Dual and Polytobacco Use After A Period of Enforced Tobacco Cessation

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Introduction

Tobacco use remains a grave public health concern, with 14.0% of the United States population using cigarettes, 2.1% using smokeless tobacco, 1.0% using hookah, and 2.8% using e-cigarettes (Wang et al., 2017). Prevalence is higher among military personnel for many of these products. In the Air Force, approximately 5.9% of Airmen (called such regardless of sex or gender identity) use cigarettes, 2.1% use smokeless tobacco, 2.2% use hookah, and 15.3% use electronic cigarettes (e-cigarettes; Little et al., under review). The military employs almost 3 million individuals (Defense Manpower Data Center [DMDC], 2019), and many service members continue their tobacco use in their civilian lives after separating from the military. Given the high prevalence of tobacco use among military personnel, understanding patterns of tobacco use is a public health priority.

Airmen have a unique opportunity to be free of tobacco since they experience a tobacco ban during the eight weeks of Basic Military Training (BMT) and during the first four weeks of Technical Training, which is the training to learn the specific skills related to their jobs. This means that newly enlisted Airmen undergo an enforced tobacco ban for a total of 12 weeks. Past studies have shown that more than half of Airmen who smoked cigarettes before training re-initiated smoking after the ban was lifted (Little et al., 2019), and that 7.9% of smokeless tobacco users re-initiated use after the ban (Dunkle et al., 2019). However, these studies focused on monoproduct use rather than multiproduct use.

Previous studies have also shown that individuals who experience a smoking ban at work or at home had increased reductions in the number of cigarettes smoked (Borland et a., 1990) and higher smoking cessation rates (Longo et al., 2001; Pizacani et al., 2012; Sorsensen, et al., 1991).

However, these studies also assess monoproduct use rather than multiproduct use. It remains unclear as to how a period of enforced tobacco cessation impacts dual and polytobacco use.

The current study aimed to assess tobacco product use after an enforced tobacco ban among Airmen who were dual or polytobacco users as civilians, prior to military training. Specifically, we aim to assess changes in the number of products used and frequency of product use among individuals who were dual or polytobacco users before BMT. Based on previous literature examining enforced bans, we expected that many Airmen would have quit using tobacco products entirely after the ban was lifted, while other Airmen who continued to use tobacco would use less frequently or would be using fewer products.

Methods

Participants and Procedures

Participants were Airmen at five Technical Training Air Force bases recruited between March of 2016 and April of 2019 as part of a study assessing tobacco initiation/re-initiation among military personnel. During the first week of Technical Training, 34,792 trainees were given information related to the study, and consent and HIPPA forms were signed in accordance with 59th Medical Wing Institutional Review Boards requirements. Consented participants ($N = $ 29,984; 86.2% consent rate) completed surveys at baseline and then 14,378 were randomly selected for completion of a follow-up survey one year later, which were administered via telephone and electronically to non-respondents. Trainees were not allowed to participate if they were under the age of 18, and were not eligible for the follow-up survey if they were overseas, separated from the military, or incarcerated ($n = 4,032$). A total of 9,147 participants completed the one-year follow-up. Participants were included in these secondary analyses ($n = 715$) if they

reported dual or poly-use at baseline (9.33% of the sample). All study procedures were approved by the 59th Medical Wing Institutional Review Boards.

Measures

Airmen completed self-report measures asking about tobacco products they used before and after BMT (*cigarettes*, *smokeless*, *snus*, *cigars*, *cigarillos*, *pipes*, *e-cigarettes*, *hookah*, and *roll your own cigarettes*). Additionally, participants were asked how often they used each product (*less than monthly*, *monthly*, *weekly*, *daily*).

Data Analysis

Tobacco frequency scores were calculated for baseline and follow-up. Each product used by a participant was assigned a frequency score (1 = *less than monthly*, 2 = *monthly*, 3 = *weekly*, 4 = *daily*). The frequency scores of each product used for each participant were summed to create a total frequency score, because decreases in the number of products used may not be harm reduction if the participant increased the frequency of use in a single product, for example. Change scores were then calculated by determining the difference between baseline and follow-up frequency scores. This allowed for consideration of intensity of product use in addition to the number of products used. Participants were also assigned to a category based on their change score (i.e., increased product use over time, no change in product use over time, decreased product use over time).

Descriptive statistics were then calculated to determine changes in frequency scores and the number of products used over time in the overall sample as well as among dual and polytobacco users separately. Tobacco frequency score and the categorical change were compared between dual and poly users using t-tests and Chi-squared tests, respectively, adjusting for clustering effects by squadron and base.

Results

Participant Characteristics

Demographic characteristics are shown in Table 1. Participants were 86.6% male, 80.1% White, 7.7% Black, 13.7% Hispanic/Latinx, 61.9% did not have a college degree, and 91.3% were living alone. The mean age was 20.2 years ($SD = 2.5$). Approximately 57.7% were dual users at baseline and 42.3% were polytobacco users. Polytobacco users had significantly higher frequency scores at baseline ($Mdn_{poly} = 11$; $Mdn_{dual} = 7$) and follow-up ($Mdn_{poly} = 4$; $Mdn_{dual} = 3$).

Changes in Tobacco Use Over Time

Among both dual and polytobacco users, most participants reduced the number of tobacco products used (displayed in Figure 1 and Table 2), although there were still significant differences in the number of products used at follow-up by baseline dual and polytobacco users, adjusting for clustering of Airmen in their respective squadrons and bases ($p = .04$). Among baseline dual users, 38.2% quit using tobacco products, 43.1% became mono-users, 14.1% remained dual users, and 4.6% became polytobacco users (see Table 3). Among baseline polytobacco users, 30.2% quit using tobacco products, 43.1% became mono-users, 19.3% became dual users, and 8.0% continued using more than two tobacco products (see Table 3).

Table 2 also displays frequency scores. At one-year follow-up, 90.0% of the sample had a decrease in their frequency scores, 3.4% saw no change, and 6.6% increased their use. Dual ($Mdn = 4$) and polytobacco ($Mdn = 7$) users were significantly different in their change scores ($p < .001$), although most participants in each group experienced decreases. Within dual users, 86.4% decreased their frequency scores, 4.1% saw no change, and 9.5% increased their use. Within polytobacco users, 95.0% decreased their frequency scores, 2.3% saw no change, and 2.7% increased their tobacco use.

Discussion

The current study examined dual and polytobacco users' changes in product use over time after an enforced tobacco ban. Impressively, most participants (90.0%) decreased their tobacco use regardless of baseline dual or polytobacco use. While polytobacco users had significantly higher frequency scores at both baseline and follow-up, the gap between dual and polytobacco users closed over time. Dual and polytobacco users saw only a one point difference in their follow-up frequency scores, indicating that their level of use was almost equal after the enforced ban. Additionally, most participants reduced the number of products used, indicating the enforced tobacco ban is an effective harm reduction strategy for the military.

It is also important to note that dual users saw a 38.2% cessation rate and polytobacco users saw a 30.2% cessation rate, which are much higher than past-year quit rates among the general population (7.5%; Creamer et al., 2019). While most civilians do not encounter such prolonged tobacco bans, there are places in which individuals are not permitted to smoke or use tobacco products, such as workplaces, restaurants, and schools or college campuses. Tobacco cessation rates in the current study are also much higher than cessation rates reported in other studies of enforced tobacco bans in civilian locations such as home or non-military workplace, although these studies have typically focused on only one tobacco product (e.g., cigarettes). One study examining home smoking bans found a 14.7% cessation rate (Pizacani et al., 2012), while another study examining workplace smoking bans found a 21% cessation rate (Sorsensen, et al., 1991). The fact that cessation rates in the current study were higher despite the use of more tobacco products is promising. It may be the case that having an enforced ban during more of the day or in more locations, rather than when inside the home or at work during certain hours, increases cessation rates.

Strengths and Limitations

Strengths of the current study include the use of a large, diverse sample and accounting for frequency of use of different tobacco products as well as the number of products. While the results from the current study are promising, an important consideration is that past studies found that these cessation rates were not sustained long-term, with relapse rates similar to individuals who did not experience a ban (Longo et al., 2001), and the current study only followed up with participants at one year. Future research may benefit from following individuals longer to determine if these decreases are lasting, or if there are shifts in use as time goes on.

Conclusions

The current study demonstrated that tobacco bans are effective for tobacco cessation over time, even among dual and polytobacco users. Additionally, tobacco bans can reduce the number of products use and the frequency of use, and they may be an effective harm reduction strategy. Thus, tobacco bans may be an effective way to promote tobacco cessation, and having policies in place to restrict tobacco use (e.g., in public areas) may help to further reduce the burden of tobacco-related problems.

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Figure 1. *Changes in Tobacco Products Used from Baseline to Follow-Up After an Enforced Tobacco Ban*
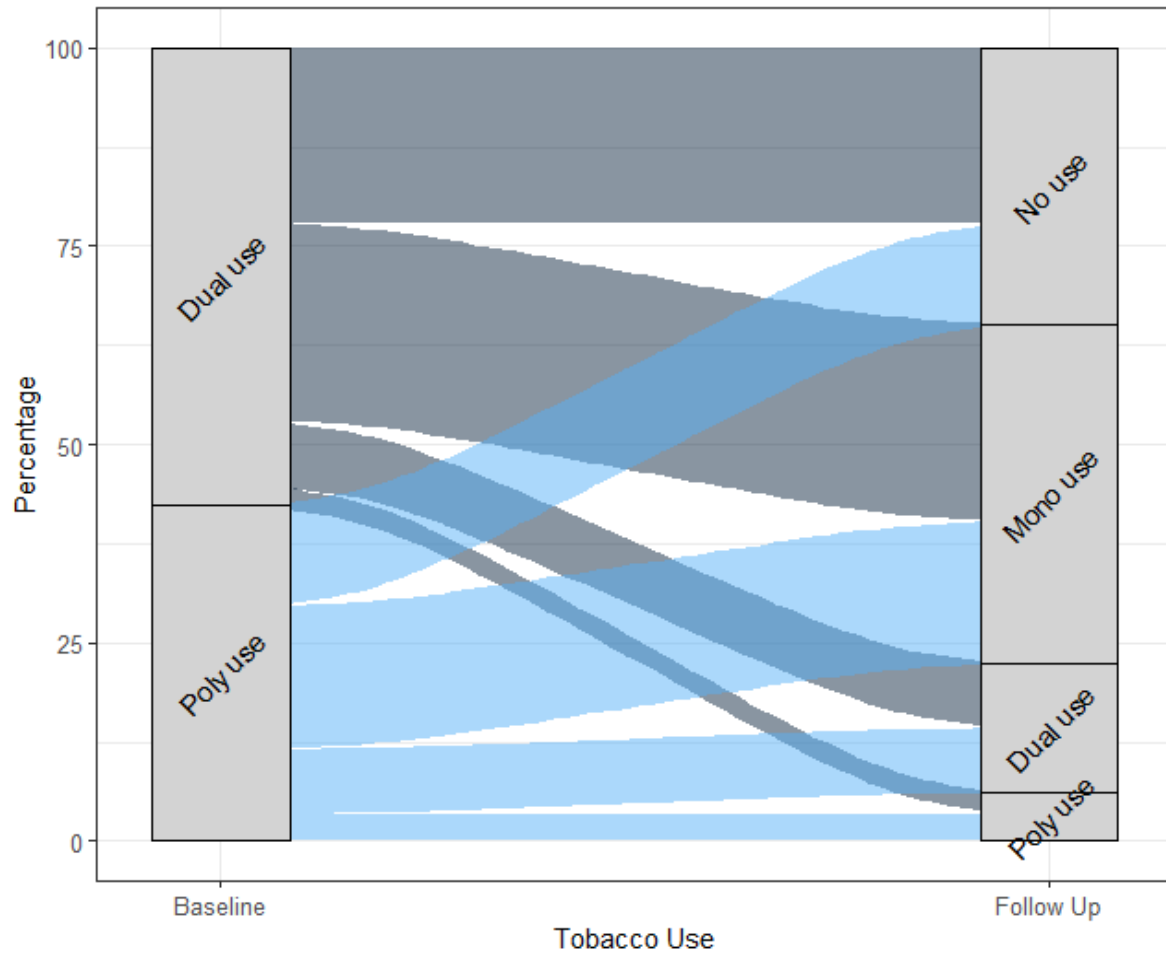
Table 1. *Participant Characteristics*

	Overall	Dual users	Poly users
	N (%)	*N (%)*	*N (%)*
Gender			
Male	615 (86.6%)	346 (84.2%)	269 (90.0%)
Female	95 (13.4%)	65 (15.8%)	30 (10.0%)
Race			
Other	38 (5.3%)	24 (5.8%)	14 (4.7%)
Black or African American	55 (7.7%)	37 (9.0%)	18 (6.0%)
White	571 (80.1%)	319 (77.2%)	252 (84.0%)
More than one race	49 (6.9%)	33 (8.0%)	16 (5.3%)
Ethnicity			
Hispanic/Latinx	96 (13.7%)	53 (13.1%)	43 (14.5%)
Not Hispanic/Latinx	607 (86.3%)	353 (87.0%)	254 (85.5%)
Marital status			
Living alone	652 (91.3%)	368 (89.3%)	284 (94.0%)
Married/Living as married	62 (8.7%)	44 (10.7%)	18 (6.0%)
Education			
High school diploma/GED	439 (61.9%)	246 (60.2%)	193 (64.3%)
Some college or higher	270 (38.1%)	163 (39.9%)	107 (35.7%)
Tobacco Use Status at Baseline			
Dual	413 (57.8%)	-	-
Poly	302 (42.2%)	-	-
	M (SD)	*M (SD)*	*M (SD)*
Age	20.2 (2.5)	20.4 (2.8)	19.8 (2.0)

Table 2. *Frequency Scores, and Change Scores at Baseline and Follow-Up*

	Dual User	Polytobacco User	Overall	*p*
	Median	**Median**		
Baseline	7	11	-	< .0001
Follow-up	3	4	-	0.004
	N (%)	*N (%)*	*N (%)*	
Change over time				< .0001
Decreased	355 (86.4%)	286 (95.0%)	641 (90.0%)	
No change	17 (4.1%)	7 (2.3%)	24 (3.4%)	
Increased	39 (9.5%)	8 (2.7%)	47 (6.6%)	

Note. P values represent differences between dual and polytobacco users.

Table 3. *Changes in Number of Products Used Over Time*

	Follow-up Tobacco use			
	Quit	**Mono-use**	**Dual Use**	**Polytobacco Use**
Dual users	157 (38.2%)	177 (43.07%)	58 (14.11%)	19 (4.62%)
Polytobacco Users	91 (30.23%)	128 (45.52%)	58 (19.27%)	24 (7.97%)
Total *N*	248	305	116	43