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CHANGES IN SMOKING BEHAVIOR FOLLOWING A STRICT NO-SMOKING POLICY IN U.S. NAVY RECRUIT TRAINING

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Changes in Smoking Behavior Following a Strict No-Smoking Policy in U.S. Navy Recruit Training

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SUMMARY

Problem

Evidence of the adverse health consequences of tobacco use and the growing evidence of risks associated with environmental tobacco smoke have contributed to recent increases in environmental restrictions on tobacco use as a means of reducing cigarette smoking as well as exposure to secondhand tobacco smoke. Reducing the prevalence of smoking has been a primary goal of the U.S. Navy's health promotion program since the 1980s. Official Navy policy is to create a healthy social and work environment that discourages the use of tobacco products. One of several factors that is emphasized is maximum discouragement of tobacco use at initial entry and training points. To accomplish this goal, recruits are prohibited from using tobacco at all recruit training commands for the duration of basic training. The impact of this type of intense tobacco restriction on short- and long-term smoking status and smoking-related variables among new Navy personnel is the focus of this paper.

Objective

This study examined only those recruits who reported that they were current smokers at entry into the Navy. The primary research objectives were to (a) describe changes in self-reported smoking status at the end of recruit training and at the end of the first year of enlistment, and (b) determine predictors of changes in self-reported smoking status.

Approach

Participants were 449 male, self-reported current smokers entering one of three Navy Recruit Training Commands located in San Diego, Great Lakes, or Orlando during the fall of 1990. Recruits completed surveys about their history of tobacco use, orientations and intentions regarding future tobacco use, attitudes toward no-smoking policy, and brief demographic information at entry into the Navy (T1), graduation from recruit training (T2), and after one year of service (T3). Percentage distributions and cross-tabulations on smoking status were computed for all three time points to examine changes in smoking behavior during the first year of enlistment. Multiple regression analyses were used to assess the relationship between smoking status change and demographic, smoking history, attitude and intention measures.

Results

Of the participants who were current smokers at entry into the Navy, 40% changed their classification to former smokers at the end of the eight-week, smoking-restricted period of recruit

training, and 60% still reported themselves as current smokers at the end of training. At the one-year follow-up 19% of the initial smokers classified themselves as former smokers and 81% said they were current smokers. Multiple regression analyses indicated that participant's age (being older) and having a higher intent to quit were predictive of reporting oneself as a former smoker at T2 (short-term smoking status change), accounting for a total of 6.3% of the variance in smoking status change from T1 to T2. Higher intent to quit, alone, was predictive of reporting oneself as a former smoker at the one-year follow-up (long-term smoking status change), accounting for 3.5% of the variance in smoking status change from T1 to T3. Similar analyses conducted separately for self-reported current smokers at T2 and former smokers at T2 indicated that attitude toward the no-smoking policy was predictive of smoking status change at the one-year follow-up (T3).

Conclusions

Findings from this study suggested a meaningful impact of the Navy's no-smoking policy during recruit training in reducing smoking prevalence. The one-year quit rate of 19% found in this study is comparable to typical one-year quit rates of 16% to 22% found across a broad variety of formal cessation interventions. Findings also indicated that there were small associations between demographic and cognitive variables and smoking status change among new Navy personnel. Initial intent to quit, and to a lesser extent, age, were important predictors of quitting smoking (in both the short- and long-term); whereas, after being exposed to eight weeks of smoking restrictions, attitude toward the no-smoking policy was the only predictor both of quitting smoking for current smokers and relapsing among former smokers. Future research should focus on strategies that might be incorporated along with the no-smoking policy to influence recruits' intentions and attitudes such that more recruits who enter the Navy as smokers consider quitting smoking. Although policy change alone cannot be expected to be effective for all smokers, results of this study of the no-smoking policy in recruit training suggest that smoking bans will likely play an important part in reducing smoking.

Changes in Smoking Behavior Following a Strict No-Smoking Policy in U.S. Navy Recruit Training

Reducing the prevalence of tobacco use has been a key public health concern for many large organizations and institutions. It has been estimated that more than 300,000 Americans die each year as a result of cigarette smoking, accounting for one in every six deaths in America, including 30% of all cancer deaths (87% of lung cancer deaths), 21% of deaths from coronary heart disease, 18% of stroke deaths, and 82% of deaths from chronic obstructive pulmonary disease (US DHEW, 1979; US DHHS, 1989). Use of other forms of tobacco (e.g., cigars, pipes, snuff, or dip) also are associated with significantly elevated risks of death and disease (US DHHS, 1986a), as are the health risks associated with chronic exposure to secondhand smoke (US DHHS, 1986b; Eriksen, LeMaistre, & Newell, 1988). Because of the evidence of the adverse health consequences of tobacco use and the growing evidence of risks associated with environmental tobacco smoke, there has been a recent trend to implement environmental restrictions on tobacco use as a means of reducing cigarette consumption and rates of smoking prevalence, as well as exposure to secondhand tobacco smoke.

Policies that restrict or totally ban smoking have been implemented in large organizations such as health-care facilities, educational settings, and a variety of worksites. Several studies have shown that workplace smoking restrictions reduce cigarette consumption among employees (Rosenstock, Stergachis, & Heaney, 1986; Millar, 1988; Petersen, Helgerson, Gibbons, Calhoun, Ciacco, & Pitchford, 1988; Biener, Abrams, Follick, & Dean, 1989; Becker, Conner, Waranch, Stillman, Pennington, Lees, & Oski, 1989; Borland, Chapman, Owen, & Hill, 1990; Gottlieb, Eriksen, Lovato, Weinstein, & Green, 1990; Borland, Owen, & Hocking, 1991). Most of these studies found a decrease in the overall consumption rate; however, the estimates of consumption change vary across studies and in some cases are accompanied by slight increases in smoking outside of the work environment.

In addition to reducing rates of cigarette consumption, it might be expected that a no-smoking policy would be effective in reducing the percentage of current smokers in an organization. Some studies have reported reductions in the prevalence of smokers following implementation of a worksite smoking ban, but it was not always apparent whether the reduction was any greater than the general community cessation rate (Millar, 1988; Petersen et al., 1988; Becker et al., 1989; Borland et al., 1990). Borland and colleagues (1991b) found that over a two-

year period from six months before the ban to 18 months after the ban, smoking prevalence decreased by 5%, which the authors estimated to be about twice the decline found for that community. Another recent study reported an overall quit rate of 21% among initial smokers over a 20-month period, with a 6% reduction in the overall smoking prevalence (Sorensen, Rigotti, Rosen, Pinney, & Prible, 1991). Though these studies suggest apparent increases in smoking cessation, a study conducted by Biener (1989) that utilized a control worksite, found no evidence of change in smoking prevalence. Thus, the effects of worksite smoking bans on smoking prevalence have not been clearly established.

There are few studies among military populations on the effects of restrictive smoking policies on consumption and prevalence. Prior to the implementation of the current no-smoking policy at all Navy recruit training commands, Cronan and colleagues (1989) conducted a study that evaluated several smoking interventions during Navy recruit training. This study found that smoking prevalence did not significantly decrease among recruit smokers who were restricted from smoking compared to a control group with no such restrictions. However, this study did show that the no-smoking restrictions were effective in preventing never-smokers from starting to smoke during recruit training. Another study conducted on Navy personnel evaluated the effect of a no-smoking policy plus an educational component at Recruit Training Command, Orlando. Looking at the no-smoking-policy-only group (no educational component), smoking prevalence decreased from 51% at entry into recruit training to 43% at a three-month follow-up; long-term follow-up data were not collected (Pokorski, 1992). Carroll, Lednar, and Carter (1989) assessed the short-term impact of smoking restrictions on cigarette consumption during Army basic combat training. The authors found that daily cigarette consumption was significantly reduced during training, but six months after training cigarette consumption had returned to the pretraining level.

Tobacco use is of particular concern to the Navy because the military has higher rates of tobacco use than that found in the civilian sector, and military personnel are more likely to engage in heavy use of cigarettes than civilians (Bray, Marsden, & Peterson, 1991). Reducing the prevalence of smoking has been a primary goal of the U.S. Navy's health promotion program since the 1980s. Official Navy policy is to create a healthy social and work environment that discourages the use of tobacco products, supports refraining from tobacco use, and provides tobacco users with encouragement and professional assistance to stop using tobacco products

(Secretary of the Navy, 1986b). One of several factors that is emphasized is maximum discouragement of tobacco use at initial entry and training points (Secretary of the Navy, 1986a). To accomplish this goal, recruits are prohibited from using tobacco at all recruit training commands for the duration of basic training.

The smoke-free policy at Navy recruit training commands is unique among most worksite policies because it is enforced the entire eight-week period of "live-in" training, which is in contrast to workplace smoking policies that can only be enforced during working hours. Furthermore, the military environment, having a strong authoritarian component, can mandate compliance thereby allowing for a lower probability of "cheating" against the policy. The impact of this type of intense tobacco restriction on short- and long-term smoking status and smoking-related variables among new Navy personnel is the focus of this paper.

This study examined only those recruits who reported that they were current smokers at entry into the Navy. The primary research objectives were to: (a) describe changes in self-reported smoking status at the end of recruit training and at the end of the first year of enlistment, and (b) determine predictors of changes in self-reported smoking status.

Method

Participants

Participants were 449 male, self-reported current smokers entering one of three Recruit Training Commands (RTCs) located in San Diego, Great Lakes, or Orlando during the fall of 1990. To be selected for the present longitudinal study, all participants had to have completed an initial "entry" survey as well as an "exit" survey eight weeks after entering recruit training and a follow-up survey given one year after entering recruit training. These participants were selected from a larger sample of 1,314 respondents, which included both smokers and nonsmokers, who completed all three surveys. The overall smoking prevalence at entry into the Navy for this longitudinal sample was 34%.

These recruit smokers had a mean age of 19.7 years (SD=2.5), ranging from 17 to 35 years. Seventy-nine percent had a high school degree or equivalent, 20% had education beyond high school, and 1% had less than a high school degree. Eighty percent of the participants were White, 7% were Hispanic, 6% were African-American, and 7% were of other racial/ethnic backgrounds. The majority of recruits were never married (91%). The largest percentage of

participants were located at RTC, San Diego (56%), followed by RTC, Great Lakes (31%), and RTC, Orlando (13%).

Procedures

Within the first week of recruit training an "entry" survey was administered to the recruits in group settings. At the end of the eight-week training period, typically one to two days prior to the recruits' graduation day, an "exit" survey was administered to the participants, also in group settings. Approximately one year after the recruits had entered recruit training, a follow-up survey, modified from the earlier two surveys, was mailed to all participants who could be identified using master personnel tapes maintained by the Bureau of Naval Personnel. If the follow-up survey was not returned within four weeks, a reminder card and a new survey were sent to the participant. If the survey was not returned within six weeks, another survey and a cover letter addressed to the participant's commanding officer were mailed.

Of 1,511 recruit male smokers who completed the "entry" survey, 996 recruits completed an "exit" survey eight weeks later upon graduating from recruit training. It is not possible to compute an exact entry-to-graduation participation rate because not all of the entering recruits completed their training. Although the exact numbers are not available for this study, typically about 10% of entering recruits drop out from training or are set back temporarily. Thus, the entry-to-graduation participation rate is estimated to have been between 66% and 73%.

Of the 996 recruit graduation respondents, 203 were dropped from further study because they could not be located for follow-up (e.g., they had been discharged from the Navy or their follow-up surveys were undeliverable due mostly to relocation with no available forwarding address). Completed one-year follow-up surveys were received from 449 of the locatable 793 participants, resulting in a 57% graduation to one-year follow-up response rate for this sample of smokers.

Measures

The Naval Health Research Center developed a 51-item, self-administered "entry" survey that assessed basic demographic information, brief history of tobacco use, and orientation and intentions regarding future tobacco use. The "exit" survey and one-year follow-up survey were

slightly modified versions of the "entry" survey and had an expanded section on attitudes regarding Navy smoking policy. Specific questionnaire measures are described below.

Demographics. Recruits provided their name and social security number (for tracking purposes) and information about their Navy rating, pay grade, age, level of education, sex, marital status, and ethnicity.

Cigarette use. Several items on history and current use of cigarettes were included. Current cigarette use status was assessed at all three points in time by asking the participant to indicate whether he was a "never user," "former user," or "current user." The "entry" survey instructed participants to answer this item according to their tobacco use behavior at entry into the Navy (that is, prior to entering recruit training). Participants were asked on all three surveys to report the most recent time they had smoked a cigarette using a 10-point scale ranging from 1 = 10 or more years ago, 2 = 6-9 years ago, 3 = 3-5 years ago, 4 = 1-2 years ago, 5 = 7-11 months ago, 6 = 4-6 months ago, 7 = 2-3 months ago, 8 = 5-7 weeks ago, 9 = during the past 30 days, to 10 = today. Three items assessed the habit strength of cigarette use: age when first started using tobacco products regularly and years of regular tobacco use (both items measured at "entry" only), and number of cigarettes smoked on a typical day when cigarettes were smoked during the last 30 days (measured on all three surveys). Response options for age when first started using tobacco regularly were 1 = <12 years old, 2 = 12-14 years, 3 = 15-17 years, 4 = 18-20 years, and 5 = ≥21 years old. Participants used a 12-point scale to indicate the number of cigarettes smoked on a typical day: 1 = <1 cigarette, 2 = 1-5, 3 = 6-10, 4 = 11-15, 5 = 16-20, 6 = 21-25, 7 = 26-30, 8 = 31-35, 9 = 36-40, 10 = 41-45, 11 = 46-55, and 12 = 56+ cigarettes. Because of different response option values for the different items, these variables were standardized. A mean of these three standardized variables (with response options for age of first tobacco use reversed) was computed to serve as an overall measure of *Habit Strength* of cigarette use (computed on T1 measures only). The internal consistency (coefficient alpha) of this scale was .62.

Orientation and intentions. Participants were asked on the "entry" survey if they were concerned about the health effects of cigarettes (with a no or yes response format) and how important it is to be a nonuser of tobacco. Participants rated importance on a 5-point scale with 1 = not at all important, 2 = somewhat important, 3 = moderately important, 4 = very important, and 5 = extremely important. Participants also were asked if, in the future, they were likely to

be a nonuser of tobacco out of concern for their health (with a no or yes response format). These three items were used to form a *Health Concerns* scale (on T1 measures only) by computing a mean of the three standardized variables. The internal consistency for this scale was .69.

All three surveys included items on intentions for future tobacco use. At T1, an *Intent to Quit* scale was composed of two items: seeing oneself as a smoker in the future (with a no or yes response format), and likelihood of stopping smoking over the next year. At T2, an *Intent to Quit* scale was computed for current smokers, or an *Intent to Remain a Nonsmoker* scale was computed for ex-smokers. Participants rated either their likelihood of quitting or remaining a nonsmoker on a 5-point scale with 1 = no chance at all, 2 = slight chance, 3 = somewhat likely, 4 = quite likely, and 5 = extremely likely. A mean of these two standardized variables (with the future smoker variable reversed) was computed. The internal consistency of the *Intent to Quit* scale for the "entry" and "exit" surveys was .73 and .79, respectively. For former smokers at T2, an *Intent to Remain a Nonsmoker* scale was computed; the internal consistency for this scale was .76.

Another section on all three surveys asked participants if, in the future, they were likely to be a nonuser of tobacco because of social pressure not to use tobacco, because of hassles related to smoking-restricted areas, and because few friends or peers use tobacco. A mean of these three items was computed as a measure of social reasons for becoming a future non-smoker. The internal consistency of the *Social Reasons* scale for the "entry" and "exit" surveys was .69 and .74, respectively. In addition, participants were asked on all surveys if, in the future, they were likely to be a nonuser of tobacco because of the cost of tobacco products.

Smoking policy and attitudes. The "exit" survey included a section on attitudes toward Navy smoking policy. Participants were asked (with a no or yes response format) if they were in favor of the smoke-free policy during recruit training and if they would be in favor of being placed in a smoke-free work environment. Participants were also asked how they thought the smoke-free policy in recruit training would influence their future tobacco use. Response options for this item were 1 = (the policy) would help me stop using tobacco, 2 = would help me reduce my tobacco use, 3 = would not change my tobacco use, and 4 = would probably increase my tobacco use when I leave. After standardizing, a mean of these three items was used to form an *Attitude Toward Policy* scale. The internal consistency of this scale was .77.

Analyses

Frequency statistics and percentage distributions of participants' demographic and smoking history variables were computed. Percentage distributions and cross-tabulations on smoking status were computed for the "entry," "exit," and one-year follow-up surveys to examine changes in smoking behavior during the first year of enlistment.

Criteria for being considered a current smoker at the "entry" survey and one-year follow-up were two self-reported survey measures: (1) identifying oneself as a current smoker, and (2) reporting that the most recently smoked cigarette was sometime during the past 30 days. The criterion for being considered a current smoker at the "exit" survey was based only on self-reported current smoker status; most recent cigarette was not a criterion for the "exit" survey because restrictions during recruit training did not allow opportunity for smoking behavior.

Multiple regression procedures were used to assess the relationship between smoking status change (i.e., from current smoker to former smoker) and demographic, smoking history, attitude, and intention measures. In these analyses smoking status at recruit training graduation and one-year follow-up were regressed on the demographic, smoking history, attitude, and intention variables measured either at entry or graduation from recruit training.

Results

Smoking Status

Of the participants who were current smokers at entry into the Navy, 40% changed their classification to former smokers at the end of recruit training and 60% still reported themselves as current smokers at the end of training (Figure 1). At the one-year follow-up, 19% of the initial smokers were former smokers and 81% were current smokers.

Examining only the 40% who changed their self-classification to former smoker at recruit training graduation, 27% of these participants maintained their former smoker status at the one-year follow-up, and 73% returned to current smoker status (Figure 2). Of the 60% of initial smokers who still reported themselves as current smokers at recruit graduation, 86% of these participants remained current smokers at follow-up while 14% became former smokers (Figure 3).

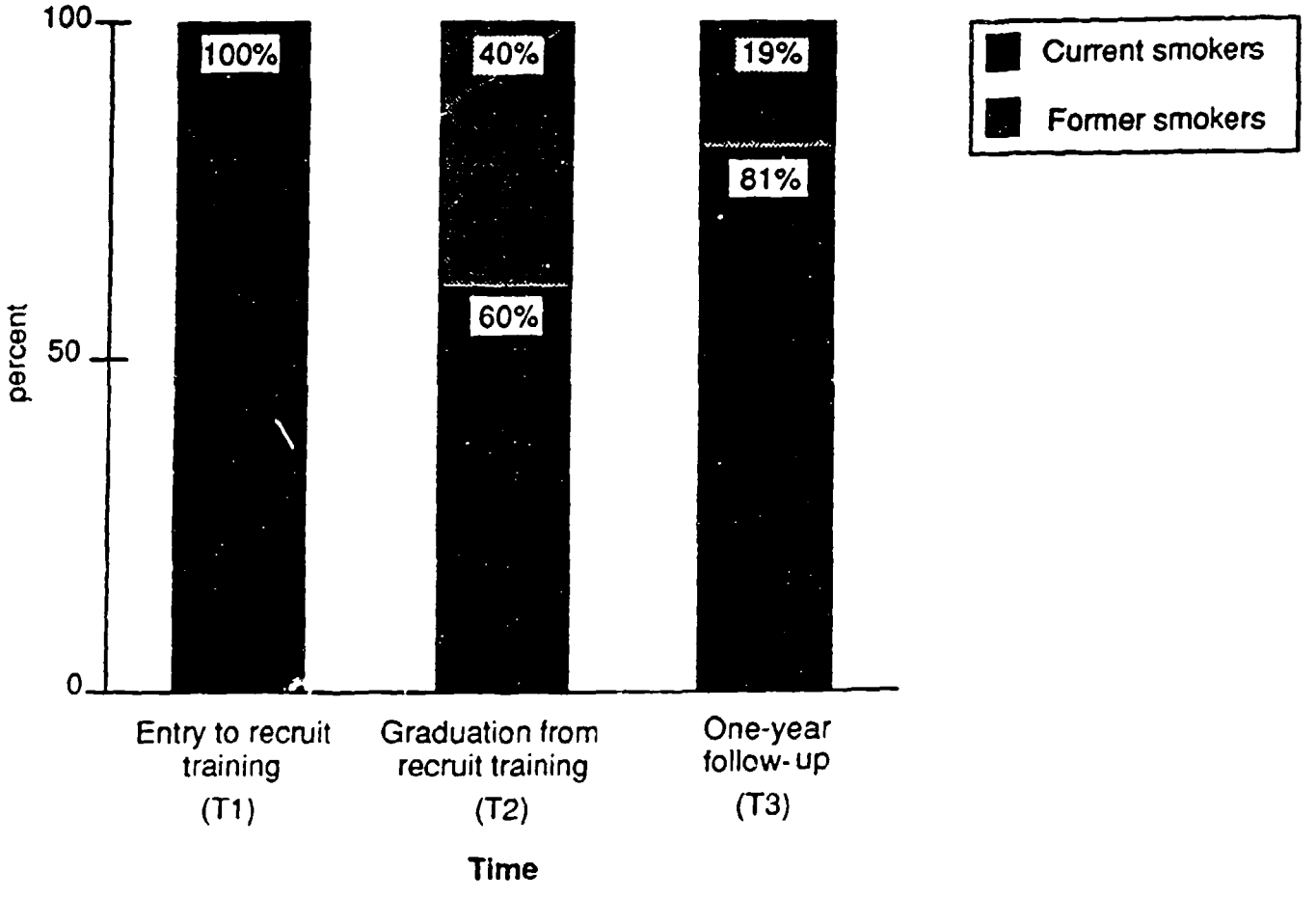

Figure 1. Self-reported smoking status among Navy recruit initial smokers over time (N=423).

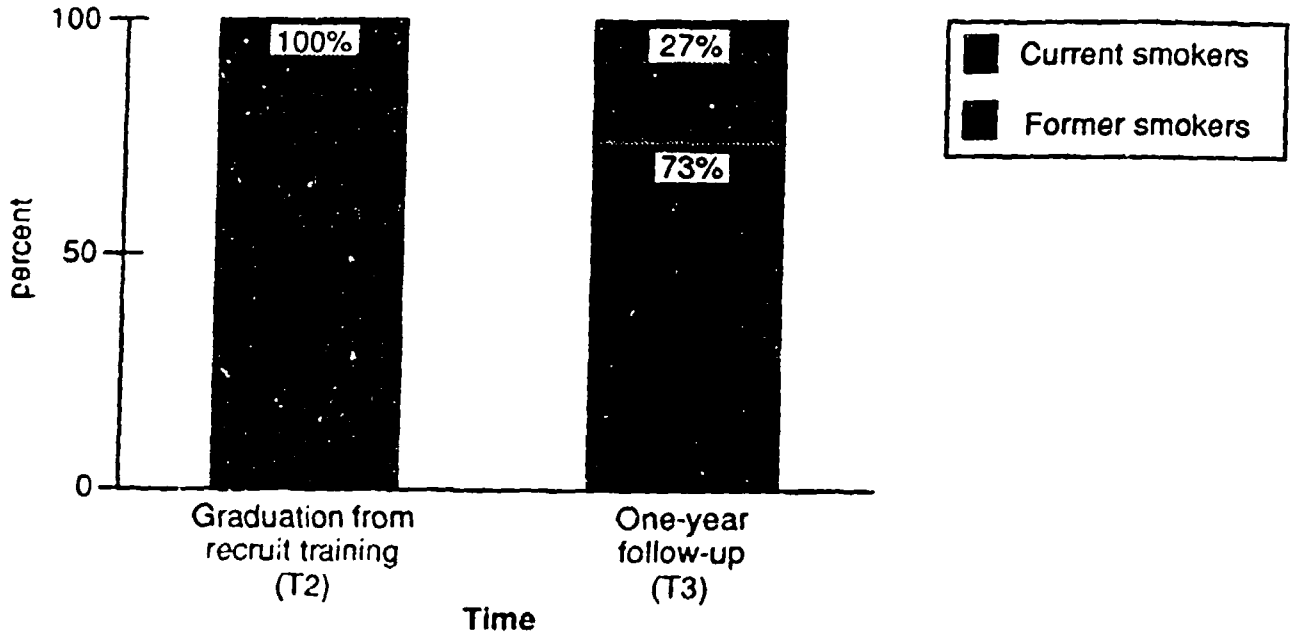

Figure 2. Self-reported smoking status among Navy recruit *former* smokers at recruit training graduation over time (N=171).

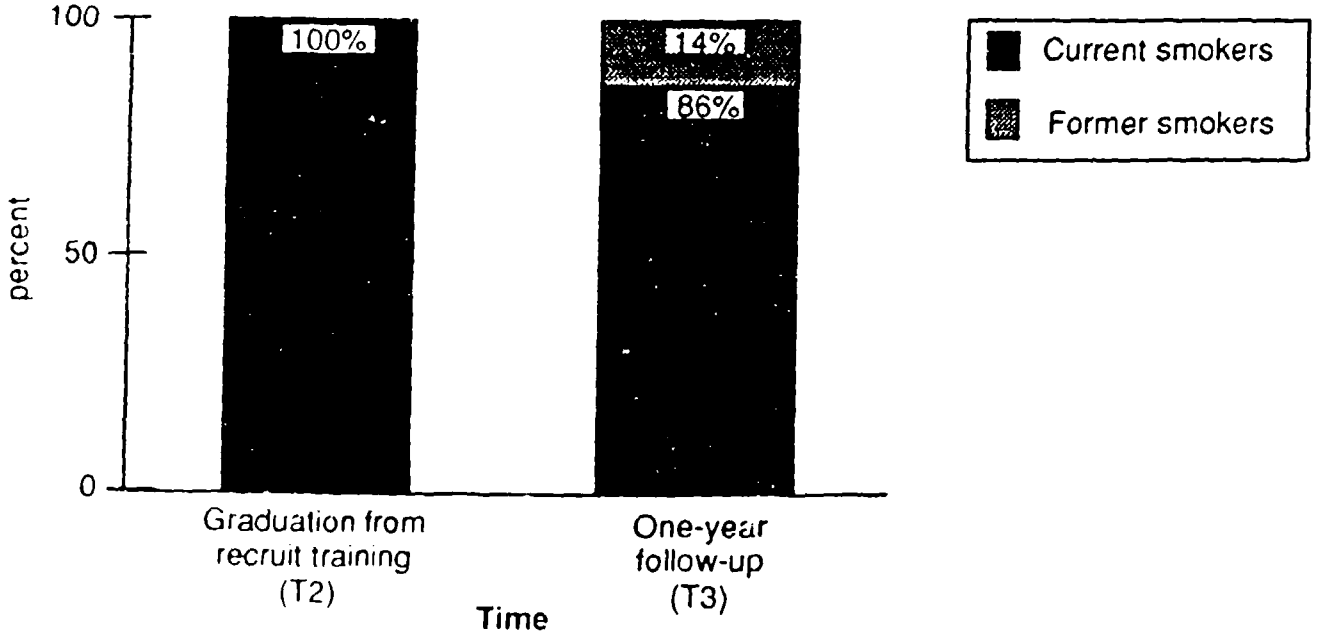

Figure 3. Self-reported smoking status among Navy recruit *current* smokers at recruit training graduation over time (N=252).

Smoking-Related Measures

Table 1 presents frequency distributions, means, and standard deviations for all smoking items and scales. Considering smoking history items, the typical age that participants first started using tobacco on a regular basis was between 15 and 17 years old. Prior to recruit training, the participants had used tobacco regularly for an average of 4.2 years and smoked an average of 15.34 cigarettes per day.

Among current cigarette smokers at entry into the Navy (T1), 75% were concerned about the health effects of cigarettes and two thirds (67%) rated themselves as likely to be a nonuser of tobacco in the future out of concern for their health. Furthermore, 47% of the sample reported that it was "moderately" to "extremely" important to be a nonuser of tobacco products.

At T1, 69% of the recruits rated themselves as at least somewhat likely to stop smoking over the next year. Among those who still categorized themselves as current cigarette smokers at recruit training graduation (T2), 55% rated themselves as at least somewhat likely to stop smoking over the next year; and 77% of former smokers at T2 rated themselves as at least somewhat likely to remain a nonsmoker over the next year. Approximately half of the participants (49% at T1 and 54% at T2) reported that they saw themselves as someone who smokes in the future.

Regarding social reasons for being a nonuser of tobacco, 22% of participants at T1 (and 19% at T2) reported that they were likely to be a nonuser of tobacco in the future because of social pressure not to use tobacco, 25% because of hassles related to smoking-restricted areas (24% at T2), and 16% because few friends or peers use tobacco (also 15% at T2). In addition, 58% of the sample at T1 (and 47% at T2) reported that they were likely to be a nonuser of tobacco in the future because of the cost of tobacco products.

Forty-five percent of participants at T2 were in favor of the smoke-free policy in recruit training and 36% reported that they would be in favor of being placed in a smoke-free work environment after leaving training. Sixty-five percent of the sample reported that the smoke-free policy in recruit training would help them reduce or stop using tobacco after leaving training.

Predictors of smoking status change

Multiple regression analyses were conducted to determine significant predictors of change in self-reported smoking status at recruit training graduation (T2) and one year after recruit

Table 1

Frequency Distributions and Means for Smoking Items and Scales

Items/Scales	% responding					Mean	SD
Habit Strength:							
	1 <12 years	2 12-14	3 15-17	4 18-20	5 ≥21 years		
At what age did you first start using tobacco products fairly regularly? (T1)	9	25	49	14	2	2.75	.89
	<1	1-3	4-7	8-11	≥12 years		
For how many years have you used tobacco on a regular basis? (T1)	9	37	41	10	3	4.24	2.99
	<1	1-10	11-20	21-30	31+ cigs.		
During the last 30 days just prior to entering the Navy, how many cigarettes did you usually smoke on a typical day when you smoked? (T1)	5	34	36	16	9	15.34	11.21
Habit Strength Scale[a] (T1 only):	-	-	-	-	-	.00	.75
Health Concerns:							
		0 No		1 Yes			
Are you concerned about the health effects of cigarettes? (T1)		25		75		.75	.43
In the future, are you likely to be a nonuser of tobacco out of concern for your health? (T1)		33		67		.67	.47
	1 Not at all important	2 Somewhat important	3 Moderately important	4 Very important	5 Extremely important		
How important is it to you to be a nonuser of tobacco products? (T1)	28	25	25	14	8	2.49	1.25
Health Concerns Scale[a] (T1 only):	-	-	-	-	-	.00	.79

Table 1 (continued)

Intent to Quit:	1 No chance at all	2 Slight chance	3 Somewhat likely	4 Quite likely	5 Extremely likely	Mean	SD
Over the next year, if you currently smoke cigarettes, how likely is it that you will stop smoking?							
(T1)	6	25	26	23	20	3.27	1.20
(T2)[b]	16	38	20	16	10	2.65	1.20
Over the next year, if you currently do not smoke cigarettes, how likely is it that you will remain a nonsmoker? (T2 only)[c]	7	13	16	10	54	3.92	1.35

	0 No	1 Yes	Mean	SD
In the future, do you see yourself as someone who smokes?				
(T1)	51	49	.49	.50
(T2)	46	54	.54	.50
Intent to Quit Scale[a] (T1):	-	-	.01	.89
Intent to Quit Scale[a] (T2):	-	-	.11	.94
Intent to Remain a Nonsmoker Scale[a] (T2 only):	-	-	-.05	.97

Social Reasons:	0 No	1 Yes	Mean	SD
In the future, are you likely to be a nonuser of tobacco because of the social pressure not to use tobacco?				
(T1)	78	22	.22	.41
(T2)	81	19	.19	.40
In the future, are you likely to be a nonuser of tobacco because of the hassles related to smoking-restricted areas?				
(T1)	75	25	.25	.44
(T2)	76	24	.24	.43

Table 1 (continued)

	0 No	1 Yes	Mean	SD
In the future, are you likely to be a nonuser of tobacco because few of your peers or friends use tobacco?				
(T1)	84	16	.16	.36
(T2)	85	15	.15	.36
Social Reasons Scale (T1):	-	-	.21	.31
Social Reasons Scale (T2):	-	-	.20	.33
Attitude Toward Policy:				
Are you in favor of the smoke-free policy at this training command? (T2)	55	45	.45	.50
Would you be in favor of being placed in a smoke-free work environment after leaving training? (T2)	64	36	.36	.48

	1 Will help me stop	2 Will help me reduce	3 Will not change	4 Will probably increase	Mean	SD
How do you think that the smoke-free policy at this training command will influence your tobacco use after you leave? (T2)	30	35	30	6	2.11	.90
Attitude Toward Policy Scale[a] (T2 only):	-	-	-	-	.01	.85

	0 No	1 Yes	Mean	SD
Cost of Tobacco Products:				
In the future, are you likely to be a nonuser of tobacco because of the cost of tobacco products?				
(T1)	42	58	.58	.49
(T2)	53	47	.47	.50

[a] Scale items have been standardized and response options were reversed where appropriate.
[b] N for this item was 242; the question was intended for T2 current smokers only.
[c] N for this item was 76; the question was intended for T2 former smokers only.
Note: N for scales and items ranged from 409 to 448, except where otherwise noted.

training (T3), with 0 = no change in status and 1 = change to former smoker. To predict a change from current-smoker status at entry (T1) to former-smoker status at T2 and T3, T1 independent variables were examined including education level, age, habit strength, health concerns, intent to quit, social reasons, and likelihood of being a nonuser of tobacco in the future because of the cost of tobacco products. In these analyses, age and education level were allowed to step into the regression equation first to remove any effects that could be due to these demographic factors. Then the other independent variables were allowed to step in if they accounted for significant additional variance in the tobacco status change variable. Bivariate correlations among the variables are provided in Appendix A.

Predicting T1 to T2 smoking status change. Results of this analysis indicated that two T1 variables predicted changed smoking status (i.e., from current to former smoker) at recruit training graduation (T2) (Table 2). Participant age (being older) and higher intent to quit were predictive of reporting oneself as a former smoker at T2. The two predictors accounted for 6.3% of the variance in smoking status change from T1 to T2.

Predicting T1 to T3 smoking status change. Similar analysis indicated that intent to quit at T1 also predicted changed smoking status at the one-year follow-up (T3). Higher intentions to quit smoking in the future were predictive of reporting oneself as a former smoker at the one-year follow-up (Table 2). This predictor accounted for 3.5% of the variance in smoking status change from T1 to T3.

Predicting T2 to T3 smoking status change. Additional multiple regression analyses were performed to explore predictors of smoking status change from recruit graduation (T2) to the one-year follow-up (T3). To predict T2 to T3 change, the following independent variables were allowed to enter the regression analysis: variables measured only at T1 included education level, age, habit strength, and health concerns; and variables measured at T2 included intent to quit (or remain a nonsmoker), social reasons, attitude toward policy, and a single-item measure indicating the likelihood of being a nonuser of tobacco in the future because of the cost of tobacco products.

Results of the analysis for only self-reported *current smokers* at T2 revealed that having a more positive attitude toward the recruit training smoke-free policy was predictive of reporting oneself as a former smoker at the one-year follow-up, accounting for 2.3% of the variance in T2 to T3 smoking status change (Table 2).

Considering only self-reported *former smokers* at T2 in a similar analysis to predict change from former smoker status at recruit training graduation to current smoker status one-year later (i.e., self-reported quitters who relapsed), recruits with a more negative attitude toward the smoke-free policy were more likely to relapse into smoking one year later, with 6.3% of the variance accounted for in T2 to T3 smoking status change (Table 2).

Table 2

Significant Predictors From Stepwise Regression Predicting Smoking Status Change From Demographic, Smoking-Related, Orientation, and Intention Measures

Predictors	Regression Statistics				
	beta	R	R^2	R^2Ch	SigCh
T1 to T2: All current smokers at entry (N=392) [Predicting change from current smoker at entry (T1) to former smoker at end of recruit training (T2)]					
Age	.103	.129	.017	.017	.011
Intent to Quit	.217	.251	.063	.046	.000
T1 to T3: All current smokers at entry (N=392) [Predicting change from current smoker at entry (T1) to former smoker at one-year follow-up (T3)]					
Intent to Quit	.186	.186	.035	.035	.000
T2 to T3: Only *current* smokers at T2 (N=228) [Predicting change from current smoker at end of recruit training (T2) to former smoker at one-year follow-up (T3)]					
Attitude Toward Policy	.151	.151	.023	.023	.022
T2 to T3: Only *former* smokers at T2 (N=164) [Predicting change from former smoker at end of recruit training (T2) to current smoker at one-year follow-up (T3)]					
Attitude Toward Policy	-.251	.251	.063	.063	.001

Discussion

Restrictive smoking policies have become widespread among many organizations and environments because of the negative health consequences of tobacco use and growing evidence of the health risks associated with exposure to secondhand smoke. However, research has indicated somewhat mixed effects on the impact of environmental restrictions on tobacco use. For example, some studies of worksite tobacco restrictions have found lowered cigarette consumption; others have found reduced consumption at work but slightly higher consumption away from work; and still other studies have found decreases in consumption about equal to that seen in the community at large.

The present study, however, examined changes in short- and long term smoking behavior following an eight-week exposure to a daily 24-hour non-smoking environment in U.S. Navy Recruit Training. Examining only self-reported current smokers entering the Navy, study results indicated that 40% of smokers exposed to this total ban on tobacco use during recruit training changed their self-perception to former smoker by the end of the eight-week period of training. At the one-year follow-up, 19% of the initial smokers were former smokers. These findings suggest a meaningful impact of the mandatory no-smoking policy during recruit training. The one-year quit rate of 19% found in this study is comparable to typical one-year quit rates of 16% to 22% found across a broad variety of formal, and generally more costly, cessation interventions (Schwartz, 1987). Also, a study on Navy recruits conducted four years before this study and prior to the total ban on tobacco use during recruit training found that only 6.8% of smokers at entry into the Navy reported that they were former smokers one year later (Cronan, Conway, & Kaszas, 1991). The 19% one-year quit rate is also sizably higher than the estimated 6% "spontaneous" quit rate (Pechacek, 1984). Spontaneous quit rate refers to the percentage of smokers who, at any given time, report that they have quit smoking. Thus, at least in this environment, restrictions on tobacco use may provide some smokers who desire to quit but have been unable to with an external impetus and support to quit.

Findings from the multiple regression analyses indicated that participant age was a significant, although weak, predictor of becoming a former smoker at recruit training graduation. Older participants were more likely to become former smokers at recruit training graduation than younger participants. However, age was not found to be a significant predictor of one-year smoking status change. In other research, age has been an inconsistent predictor in that some

investigators have found it to be associated with smoking cessation (Kabat & Wynder, 1987; Kirscht, Brock, & Hawthorne, 1987; Stevens, Greissman Greene, & Primavera, 1982) while others have not (Garvey, Bosse, Glynn, & Rosner, 1983). The relationship may be due in part to the fact that health symptoms associated with smoking increase with age, cuing older participants to quit. However, this may not sufficiently explain the association between age and short-term smoking status in this sample given the relatively young and limited age range of the participants.

Intent to quit (measured at entry into the Navy) was a significant predictor of becoming a former smoker both over the short-term (at recruit training graduation) and long-term (after one year of service). This finding lends support to Ajzen's (1985) theory of planned action, which asserts that intentions are linked to actual behavior change. Intent to quit and other smoking-related cognitions are seen as mediators or precursors to behavior change by many researchers. A recent example is Borland and colleagues' (1991a) report that having a high desire to quit (which contained an index of intention to quit smoking) was a significant predictor of making an attempt to quit smoking.

Attitudes toward the recruit training no-smoking policy were important in predicting long-term smoking status change. Among those who continued to report themselves as current smokers at recruit training graduation (i.e., at the end of the eight-week period of tobacco abstinence), having more positive attitudes toward the no-smoking policy predicted becoming a former smoker at the one-year follow-up. Among self-reported former smokers at recruit training graduation, having more negative attitudes toward the policy predicted relapsing to current smoker status at the one-year follow-up. These findings may have implications for the context in which the no-smoking policy is enforced. The way in which a policy is implemented and enforced may have an even greater impact on worker reaction to a policy and how effective it is than the actual content of the policy (Glasgow, 1989). For example, if the no-smoking policy is implemented as just one more restriction in an environment in which virtually all freedoms are removed, recruits' attitudes toward the policy are likely to be negative. However, if the no-smoking policy is enforced in the context of being beneficial to individual health and fitness performance, for example, recruit smokers may be more likely to continue their abstinence from cigarette smoking after leaving training.

Education level did not predict smoking status change at any point in time. This was not expected, given the number of studies that have associated education level with smoking status (US DHHS, 1990; Wilcox, Prochaska, Velicer, & DiClemente, 1985; Kirscht et al., 1987; Borland et al., 1991a). However, a plausible explanation for this is that there was very little variance in education level in the present sample, with 97% of participants having at least a high school degree but less than a four-year college degree. Additionally, the behavioral composite variable, habit strength, did not predict smoking status change at any point in time, even though habit strength and various single-item measures (e.g., amount smoked, length of time smoked) have been found to predict smoking status in several other studies (Wilcox et al., 1985; Borland et al., 1991a; Stevens et al., 1982; Cummings, Hellmann, & Emont, 1988). Other social factors (i.e., health concerns, social reasons, and cost of tobacco products) also did not predict smoking status change at any point in time.

One limitation of the study is the reliance on self-reported measures for smoking behavior. It was not possible to obtain biochemical validation of smoking status in this study, however, self-reports of smoking status have been found to be generally reliable (Kozlowski & Heatherton, 1990). It is possible, however, that there may be some systematic bias in reporting of smoking behavior, which may have affected the results. Another limitation of the study is the relatively low one-year response rate. The loss of participants between the "exit" recruit graduation survey and the one-year follow-up may have implications for the generalizability of the findings. The absence of a comparable control group is another limitation of the study and a methodological concern when evaluating any worksite smoking policy (Biener et al., 1989). The current top Navy leadership and media attention given to the issue of smoking in the military makes it problematic to differentiate the effects of societal trends (both within the military and in the civilian sector) from the effects of the Navy recruit training no-smoking policy; therefore, results should be interpreted with caution.

In conclusion, findings from this study suggested a meaningful impact of the Navy's no-smoking policy during recruit training in reducing smoking prevalence. Findings also indicated that there were small associations between demographic and cognitive variables and smoking status change among new Navy personnel. Initial intent to quit, and to a lesser extent, age, were important predictors of quitting smoking (in both the short- and long-term), whereas after being exposed to eight weeks of smoking restrictions, attitude toward the no-smoking policy was the

only predictor both of quitting smoking for current smokers and relapsing among former smokers. Education level, habit strength, health concerns, social reasons, and cost of tobacco products were not found to be predictive of smoking status change in this group of new Navy personnel. Future research should focus on strategies that might be incorporated along with the no-smoking policy to influence recruits' intentions and attitudes such that more recruits who enter the Navy as smokers will consider quitting smoking. For example, a multicomponent approach, including organizational support for smokers to quit, cessation skills training, education, and policy change, could result in additive effects on smoking outcomes. It is important to keep in mind that policy change alone cannot be expected to be effective for all smokers, but results of this study of the no-smoking policy in recruit training suggest that smoking bans will likely play an important part in reducing smoking.

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Appendix A

Correlation Coefficients for All Smoking-Related Scales/Items and Smoking Status Change Variables

		1	2	3	4	5	6	7	8	9	10	11	12
1	Age	1.00											
2	Education	.41***	1.00										
3	Habit str	.07	-.14**	1.00									
4	Health cn	.21***	.06	-.20***	1.00								
5	Intent1	.12**	-.01	-.26***	.46***	1.00							
6	Intent2	.12**	.06	-.15***	.32***	.44***	1.00						
7	Intent2f	.09*	.07	-.16***	.29***	.42***	.90***	1.00					
8	Policy	.13**	.04	-.19***	.32***	.40***	.71***	.67***	1.00				
9	Social rs1	.08*	.11*	-.07	.12**	.12**	.18***	.16***	.14**	1.00			
10	Social rs2	.03	.04	-.02	.14**	.10*	.24***	.22***	.27***	.47***	1.00		
11	Tob cost1	.08	-.02	-.00	.14**	.16***	.11*	.10*	.10*	.35***	.13**	1.00	
12	Tob cost2	.06	-.03	.04	.13**	.13**	.25***	.24***	.29***	.23***	.40***	.29***	1.00
13	Smk chg1	.12**	-.01	-.04	.15***	.22***	.41***	.38***	.33***	.04	.12**	.04	.12**
14	Smk chg2	-.05	.04	-.13**	.13**	.19***	.25***	.24***	.26***	-.00	.04	-.06	.01
15	Smk chg3	-.02	.00	-.11*	.04	.13*	.17**	.16**	.17**	.03	-.00	.01	.05
16	Smk chg4	.10	-.07	.14*	-.18**	-.21**	-.26***	-.26***	-.27***	.06	-.05	.16*	.08

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Note: Habit str = Habit strength; Health cn = Health concern; Intent1 = Intent to quit,T1; Intent2 = Intent to quit, T2; Intent2f = Intent to remain a nonsmoker among former smokers at T2; Policy = Attitudes toward no-smoking policy,T2; Social rs1 = Social reasons, T1; Social rs2 = Social reasons, T2; Tob cost1 = Cost of tobacco products, T1; Tob cost2 = Cost of tobacco products, T2; Smk chg1 = Change in smoking status from T1 smoker to T2 former smoker; Smk chg2 = Change in smoking status from T1 smoker to T3 former smoker; Smk chg3 = Change in smoking status from T2 smoker to T3 former smoker; Smk chg4 = Change in smoking status from T2 former smoker to T3 current smoker.

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13. ABSTRACT (Maximum 200 words)

This study examined 449 Navy recruits who reported that they were current smokers at entry into the Navy. The primary research objectives were to: (a) describe changes in self-reported smoking status at the end of recruit training (RT) and at the end of the first year of enlistment, and (b) determine predictors of changes in self-reported smoking status. Recruits completed surveys about their history of tobacco use, intentions, attitudes toward no-smoking policy, and demographics at entry into the Navy (T1), graduation from RT (T2), and after one year of service (T3). Of the participants who were current smokers at entry into the Navy, 40% changed their classification to former smokers at the end of the 8-week, smoking-restricted period of RT. At the one-year follow-up 19% of the initial smokers classified themselves as former smokers. Multiple regression analyses indicated that participant's age (being older) and having a higher intent to quit were predictive of reporting oneself as a former smoker at T2. Higher intent to quit, alone, was predictive of reporting oneself as a former smoker at the one-year follow-up. Similar analyses indicated that attitude

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13. toward the no-smoking policy was predictive of smoking status change from T2 to one-year follow-up (T3). Findings from this study suggested a meaningful impact of the Navy's no-smoking policy during RT in reducing smoking prevalence.

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