are individuals' perception of what is, and what ought to be, usually defined by public policies or cultural rewards or punishments.¹²⁻¹⁴ Social norms are enhanced in a military setting. Military service provides a dense social environment where social ties are reworked to promote uniform behavior. To assess smoking social norms we asked veterans to describe how smoking and smokers were treated in the military, and compared these norms among veterans by smoking status.

MATERIALS AND METHODS

Data were drawn from a population based probability telephone sample of Korean adults in California. Women may volunteer for SK military service but rarely do so, and were excluded. The sampling frame was made up of all tele-

phone numbers connected to Korean surnames, compiled from public directories and commercial sources, e.g., warranties, and included cell phones. Interviewers screened for Korean descent, with 91% of men being first generation Korean Americans eligible for inclusion in the quasi-experimental design (n=510). Other sample details have been published elsewhere.^{7,19}

Measures

Having ever tried smoking was labeled "ever-puffed" and having ever smoked 100 cigarettes was labeled "ever-smoked". Veterans recalled whether they began smoking "before, during or after serving", and if they already smoked they were asked if their "smoking increased, decreased, or stayed the same" during service. Military social norms for smoking were measured by if "cigarettes were distributed at no cost", they "felt social pressure to smoke" and if "additional work breaks were given to smokers".

Analysis strategy

A subset was selected by allowing immigration patterns to assign military service. Civilians who immigrated after the age of required military service were omitted. If this group did not serve due to military waivers, their comparisons with veterans is likely invalid (n=29). Veterans who reported serving in the military but immigrated before adulthood, or civilians who reported serving in the United States military, were also omitted (n=6). Civilians were entirely comprised of those who did not serve because they immigrated before required military service. As expected, civilians immigrated at a younger age (14 years, SD=7 versus 38 years, SD=10), and were typically younger (33 years, SD=11 versus 58 years, SD=14) than veterans. An assumption for using age of immigration as a natural selector of military service is that age of immigration is independent of the outcomes. Sensitivity analyses confirmed this assumption where age of immigration was used to predict smoking behaviors with the mean association consistently null [ever-puffed: OR=0.99, 95% confidence interval (CI): 0.97 to 1.02, $p<0.54$ and ever-smoked: OR=1.00, 95% CI: .97 to 1.05, $p<0.74$]. The resulting subsample [n=475, with 319 (67%) veterans and 156 (33%) civilians] was then confidently analyzed to estimate the association of military service with smoking, and describe smoking social norms in the military.

First, military social norms favoring smoking were described among veterans. Second, predictors of 1) ever-

puffed versus never and 2) ever-smoked versus puffed but never smoked 100 cigarettes by SK military service were assessed using bivariable and multivariable analysis.²⁰ In the multivariable model we adjusted for age by including quartiles of age, to adjust for cohort effects and present a mean military-smoking association. Predictors we, and others, have previously used to describe the social epidemiology of smoking, like education, were excluded, since these temporally occur after military service violating the confounding assumption that these precede military service and smoking behaviors. Third, analyses among veterans by levels of smoking social norms in the military were computed to describe the probable mechanisms responsible for military and smoking associations. Predicted probabilities of ever-puffed or ever-smoked, were calculated by simulation for the second and third strategies using 1000 randomly drawn sets of estimates from a sampling distribution with mean equal to the maximum likelihood point estimates and variance equal to the variance covariance matrix of the estimates, with covariates held at their mean values.²¹ All tests were two-tailed $p < 0.05$.

RESULTS

About 82% (95% CI, 77 to 86) of veterans ever tried smoking, 92% (95% CI, 89 to 95) of which were ever-smokers, by smoking 100 cigarettes in their lifetime. This compared to 65% (95% CI, 58 to 73) and 76% (95% CI, 68 to 85) prevalences among civilians, respectively. Among veterans who smoked before serving, 56% (95% CI, 48 to 64) reported smoking more during service. Approximately, 29% (95%

CI, 23 to 35) of all veterans who did not smoke prior to military service began smoking in the military.

Analysis comparing veterans with civilians suggested veterans were more likely to have ever-puffed or ever-smoked. Veterans were 16% (95% CI, 8 to 25) more likely to have ever tried cigarettes (Fig. 1A). This association was similar after adjusting for cohort effects using age, 15% (95% CI, 4 to 27). Veterans were 16% (95% CI, 7 to 25) more likely to be ever-smokers compared to civilians. This association was more modest after adjusting for cohort effects, 10% (95% CI, 0 to 22; $p < 0.06$).

South Korean military service may be characterized as strongly supportive of smoking (Fig. 1B). For example, 30% (95% CI, 25 to 35) of veterans reported smokers were given additional work breaks, 92% (95% CI, 89 to 95) free cigarettes were distributed and 38% (95% CI, 32 to 43) they were pressured to smoke in the military.

Analyses among veterans ($n = 319$) by levels of social norms suggested free cigarette distribution was the most powerful mechanism for veterans' smoking affinity. For example, veterans who recalled cigarettes being freely distributed were 16% (95% CI, 1 to 35) more likely to have ever-smoked, 93% (95% CI, 89 to 96) versus 77% (95% CI, 58 to 90). Recall of more smoking breaks and social pressures for smoking were positively associated with smoking but statistically insignificant.

DISCUSSION

Military service is partially responsible for the unusually high smoking prevalence among SK men. Compared to a

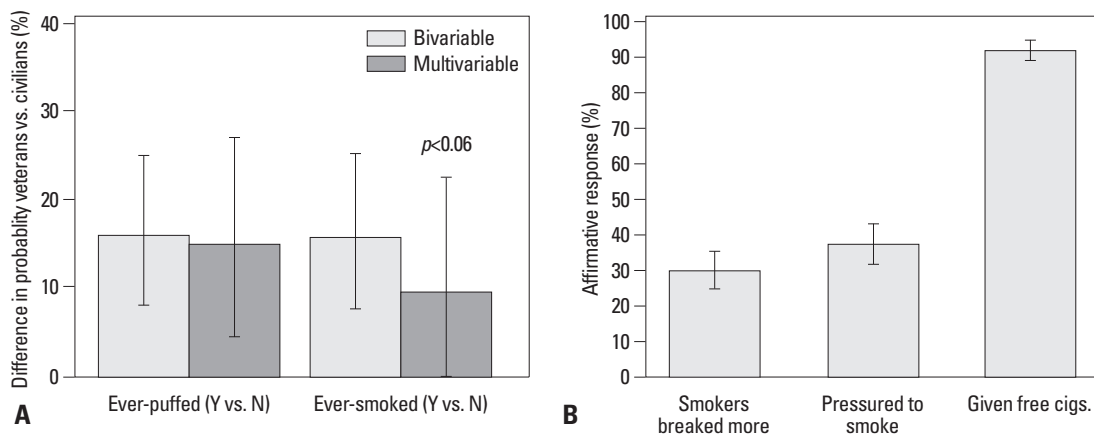


Fig. 1. South Korean military service promotes cigarette smoking experimentation and use. (A) Shows the association between any Korean military service, versus none, with ever experimenting with cigarettes (puffing versus never) and ever being addicted to cigarettes (ever smoked 100 cigarettes versus puffed but never smoked 100 cigarettes). (B) Shows the prevalence and 95% confidence interval of smoking behaviors and smoking promotion among Korean military veterans.

similar group of civilians, veterans were consistently more likely to ever-puff or ever-smoke cigarettes. Veterans described their military service as a period strongly supportive of smoking, with veterans recalling the free distribution of cigarettes being especially likely to smoke.

Military personnel have a higher smoking prevalence than civilians,²² likely because recruits start smoking during service.²³ We added to this evidence and described the prevalence of social norms likely responsible for SK veterans' smoking. Other mechanisms may be active, like stress responses to military training,²⁴ but await additional analyses. Our findings also accord with the one prior description of SK veterans' smoking. Although focus group data are not traditionally analyzed this way, most smokers began smoking in the military, with one smoker saying "...army life turns those who have never smoked...into regular smokers".⁶

This quasi-experimental design exemplifies a novel approach to compare veterans with civilians selected by a process closer to chance than comparing all veterans with all civilians, where some civilians were unfit for service or granted a special deferment. Had we simply treated all veterans and civilians as a pure cross-section representing the average effect, our estimates varied from those presented herein so much that a raw association using the entire sample without preprocessing produced illogical results, where veterans were less likely to ever-puff a cigarette.

Our data, however, posed several limitations where recall of past events may be inaccurate, and a historical analysis may not capture temporal order and be sensitive to how military smoking support varied across time. It is possible the civilians described herein were less likely to smoke because they spent less time in SK compared to veterans and more time in California, a state with stringent tobacco control policies and social norms that discourage smoking.^{27,30} However, age of immigration was independent of outcomes, minimizing this potential bias in our comparisons. Data limitations and the invalid comparison between all veterans and all civilians left us with little alternative for a superior civilian comparison group.

Military induced smoking may carry over into a lifetime of smoking. Smoking in SK not only has public health costs⁴ but the economic costs are also antagonistic to the government who monopolize the tobacco industry.²⁵ With one of the highest smoking prevalence among developed nations, smoking is the most critical front for public health reform in South Korea.²⁵ Since military service is completely within government purview, public policy is the most effective

method to reduce smoking. Apart from the 2001 National Health Promotion Act, which largely aimed to reduce smoking among minors, efforts to reduce adult smoking have been limited in comparison to comprehensive reforms in Western nations. Regardless, smoking reforms in the military often fall outside national policy. In 2003, for example, a full workplace ban was implemented and the result was a 6%²⁵ reduction in smoking but this ban did not apply to military operations. Increasing cigarette prices is an effective tobacco control policy,²⁶ however, cigarettes were given freely or subsidized in the SK military until very recently.

Policies should expand clean indoor air provisions to military bases. Secondhand smoke exposure is exceptionally high in SK, as are the various detrimental health effects.²⁷⁻³⁰ The close military quarters leave numerous nonsmokers at risk for serious health problems and lends even more weight to a smoking ban in the SK military. A complete smoking ban, both indoor and outdoor, on all military properties including military vehicles that may be used to transport troops would be ideal. Formal policies permanently banning the subsidy of cigarettes in the military and restricting access to full retail priced cigarettes on military bases are needed. Interventions to assuage the consequences of recent cigarettes subsidies should also be enacted. These may include screening for smoking risks among veterans and providing interventions among veteran peer groups designed to mimic social processes similar to those that occur in the military but in an attempt to reinforce smoking cessation. Findings in this study suggest social norms may influence smoking behavior, therefore perceived rewards for not smoking, in addition to social pressure to stop, among a group of SK veterans, could prove effective in interventions.

In the few years since our data were collected, the SK government has enacted several policies to curtail smoking.²⁵ For example, all programs that provided military personnel with free, duty-free, or extra money for, cigarettes were abolished.³¹ This study suggested that veterans were 16% more likely, and in an absolute sense almost sure to try smoking (with only 1 in 20 veterans never puffing a cigarette) as a result of SK's distribution of cigarettes in the military. And, we anticipate in the years to come, to the degree this policy is enforced, the smoking prevalence should be accordingly reduced in the entire population by as much as 10% using an algebraic extension of these estimates to the population. Still, other military smoking social norms need policy attention. For example, regardless of its association

with the outcomes in this study about a third recalled smokers were given additional work breaks. Military leaders should abolish preferential treatment of smokers, including work breaks, but also less obvious social rewards.

This was an early study to examine how SK military service promoted smoking, where previously this association had been assumed but never observed. The government, who also monopolizes the tobacco industry, appears to have used a captive audience of military recruits to expand their tobacco market. Even though early in the scientific sequence of reports to clarify the role of SK military service in smoking promotion, it is sufficient to begin advocating for new policies to reduce smoking risks among current enlistees and begin efforts to undo the unnecessary smoking harms veterans were exposed to.

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