

Efficacy of a Tailored Tobacco Pamphlet With and Without a Face-to-Face Intervention

Robert C. Klesges, Ph.D.^{1,2}

Zoran Bursac, Ph.D.³

Margaret C. Fahey, M.A.⁴

Melissa Little, Ph.D.^{1,2,5}

G. Wayne Talcott, Ph.D.^{1,2,5}

Jon O. Ebbert, M.D.⁶

Jennifer P. Halbert, M.S.P.H.^{1,2}

Thomas A. Brandon, Ph.D.⁷

¹ Center for Addiction Prevention Research, University of Virginia

² Department of Public Health Sciences, University of Virginia.

³ Department of Biostatistics, Stempel College of Public Health, Florida International University.

⁴ Department of Psychology, University of Memphis

⁵ Joint Base San Antonio-Lackland, 2200 Berquist Dr. STE 1, San Antonio, TX 78236

⁶ Division of Primary Care Internal Medicine, Mayo Clinic, 200 First Street SW, Rochester, MN
55905

⁷ Tobacco Research & Intervention Program, H. Lee Moffitt Cancer Center

Disclaimers: The views expressed are those of the [author(s)] [presenter(s)] and do not reflect the official views or policy of the Department of Defense or its Components. The voluntary, fully informed consent of the subjects used in this research was obtained as required by 32 CFR 219 and DODI 3216.02_AFI40-402."

Keywords: military; tobacco prevalence; non-cigarette tobacco use; young adults

Funding: The study was funded by the National Heart, Lung, and Blood Institute (RO1 H095785) of the National Institutes of Health. The trial is registered on clinicaltrials.gov (NCT01374724). The opinions expressed on this document are solely those of the authors and do not represent an endorsement by or the views of the United States Air Force, the Department of Defense, or the United States Government. The authors gratefully acknowledge the support of 2nd Air Force, the leadership branch for training in the United States Air Force.

Abstract

Objective: During basic military training (BMT), tobacco use is strictly forbidden in all service branches, but tobacco relapse (and initiation) following BMT is extremely high. We conducted a randomized control trial to determine the effectiveness of a standard pamphlet, a targeted pamphlet, or a targeted pamphlet plus brief face-to-face intervention on smokeless tobacco (ST) use and cigarette smoking at a one-year follow-up.

Method: This study randomized (n=6,914) United States Air Force (USAF) personnel to a standard pamphlet (*Clearing the Air*, n=1,995), a targeted pamphlet designed for USAF personnel (*Airmen's Guide to Remaining Tobacco Free*, n=3,382) or the *Airmen's Guide + A Brief Face to Face Intervention Session* (n=1,537).

Results: Results for cigarette smoking outcomes indicated no main effects for any of the interventions (all odds ratios < 1.05 or > than .85). However, there was a significant *Airmen's Guide* ($p<.0001$) and *Airman's Guide + Face to Face* ($p<.001$) time by treatment interaction. For Airmen cohort recruited during the second half of a three-year recruitment (final 18 months of recruitment vs. earlier), the *Airmen's Guide* was associated with lower cigarette use relative to *Clearing the Air* (13.7% vs 21.1%) and lower smokeless tobacco use (10.2%) than either *Clearing the Air* (14.8%) or the Face-to-Face Intervention (15.9%).

Conclusions: Consistent with civilian research, the results indicate that targeted pamphlets may have some potential for reducing smoking and ST use. Future research should test methods of increasing the efficacy of these interventions as well as intervening with other tobacco and nicotine containing products.

Public Health Significance: Despite successful, validated cessation programs, smoking continues to be the number one cause of morbidity and mortality in the United States ¹. This study demonstrates that targeting printed pamphlets to a particular population may increase the number of successful tobacco cessation attempts.

Despite doctors' advice, public health campaigns, and creative interventions, Americans continue to use tobacco to the point that cigarette smoking remains the number one cause of premature mortality and morbidity in this country¹. Smokeless tobacco (ST) is also a proven risk factor for both cancer (primarily throat and esophageal cancer¹), as well as an independent risk factor for heart disease and stroke¹. While the prevalence of cigarette smoking has decreased steadily since the release of the 1964 *Surgeon General's Report on the Health Effects of Smoking*, the prevalence remains at 14% (i.e., 34.3 million adults) in the United States². The prevalence of ST was on the increase, particularly among males, from 2000 to recent years¹. Despite a decline in prevalence since 2016², rates of current use are still at 2.1% (i.e., 5.1 million adults)².

Tobacco use is twice as common in the US military compared to age matched civilian rates³⁻⁶, with approximately (24%) of active duty personnel using cigarettes and 19.5% using ST^{4,6}. In general, attempts to reduce the rate of smoking and ST have met with modest results^{7,8}. For example, one study randomized 25,996 Airmen (note they are called Airmen regardless of rank or gender) to either the 6-week forced tobacco abstinence required in Basic Military Training or to the tobacco ban plus a brief (one hour) smoking cessation intervention⁷. Among smokers not planning to remain abstinent at baseline, those receiving the intervention were 1.73 higher odds to be abstinent. However, substantial smoking initiation occurred among nonsmokers (8% of never smokers, 26% of experimental smokers, and 43% of former smokers). In a follow-up study⁸, Airmen (n=33,215) were randomized to either a tobacco use intervention based on tobacco use history (either smoking cessation, smokeless tobacco cessation, or prevention). At a one year follow-up, results indicated that the smokers who received the intervention had a 1.16 higher odds ($p<.01$) to be

continuously abstinent and ST users were 1.33 higher odds ($p < .01$) to be continuously abstinent at follow-up. Unfortunately, the smoking prevention program had no impact on smoking initiation. Thus, while all military branches have tobacco bans in Basic Military Training and there is some sustained abstinence in smokers, tobacco initiation in never, experimental, and former smokers results in a net increase of tobacco prevalence a year after Basic Military Training.⁷

One of the challenges of conducting smoking cessation and ST research in military populations is the sheer volume of military personnel being trained. The DoD is the nation's largest employer⁹, with 3.36 million active duty, reservists, and civilian employees, far exceeding Walmart (2.2 million), and McDonalds (440,000)¹⁰.

One cost-effective intervention that could easily be disseminated DoD wide are well-designed and researched pamphlets¹¹⁻¹³. Although there have been a number of pamphlets that have shown some degree of efficacy (e.g., *Clearing the Air*)¹⁴⁻¹⁶, the strongest intervention effects appear to be observed in the *Forever Free* pamphlets¹¹⁻¹³. This intervention included eight self-help pamphlets aimed to reduce the prevalence of relapse after tobacco cessation¹¹⁻¹³. However, *Forever Free* is relevant to civilians who have decided they want to quit smoking and not tailored to the protracted involuntary abstinence in Basic Military Training and Technical Training. Importantly, a Cochrane review¹⁵ concluded that self-guided cessation interventions were more effective when tailored to the individual smoker. Thus, there is growing need for self-guided materials specific to tobacco behaviors in the US military.

The purpose of this investigation was to evaluate *the Airmen's Guide to Remaining Tobacco Free*, a tailored guide for Air Force trainees, which targeted the times Airmen are most likely to initiate or relapse to tobacco and smokeless tobacco use (see below). We evaluated the long-term

efficacy of the *Airmen's Guide* to prevent both smoking and smokeless tobacco initiation and relapse at a one-year follow-up.

METHODS

Design The current study is a three-armed group randomized trial. Airmen were randomized to either (1) *The Airmen's Guide to Remaining Tobacco Free*, (2) *The Airmen's Guide + A Brief Face to Face Individual Intervention*, or (3) NCI's *Clearing the Air*¹⁶, as an interventional minimal intervention control group. The primary dependent variables are both point prevalence abstinence at a one-year follow-up following a forced tobacco use cessation of 8.5 weeks during BMT. Out of logistical necessity and to reduce potential intervention contamination, Airmen were randomly assigned at the squadron level, rather than the individual level, on a weekly basis. A block randomization scheme was used to assign the Airmen from 1 out of 4 squadrons to the Standard intervention, 2 out of 4 to the Targeted Guide intervention and 1 out of 4 to the Face-to-Face intervention. The ratio of Targeted Guide to Face-to-Face is 2:1 to facilitate actual delivery of the more labor-intensive latter intervention.

Intervention Development: *Airman's Guide to Remaining Tobacco Free* (aka Targeted Guide). Although the original intent was to modify an existing, validated *Forever Free* booklets^{7,8,11-14,17-19} to adapt them for use with military personnel, we soon recognized that young military recruits who were experiencing forced tobacco abstinence would require substantially different messages and format than had been shown efficacious for older civilian smokers who had voluntarily quit smoking^{11,12}. Tobacco products (along with alcohol and snack food) are banned during the 8½-week period of Basic Military Training, where Airmen learn skills (e.g., saluting, marching in formation) that all members of the Air Force must know. They then graduate to Technical (Advanced) Training where they learn the job skills need to perform their duties in their

permanent job assignment (e.g., aircraft mechanic, para-rescue). Airmen are tobacco free for another 4 weeks and the scrutiny is such that it is virtually impossible to violate this ban.

Unlike the general population of smokers whose relapse risk tends to diminish monotonically over time, Airmen have four distinct “high risk” tobacco relapse/initiation periods (identified via formative assessment): (1) The first the first time they are allowed to use tobacco, approximately four weeks after the start of Technical Training; (2) first leave after graduating from Technical Training School (time varies depending on the training school) ; (3) first duty station (the first Air Force Base they are assigned for permanent duty) and (4) if and when they deploy outside the continental US¹⁷.

Based on the unique characteristics of military recruits and their smoking patterns, we developed new targeted intervention material for this population. The guiding principles underlying the intervention were derived from the Theory of Planned Behavior¹⁸ and Relapse Prevention Theory¹⁹. Formative work was conducted to initially come up with content areas and then the *Airmen’s Guide* was pilot tested, refined, redesigned, and pilot tested again. The intervention development work was conducted over an entire year. Details regarding the intervention development and validation can be found elsewhere²⁰. The resultant booklet, tailored to Airmen and their unique relapse risks, was arranged in a flip-book style. Finally, we received permission from the Air Force Branding Office (Air Force Personnel Center) to use the Air Force “wings” logo on the finalized booklet with the intent of enhancing perceived credibility of the intervention. To our knowledge, this booklet is the only civilian-generated material that has ever been allowed to use the Air Force logo. A copy of the *Airman’s Guide* can be found on at <http://www.uthsc.edu/airmansguide>.

Procedure: Airmen were initially seen following 8½ weeks of tobacco and alcohol abstinence in Basic Military Training. Following a quid pro quo brief alcohol intervention (which we conduct to get access to Airmen to discuss research studies), Airmen were asked to participate in the study. The study was described and those agreeing to participate were read the consent form, and then each participant signed and dated two copies of the written consent.

Participants were 6,914 Airmen who were being trained in Technical Training. Following a brief discussion, the *Airmen's Guides* were distributed to Airmen with instructions regarding the most important times to read it (per the four risk situations above). Participants in all conditions first received a very brief group intervention, pointing out important sections of the manual and conducting a brief (3-5 minute motivational interviewing based tobacco initiation/re-initiation session (recall that all Airmen at that time were tobacco free). Those assigned to the *Clearing the Air* condition received copies of the brochure with instructions to read the materials when they were tempted to use or re-use tobacco¹⁶. Finally, those randomized to the *Airmen's Guide* + Face to Face condition were given the *Airmen's Guide* (with the same instructions as above). For those assigned to the Face to Face intervention, they also were scheduled to have a brief, 20-minute face-to-face intervention that focused on either preventing smoking initiation or resuming tobacco use, depending on their baseline tobacco status.

Measures

Demographic Information. At baseline, participants provided information on sex, marital status, income, rank, years of education, and ethnicity.

Tobacco Use. At baseline and the one year follow-up, Airmen provided information about the frequency of cigarette and ST use. At baseline, because Airmen were surveyed during a period of

forced abstinence, Airmen were asked to report their tobacco use prior to Basic Military Training (BMT). Response categories ranged from “Never,” “Quit prior to BMT,” “Less than monthly,” “Monthly,” “Weekly,” to “Daily.” Regular use of a tobacco product was defined as at least monthly use of the product, as this is a common definition of regular tobacco use in young adults^{21,22}. Participants reporting tobacco-use less than monthly were considered seldom users.

Statistical Analysis

To reduce the possibility of contamination, squadrons (the Air Force equivalent of Army platoons) were randomized instead of Airmen. Squadrons eat, train, and sleep together so the possibility of contamination was very high. However, since the unit of assignment was at the squadron level while the unit of analysis was individual Airmen cigarette and ST use, we calculated the Intra Class Correlation (ICC) for both cigarette use and ST. The resulting ICCs were trivial or nearly zero; therefore we treat it as individually randomized.

All of the analyses were performed with SAS/STATv14.2. We conducted Intention to Treat (ITT) analysis by including all subjects from the baseline and creating non-response weight at the 12-months to account for loss to follow-up; therefore no participants were excluded from the analysis. Specifically, we calculated sampling weight to adjust for non-response assuming missing at random mechanism based on comparison of completers and non-completers.

Descriptive statistics for demographics and outcomes of interests consisted of frequencies and proportions. Comparison of these proportions by intervention group and response status were performed with a chi-square test. In order to test the associations between the intervention group and the main outcome rates for use of cigarettes and ST, we first performed unadjusted logistic regression (data not shown). We then extended that model to include adjustments for demographics (gender, age, race, ethnicity, marital status and education). We also tested the

interactions between intervention group assignment and time (viz., the first phase of recruitment vs. the second phase of recruitment) due to univariate indications that impact of intervention differed over time. That is, while Airmen were part of the study out to a 12-month follow-up, recruitment occurred for a total of three years. Thus, the interaction tested compared the first half of intervention implementation (the first 18 months) with the second half of intervention implementation (the second 18 months), given that preliminary univariate results suggested a change in the patterns of outcome over time. Finally, we assessed the impact of the interventions separately on the baseline users and non-users.

We applied the same model for subgroups of product users and non-users at baseline, as well as by time. We report relative odds and their 95% confidence intervals to present the magnitude of the association and level of uncertainty. All associations were considered significant at the alpha level of 0.05.

Results

Approach to Analyses: Given that there were two significant (though not large in magnitude and likely due to large sample) demographic baseline differences between the study arms (age and education), we conservatively adjusted our statistical models to control for these.

Demographics: Table 1 presents the demographics of the overall sample. Close to three-fourths of the participants were male (72.7%), over a third were 21 or older (37.1%), two out of three were White Non-Hispanic (67.7%), and little over 10% were married. The three intervention conditions were similar in demographics with the exception of age and education, with booklet and booklet plus face to face have slightly higher proportion of participants older than 21 and with more than high school education.

Characteristics of Responders versus Non-Responders: Table 2 presents the baseline characteristics of those we were able to obtain at one-year follow-up data (responders) versus those that either dropped out of the study or who could not be located at follow-up (non-responders). Marital status and race distribution were significantly but not meaningfully different between the two groups, suggesting random drop out.

Impact of the Interventions on Cigarette and ST Use Overall and for Baseline Users and Non-users: Table 3 presents the impact of the intervention on cigarette and smokeless tobacco users overall and then by baseline use/non-use status. In terms of the impact of the intervention on cigarette resumption/relapse, the results indicate lower but non-significant odds of tobacco use for booklet and booklet plus face to face compared to control condition. Similar overall findings were observed for cigarette and smokeless tobacco users and non-users at baseline. Based on univariate results (see detail above) we then tested the interaction term between the intervention and two time periods (1st phase of study implementation, 18 months, vs. the second phase of study implementation). Interaction was significant for both cigarette and ST outcomes. Results are summarized in Table 4.

Simplified models by time indicate significantly reduced odds of cigarette use for the later time period). Both *Airmen's Guide* alone (aOR=0.58; 95% CI 0.45-0.76; $p<0.0001$) and *Airman's Guide* + Face-To-Face (aOR=0.57; 95% CI 0.40-0.79; $p=0.001$) showed over 40% reduction in odds of cigarette use compared to the control condition. Overall, 21.1% of those in the *Clearing the Air* condition were smoking at one-year follow-up compared with 13.7% and 13.1% for *Airmen's Guide* and the *Airmen's Guide* + Face to Face, respectively. There was not a significant difference between the *Airmen's Guide* versus the *Airmen's Guide* + Face to Face. The magnitude was even more dramatic for cigarette users at baseline with 58% and 65%

reduction in odds or re-initiation for booklet and booklet with face time, respectively (74.5% vs. 55% vs. 50% use for *Clearing the Air*, the *Airmen's Guide*, and *Airmen's Guide + Face to Face* respectively). For non-users at baseline the odds of initiation were also significantly lower, with over 40% reduction of cigarette use for booklet plus face-top-face, and approximately 30% reduction in use for booklet alone (13.4, 10.1, 8.2% for *Clearing the Air*, the *Airmen's Guide*, and the *Airmen's Guide + Face to Face*, respectively).

For ST, we observed some similar results and trends by time (viz., the interaction between intervention and the 1st vs. 2nd half of study implementation). For the first 18 months of the study, the *Airmen's Guide + Face to Face* significantly reduced the odds of use by little over 20% (aOR=0.78; 95% CI 0.61-0.99; p=0.0451) compared to *Clearing the Air* group respectively. No associations were detected by baseline use at that time point. For the second phase (i.e., the following 18 months) the *Airmen's Guide* alone was associated with approximately 35% reduced odds of ST use (aOR=0.66; 95% CI 0.48-0.89; p=0.0084) compared to *Clearing the Air* group respectively. Similarly, for non-ST users at baseline booklet alone reduced the odds of initiation by almost 40%. Overall, 15.9% of those assigned to *Clearing the Air* reported using ST at the one-year follow-up with compared to 10.1% for the *Airmen's Guide* condition and the 15.9% for the *Airmen's Guide* plus Face to Face condition

Discussion

Overall, across the full three years of study implementation, the impact of the *Airmen's Guide* pamphlet and the *Airmen's Guide* plus Face-to-Face interventions were not significantly more effective at reducing rates of cigarettes and smokeless tobacco at a one-year follow-up compared to the control condition. However, the impact of the intervention significantly increased over time. Although not significantly effective in the first 18 months of study implementation, during

the second phase of implementation (i.e., the following 18 months), there was, in fact, a large and highly clinically significant impact on reduced rates of cigarette and smokeless tobacco use at follow-up.

Specifically, during the second phase of study implementation, for cigarette users at baseline, there was a 58% and 65% reduced rate of re-initiation of cigarettes for those receiving *Airmen's Guide* and *Airmen's Guide* plus face-to-face intervention, respectively (74.5% vs. 55% vs. 50% use for *Clearing the Air*, the *Airmen's Guide*, and *Airmen's Guide + Face to Face* respectively). For Airmen who had never used cigarettes at baseline, those who received the *Airmen's Guide* pamphlet had 40% reduced odds of initiating and those receiving the pamphlet plus face-to-face intervention had 30% reduced odds of initiating (13.4% vs. 10.1% vs. 8.2 for *Clearing the Air*, the *Airmen's Guide*, and *The Airmen's Guide + Face to Face*, respectively) . Similarly, in the second phase of the study (i.e., last 18 months), although these interventions did not significantly reduce re-initiation rates for smokeless tobacco users at baseline, there was significantly reduced rates among never users. The *Airmen's Guide* pamphlet reduced initiation of smokeless tobacco rates by 40% among baseline never users (9.8% vs. 6.2% vs. 7.1% for *Clearing the Air*, the *Airmen's Guide*, and *Airmen's Guide + Face to Face*, respectively).

Current results suggest that the *Airmen's Guide* pamphlet was effective at reducing cigarette and smokeless tobacco rates in the last 18 months of the study, having an impact on both initiation and re-initiation. Findings extend previous literature of *Forever Free* cessation pamphlets, which reduced relapse rates among cigarette users¹¹⁻¹³. However, these previous studies were implemented among former smokers, and were not targeting prevention among never users¹¹⁻¹³. Additionally, current findings are dissimilar from previous studies of cessation programs implemented during Air Force basic military training, which reduced re-initiation but

not initiation of cigarettes and smokeless tobacco at a one-year follow-up^{7,8}. Finally, it is important to point out that we recruited tobacco users universally and not necessarily those wanting to stay tobacco free. Thus, while one must be cautious given the lack of intervention effects in the first half of recruitment, these results are encouraging and call for replication and perhaps extension to other tobacco products (e.g., e-cigarettes, which has been shown to be a gateway product for cigarette onset)²³.

Thus, outcomes from the current study suggest that the *Airmen's Guide* was uniquely effective at targeting never users of these tobacco products, at least in the second half of the three year trial. Previous programs^{7,8} implemented cognitive behavioral components in an interview during the military tobacco ban among recruits. *Forever Free* pamphlets included self-help booklets mailed to participants over a year¹¹⁻¹³. Dissimilarly from these interventions, *Airmen's Guide* was uniquely tailored to Air Force trainees. Further, both conditions contained a motivational component administered by study counselors. In the *Airmen's Guide* condition, Airmen received motivational components in a group format and those in the *Airmen's Guide* plus face-to-face intervention received these motivational components individually. Thus, perhaps having motivational components, along with tailored cessation information, was effective at reducing tobacco rates, particularly among never users.

The reasons why these interventions only reduced tobacco outcomes during the last 18 months of the study's implementation is unknown. However, there are several possible explanations for this, on both policy and intervention level. There is a documented change in nature of tobacco use in the Air Force with both cigarette smoking and ST use declining^{4,5,24}. Thus, it is possible that Airmen became more receptive to the intervention over time due to decreasing prevalence of these products among fellow Airmen. A second possible reason is that

tobacco policies in the USAF have become more rigorous. A Department of Defense policy⁶ bans smoking in indoor facilities on base. Additionally, a more recent policy requires that the pricing of cigarettes on base match the prevailing local prices (including applicable taxes)²⁵. These policies might have helped decrease rates of products and perhaps making Airmen more receptive to this intervention. While the exact reason(s) for this pattern of results is unknown, the intervention effects observed in the second half of the trial certainly merit further investigation, now that DoD tobacco policies are very rigorous and unlikely to significantly change in the future. Regardless of the reason, it is clear that the pamphlets produced much higher intervention effects than the typical tobacco pamphlet (and the intervention effects rivaled face to face intervention effects).

Given the changing landscape of tobacco use in the U.S.² future studies should focus on alternative tobacco products, not exclusively cigarettes and smokeless tobacco. For example, electronic cigarettes (e-cigarettes) are now the most commonly used product among young adults^{2,28}, and military recruits are typically within this age range. Additionally, e-cigarettes have been found to be more common in military samples compared to the general population^{29,30}, and notably using this product is associated with increased cigarette initiation among young adults in military and civilian populations^{29,31,32}. Indeed, research studies done among US children in middle and high school strongly indicates that e-cigarettes are a “gateway” to the initiation of cigarette smoking in those that had previously never smoked²³. Also, in a manuscript being prepared for publication, e-cigarettes were a gateway drug for later cigarette and other tobacco use in Airmen³³.

Regardless of tobacco product, using tailored and targeted prevention and cessation pamphlets could help address the alarming military tobacco disparity^{4,5,24} and growing epidemic of e-

cigarettes use^{2,29,30,34}. Thus, there is the possibility that military tobacco disparities will continue to increase, particularly for those between the ages of 18 and 21 years. The Department of Defense spends approximately \$1.6 billion a year on tobacco-related medical costs, which significantly impacts military readiness^{36,37}. Given that 250,000 personnel leave the military annually³⁸, current findings can have a vast impact on both military and civilian populations. It is important to note that both the *Airmen's Guide* and the *Airmen's Guide* plus face-to-face lowered cigarette smoking and ST use at the follow-up, but only for those in the second part of the trial. As indicated above, the reason for this is unknown but it is clear that given the magnitude of the intervention effects later in the study, along with the low cost of conducting the intervention, replication and extension of these findings are warranted. Extension to other military branches (e.g., Army) would also be a logical next step.

Another key note for the study is that when significant differences did arise favoring the *Airmen's Guide*, we did not see a consistent pattern of adding a brief (30 minute), face to face, motivational-interviewing-based tobacco cessation/prevention intervention. Perhaps this intervention was too brief to have an impact. Alternatively, the intervention was delivered after the *Airmen's Guide* was distributed and may have had no additional impact as a result.

There are some limitations that are important to address. First, tobacco patterns of Airmen who did not consent to the study are unknown. Further, this sample only included US Air Force trainees, thus, generalizability to other military branches might be limited. However, this study had several notable strengths. First, this study provided a unique opportunity to disseminate tobacco-cessation pamphlets to a large, young adult military sample, diverse in race and educational backgrounds. Further, because the US military has an alarming tobacco disparity

compared to civilians³⁻⁵, this is a population in which tobacco cessation is crucial. Finally, ST and cigarette use were both longitudinally observed across a one-year follow-up.

Conclusion

Current findings suggest that a cost-effective tobacco-cessation pamphlet, by itself or in combination with brief motivational components, was effective at reducing rates of cigarettes and smokeless tobacco in the US military during the final year and a half of the study's implementation. Although the intervention was not initially effective, this community-based intervention provided evidence that disseminating these tobacco cessation materials was sustainable, and increasingly effective in showing large effects for reduced rates of both cigarette smoking and smokeless tobacco use. Given the tobacco disparity in the US military, tobacco-cessation interventions tailored to the specific needs of this population might be crucial at reducing high rates of cigarettes and smokeless tobacco use. Further study of this cost-effective method to reduce other tobacco use such as e-cigarettes is clearly warranted.

Table 1. Sample demographics overall and by intervention arm.

%	Overall (N=6,914)	Clearing the Air (N=1,995)	Airmen's Guide (N=3,382)	AG + FtF/Rx (N=1,537)	<i>p</i> -value
Male	72.7	74.2	71.9	72.2	0.1714
Age >=21	37.1	33.3	39.1	37.9	0.0001
Hispanic	16	14.8	16.7	16	0.1914
Married	10.8	11.1	10.9	10.1	0.5806
>HS	45.8	42.1	47.2	47.6	0.0004
Race					0.5519
W NH	67.7	69.1	67.4	66.8	
AA NH	14.3	13.6	14.7	14.4	
Other	18	17.3	17.9	18.9	

FtF/Rx = Face to Face Intervention

Table 2. Characteristics of those who were reached at the follow-up vs those that were not.

%	Responders (N=4,314)	Non-responders (N=2,600)	<i>p</i> -value
Male	72.5	73	0.636
Age >=21	37.9	36	0.1182
Hispanic	15.4	17	0.0796
Married	11.8	9.2	0.0009
>HS	46.3	45.1	0.36
Race			0.0256
W NH	68.8	65.9	
AA NH	13.6	15.5	
Other	17.6	18.6	

Table 3. Adjusted¹ regression models of point prevalence/continuous abstinence cigarette and ST use at 1-year follow-up for the overall cohort, and by the respective product use and non-use at baseline*.

<u>Impact of the Intervention Overall (All Tobacco Categories Combined)</u>								
	Cigarette Smoking (N=6,904)				Smokeless Tobacco Use (N=6,905)			
	Use at 1 Year %	OR	95% CI	p-Value	Use at 1 Year %	OR	95% CI	p-Value
<i>Clearing The Air</i>	22	1			15.4	1		
AG Pamphlet	20.8	0.93	0.81-1.07	0.315	14.4	0.95	0.81-1.12	0.5141
AG Pamphlet + FtF/Rx	21.1	0.96	0.81-1.13	0.597	13.4	0.87	0.71-1.06	0.1603
<i>Treatment*time interaction p<0.0001</i>								
<u>Impact of the Interventions on Users at Baseline</u>								
	Cigarette Smoking (N=875)				Smokeless Tobacco Use (N=628)			
	Use at 1 Year %	OR	95% CI	p-Value	Use at 1 Year %	OR	95% CI	p-Value
<i>Clearing The Air</i>	70.5	1			72.4	1		
AG Pamphlet	69.5	0.93	0.66-1.31	0.6665	72	0.85	0.56-1.29	0.4549
AG Pamphlet + FtF/Rx	67.7	0.91	0.61-1.36	0.6425	71.3	0.86	0.52-1.43	0.5594
<u>Impact of the Interventions on Non-Users at Baseline</u>								
	Cigarette Smoking (N=6,029)				Smokeless Tobacco Use (N=6,277)			
	Use at 1 Year %	OR	95% CI	p-Value	Use at 1 Year %	OR	95% CI	p-Value
<i>Clearing The Air</i>	13.9	1			8.9	1		
AG Pamphlet	14.4	1.05	0.88-1.24	0.6229	8.7	0.97	0.78-1.19	0.7745
AG Pamphlet + FtF/Rx	14.3	1.04	0.84-1.28	0.7133	8.2	0.92	0.71-1.19	0.5246
<i>*Adjusted for gender, age, race, ethnicity, marital status and education. AG=Airman's guide</i>								

Table 4. Adjusted1 regression models of cigarette and ST use at 1-year follow-up for the significant interaction by time (first vs second half of the intervention).

Impact of the Intervention Overall (All Tobacco Categories Combined)																
	Cigarette Smoking								Smokeless Tobacco Use							
	1 st 18 Months (N=4,334)				2 nd 18 Months (N=2,570)				1 st 18 Months (N=4,335)				2 nd 18 Months (N=2,570)			
	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value
<i>Clearing The Air</i>	22.5	1			21.1	1			15.7	1			14.8	1		
<i>Airman's Guide</i>	24.7	1.14	0.97-1.34	0.1083	13.7	0.58	0.45-0.76	<0.0001	16.8	1.1	0.91-1.33	0.3483	10.2	0.66	0.51-0.86	0.0001
<i>AG + FtF/Rx</i>	24.6	1.15	0.95-1.39	0.1625	13.1	0.57	0.40-0.79	0.001	12.4	0.78	0.61-0.99	0.0451	15.9	1.08	0.85-1.37	0.0001
<i>Treatment*time interaction p<0.0001</i>																
Impact of the Interventions on Users at Baseline																
	Cigarette Smoking								Smokeless Tobacco Use							
	1 st 18 Months (N=640)				2 nd 18 Months (N=235)				1 st 18 Months (N=425)				2 nd 18 Months (N=155)			
	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value
<i>Clearing The Air</i>	69	1			74.5	1			76.1	1			62.9	1		
<i>Airman's Guide</i>	74.1	1.19	0.79-1.79	0.398	55	0.42	0.21-0.83	0.0123	74.7	0.81	0.49-1.36	0.4293	64.7	0.99	0.77-1.27	0.93
<i>AG + FtF/Rx</i>	74.4	1.33	0.81-2.17	0.2614	50	0.35	0.16-0.76	0.0076	65.9	0.6	0.31-1.15	0.1209	77.8	1.85	1.45-2.38	0.0001
Impact of the Interventions on Non-Users at Baseline																
	Cigarette Smoking								Smokeless Tobacco Use							
	1 st 18 Months (N=3,694)				2 nd 18 Months (N=2,335)				1 st 18 Months (N=3,910)				2 nd 18 Months (N=2,570)			
	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value	Use at 1 Year %	OR	95% CI	p-value
<i>Clearing The Air</i>	14.1	1			13.4	1			8.6	1			9.8	1		
<i>Airman's Guide</i>	16.9	1.25	1.01-1.54	0.0369	10.1	0.71	0.51-0.98	0.0369	10.1	1.18	0.91-1.52	0.2077	6.2	0.61	0.46-0.81	0.0001
<i>AG + FtF/Rx</i>	16.9	1.26	0.99-1.61	0.0607	8.2	0.57	0.37-0.88	0.0108	8.6	1.02	0.76-1.39	0.8794	7.1	0.71	0.54-0.94	0.0001
<i>*Adjusted for gender, age, race, ethnicity, marital status and education. AG=Airman's guide</i>																

Bibliography

1. U.S. Department of Health and Human Services. *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General.*; 2014.
2. Wang TW, Asman K, Gentzke AS, Cullen KA, Holder-Hayes E, Reyes-Guzman C, Jamal A, Neff L, King BA. Tobacco Product Use Among Adults - United States, 2017. *MMWR Morb Mortal Wkly Rep.* 2018;67(44):1225-1232. doi:10.15585/mmwr.mm6744a2
3. Agaku IT, King BA, Husten CG, Bunnell R, Ambrose BK, Hu SS, Holder-Hayes E, Day HR, Centers for Disease Control and Prevention (CDC). Tobacco product use among adults--United States, 2012-2013. *MMWR Morb Mortal Wkly Rep.* 2014;63(25):542-547.
4. Barlas FM, Higgins WB, Pflieger JC, Diecker K. *2011 Health Related Behaviors Survey of Active Duty Military Personnel.* OSD or Non-Service DoD Agency; 2013.
doi:10.21236/ADA582287
5. Little MA, Derefinko KJ, Bursac Z, Ebbert JO, Colvin L, Talcott GW, Hryshko-Mullen AS, Richey PA, Klesges RC. Prevalence and correlates of tobacco and nicotine containing product use in a sample of united states air force trainees. *Nicotine Tob Res.* 2016;18(4):416-423. doi:10.1093/ntr/ntv090
6. Truth Initiative. Smoking in the military. Truth Initiative.
<https://truthinitiative.org/research-resources/targeted-communities/smoking-military>.
Published June 11, 2018. Accessed March 9, 2020.
7. Klesges RC, Haddock CK, Lando H, Talcott GW. Efficacy of forced smoking cessation and an adjunctive behavioral treatment on long-term smoking rates. *J Consult Clin Psychol.* 1999;67(6):952-958. doi:10.1037/0022-006X.67.6.952

8. Klesges RC, DeBon M, Vander Weg MW, Haddock CK, Lando HA, Relyea GE, Peterson AL, Talcott GW. Efficacy of a tailored tobacco control program on long-term use in a population of U.S. military troops. *J Consult Clin Psychol*. 2006;74(2):295-306. doi:10.1037/0022-006X.74.2.295
9. Amadeo K. Defense Department: What It Does and Its Impact. *The Balance*. February 2020. <https://www.thebalance.com/department-of-defense-what-it-does-and-its-impact-3305982>. Accessed March 9, 2020.
10. Hess AEM. The 10 largest employers in America. *USA Today*. <https://www.usatoday.com/story/money/business/2013/08/22/ten-largest-employers/2680249/>. Published August 22, 2013. Accessed March 9, 2020.
11. Brandon TH, Meade CD, Herzog TA, Chirikos TN, Webb MS, Cantor AB. Efficacy and cost-effectiveness of a minimal intervention to prevent smoking relapse: dismantling the effects of amount of content versus contact. *J Consult Clin Psychol*. 2004;72(5):797-808. doi:10.1037/0022-006X.72.5.797
12. Brandon TH, Collins BN, Juliano LM, Lazev AB. Preventing relapse among former smokers: A comparison of minimal interventions through telephone and mail. *J Consult Clin Psychol*. 2000;68(1):103-113. doi:10.1037/0022-006X.68.1.103
13. Brandon TH, Simmons VN, Sutton SK, Unrod M, Harrell PT, Meade CD, Craig BM, Lee J-H, Meltzer LR. Extended Self-Help for Smoking Cessation: A Randomized Controlled Trial. *Am J Prev Med*. 2016;51(1):54-62. doi:10.1016/j.amepre.2015.12.016
14. Agboola S, McNeill A, Coleman T, Leonardi Bee J. A systematic review of the effectiveness of smoking relapse prevention interventions for abstinent smokers. *Addiction*. 2010;105(8):1362-1380. doi:10.1111/j.1360-0443.2010.02996.x

15. Hartmann-Boyce J, Lancaster T, Stead LF. Print-based self-help interventions for smoking cessation. *Cochrane Database Syst Rev.* 2014;(6):CD001118.
doi:10.1002/14651858.CD001118.pub3
16. National Cancer Institute. *Clearing the Air: Quit Smoking Today.* NIH-Publication No. 11-1647. Bethesda, Maryland: National Institutes of Health, US Department of Health and Human Services; 2011. <https://www.cancer.gov/publications/patient-education/clearing-the-air>. Accessed October 9, 2019.
17. Talcott GW, Cigrang J, Sherrill-Mittleman D, Snyder DK, Baker M, Tatum J, Cassidy D, Sonnek S, Balderrama-Durbin C, Klesges RC, Ebbert JO, Slep AM, Heyman RE. Tobacco use during military deployment. *Nicotine Tob Res.* 2013;15(8):1348-1354.
doi:10.1093/ntr/nts267
18. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process.* 1991;50(2):179-211. doi:10.1016/0749-5978(91)90020-T
19. Witkiewitz K, Marlatt GA. Relapse prevention for alcohol and drug problems: that was Zen, this is Tao. *Am Psychol.* 2004;59(4):224-235. doi:10.1037/0003-066X.59.4.224
20. Brandon TH, Klesges RC, Ebbert JO, Talcott GW, Thomas F, Leroy K, Richey PA, Colvin L. Preventing smoking initiation or relapse following 8.5 weeks of involuntary smoking abstinence in basic military training: trial design, interventions, and baseline data. *Contemp Clin Trials.* 2014;38(1):28-36. doi:10.1016/j.cct.2014.03.001
21. SRNT Subcommittee on Biochemical Verification. Biochemical verification of tobacco use and cessation. *Nicotine Tob Res.* 2002;4(2):149-159. doi:10.1080/14622200210123581
22. Velicer WF, Prochaska JO. A comparison of four self-report smoking cessation outcome measures. *Addict Behav.* 2004;29(1):51-60.

23. Glantz SA, Bareham DW. E-Cigarettes: Use, Effects on Smoking, Risks, and Policy Implications. *Annu Rev Public Health*. 2018;39:215-235. doi:10.1146/annurev-publhealth-040617-013757
24. Meadows SO, Engel CC, Collins RL, Beckman RL, Cefalu M, Hawes-Dawson J, Doyle M, Kress AM, Sontag-Padilla L, Ramchand R, Williams KM. 2015 department of defense health related behaviors survey (HRBS). *Rand Health Q*. 2018;8(2):5.
25. Carter. Policy Memorandum 16-001, Department of Defense Tobacco Policy. April 2016. <http://www.med.navy.mil/sites/nmcphc/Documents/health-promotion-wellness/tobacco-free-living/INCOMING-CARTER-Tobacco-Policy-Memo.pdf>.
26. Glasgow RE, Emmons KM. How can we increase translation of research into practice? Types of evidence needed. *Annu Rev Public Health*. 2007;28:413-433. doi:10.1146/annurev.publhealth.28.021406.144145
27. Glasgow RE, Vinson C, Chambers D, Khoury MJ, Kaplan RM, Hunter C. National Institutes of Health approaches to dissemination and implementation science: current and future directions. *Am J Public Health*. 2012;102(7):1274-1281. doi:10.2105/AJPH.2012.300755
28. McMillen RC, Gottlieb MA, Shaefer RMW, Winickoff JP, Klein JD. Trends in electronic cigarette use among U.S. adults: use is increasing in both smokers and nonsmokers. *Nicotine Tob Res*. 2015;17(10):1195-1202. doi:10.1093/ntr/ntu213
29. Little MA, Derefinko KJ, Colvin L, Ebbert JO, Bursac Z, Talcott GW, Richey PA, Klesges RC. The Prevalence of E-cigarette Use in a Sample of U.S. Air Force Recruits. *Am J Prev Med*. 2015;49(3):402-408. doi:10.1016/j.amepre.2015.02.019

30. King BA, Patel R, Nguyen KH, Dube SR. Trends in awareness and use of electronic cigarettes among US adults, 2010-2013. *Nicotine Tob Res.* 2015;17(2):219-227.
doi:10.1093/ntr/ntu191
31. Bold KW, Kong G, Camenga DR, Simon P, Cavallo DA, Morean ME, Krishnan-Sarin S. Trajectories of E-Cigarette and Conventional Cigarette Use Among Youth. *Pediatrics.* 2018;141(1). doi:10.1542/peds.2017-1832
32. Soneji S. Errors in Data Input in Meta-analysis on Association Between Initial Use of e-Cigarettes and Subsequent Cigarette Smoking Among Adolescents and Young Adults. *JAMA Pediatr.* 2018;172(1):92-93. doi:10.1001/jamapediatrics.2017.4200
33. Klesges RC, Little MA, Wang XQ, Fahey MC, Ebbert J, Halbert JP, Talcott GW. Are e-cigarettes a gateway product for other tobacco use in young adults? A longitudinal investigation in the United States Military. *Nicotine & Tobacco Research.*
34. Soule EK, Rosas SR, Nasim A. Reasons for electronic cigarette use beyond cigarette smoking cessation: A concept mapping approach. *Addict Behav.* 2016;56:41-50.
doi:10.1016/j.addbeh.2016.01.008
35. *Tobacco 21: Legislative Policy Analysis.* ASTHO; 2018.
<http://www.astho.org/ASTHOBriefs/Tobacco-21-Legislative-Policy-Analysis/>. Accessed July 2, 2019.
36. Dall TM, Zhang Y, Chen YJ, Wagner RCA, Hogan PF, Fagan NK, Olaiya ST, Tornberg DN. Cost associated with being overweight and with obesity, high alcohol consumption, and tobacco use within the military health system's TRICARE prime-enrolled population. *Am J Health Promot.* 2007;22(2):120-139. doi:10.4278/0890-1171-22.2.120

37. Department of Defense. Department of Defense Anti-Tobacco Campaign Invades Military Markets. *Fairchild Air Force Base News*. March 2008.
<https://www.fairchild.af.mil/News/Article-Display/Article/240472/departement-of-defense-anti-tobacco-campaign-invades-military-markets/>. Accessed March 9, 2020.
38. Chairman's Office of Reintegration, ed. *Enabling Collaborative Support to Reintegrate the Military Family*.; 2014.
https://www.jcs.mil/Portals/36/Documents/CORE/141103_Enabling_Collaborative_Support.pdf. Accessed March 9, 2020.