



Dual Use of Cigarettes and Smokeless Tobacco: Product Use and Nicotine Exposure

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Abstract

Introduction: Smokeless tobacco (SLT) products have been marketed to smokers as a means to reduce risk of tobacco-related diseases or to use in situations where smoking is prohibited. An (un)intended consequence of such marketing may be that smokers supplement rather than replace their cigarettes with SLT. **Purpose:** To compare product use and nicotine exposure on days when only cigarettes are smoked (single use) versus when both cigarettes and SLT are used (dual use). **Methods:** Forty-three dual users (M±SD = 19.3±8.9 cigarettes/day; 4.1±2.2 SLT uses/day for 5.7±1.6 days/week) recorded their product use daily for two weeks via an electronic diary. They also collected butts from all cigarettes smoked, and a saliva sample for measurement of cotinine, every day during this two-week period. On the final visit, users provided reasons for and beliefs about traditional SLT (e.g., snuff, dip) and/or snus products. **Results:** The number of cigarettes smoked/day, as measured by diary records (M±SEM = 10.8±0.3) and returned cigarette butts (11.1±0.3), were correlated significantly ($r = .62$; $p < .01$). Cotinine levels were significantly higher on dual versus single use days (M±SEM = 375.1±10.6 ng/ml versus 306.1±18.0 ng/ml, respectively; $p < .01$), though the number of cigarettes recorded did not differ between these days (10.3±0.7 versus 10.8±0.3 cigarettes, respectively; $p > .05$). The most commonly reported reason for initiating (72.1%) and continuing (79.1%) use of their preferred SLT/snus product was to circumvent indoor smoking restrictions. Most participants believed that traditional SLT (65.1%) and snus (48.8%) are equally as harmful as cigarettes, and that neither traditional SLT (51.2%) nor snus (51.2%) help with quitting cigarettes. A notable portion, however, do believe that these products (37.2% and 20.9%, respectively) could serve as cessation aids. **Conclusions:** Those smokers sampled here show a pattern suggestive of product supplementation rather than replacement, and consequently increased exposure to nicotine. This pattern of SLT use may be explained by the motivation to use SLT primarily for situations where smoking is forbidden.

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Introduction

- Cigarette smokers may use SLT products (e.g., dip, snus) to reduce the harms associated with smoking or to circumvent indoor smoking restrictions.^{1,2}
- The use of SLT as a supplement to, rather than a replacement for, cigarettes may increase exposure to toxicants.³
- Patterns of SLT use among cigarette smokers have not been examined prospectively.
- This study was designed to characterize patterns of product use and nicotine exposure in a sample of dual cigarette-SLT users using ecological momentary assessment methods.

Design

| | Day 1 | Day 3 | Day 9 | Day 14 |
|---|-------|-------|-------|--------|
| Electronic diary training | ■ | | | |
| Cigarette & SLT recording | ■ | ■ | ■ | ■ |
| Craving, mood, situational assessments ^a | ■ | ■ | ■ | ■ |
| Saliva sample collection | ■ | ■ | ■ | ■ |
| Cigarette butt collection | ■ | ■ | ■ | ■ |
| Laboratory visits / compliance checks | | ■ | ■ | ■ |
| Reasons / beliefs questionnaire | | | | ■ |

^aData not included here

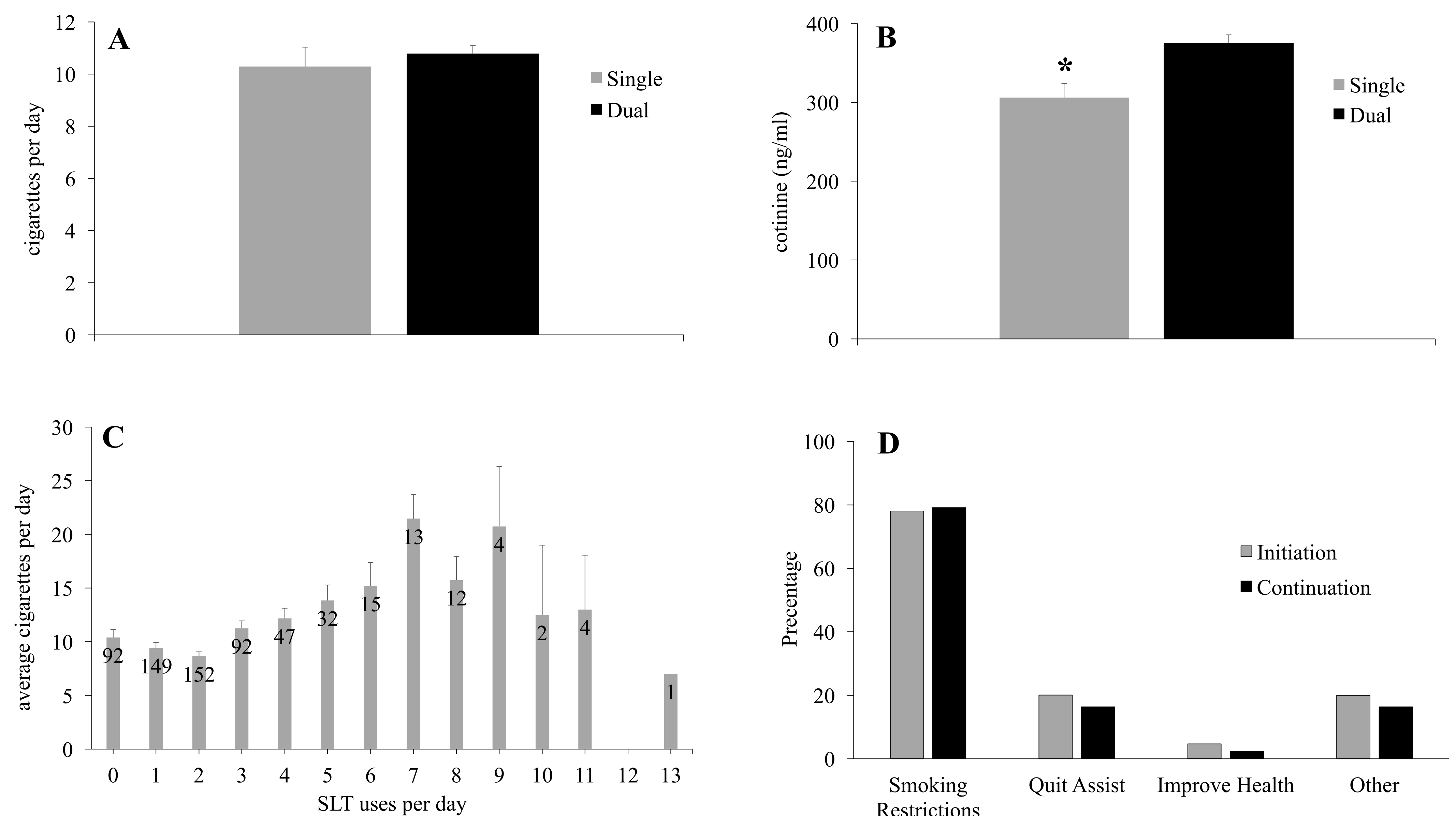
Outcome Measures

- Cigarette (diary logs; returned butts) & SLT (diary logs) use.
- Salivary cotinine.
- Reasons for initiation and continued use of SLT:
 - “to improve health”
 - “to assist with quitting”
 - “to use in places where I can’t smoke”
 - “other”

Inclusion / Exclusion

- Inclusion:
 - Cigarette use: ≥ 5 cigarettes per day (CPD) for ≥ 1 year.
 - SLT use: ≥ 2 uses per day, ≥ 4 days per week for ≥ 6 months.
 - Expired air CO level ≥ 10 ppm and urinary cotinine reading > 3 via semi-quantitative methods.
- Exclusion:
 - Uncontrolled medical conditions.
 - Diagnosis of schizophrenia or bipolar disorders.
 - Illicit drug use in past 3 months; marijuana use >5 days past month; alcohol use ≥15 days in past month.

Results



Top Panel: Mean (± SEM) diary-recorded cigarettes per day (Panel A) and salivary cotinine level (Panel B) on single (cigarettes only) vs. dual use (cigarettes and SLT) days. Asterisk = significant difference from dual use days.

Bottom Panel: Mean (± SEM) diary-recorded cigarettes per day as a function of diary-recorded chews per day. The number on each bar represents the frequency of the corresponding SLT uses per day. (Panel C). Frequency of responses for reasons for initiation and continuation of SLT (Panel D). Participants were permitted to choose more than one answer for their reasons.

Participant Characteristics (N = 47)

| | M (SD) or % |
|--------------------------|-------------|
| Male | 93.6% |
| Non-Hisp, Caucasian | 97.9% |
| Age (Years) | 30.4 (8.9) |
| Cigarettes per Day | 19.2 (8.8) |
| Years Smoking | 10.7 (6.4) |
| Expired Air CO (ppm) | 25.9 (14.6) |
| ^a FTND Score | 5.9 (2.6) |
| SLT Products | |
| Snuff / Dip | 78.7% |
| Chew | 2.1% |
| Snus | 6.4% |
| Multiple | 12.8% |
| Wintergreen / Mint | 63.8% |
| SLT Days/Week | 5.8 (1.5) |
| SLT Uses/Day | 4.3 (2.2) |
| Years SLT Use | 9.0 (7.8) |
| ^b SSTDS Score | 9.4 (7.9) |

^a Fagerstrom Test for Nicotine Dependence (1-10)⁴

^b Severson SLT Dependence Score (0-19)⁵

Discussion

- Mean cotinine levels were significantly higher on dual vs. single use days ($p < .05$), though mean CPD did not differ between days ($p > .05$).
- In previous work:³
 - significantly greater mean serum cotinine level for cigarette smokers who used SLT daily (mean±SEM = 344.2 ± 40.0 ng/ml) vs. never (241.5 ± 4.9 ng/ml).
 - no difference in mean serum cotinine level for smokers who used SLT some days (215.8 ± 22.7 ng/ml) vs. never (241.5 ± 4.9 ng/ml).
 - no differences in mean CPD as a function of SLT use (never, some days, or every day).
- The most frequently reported reason for SLT initiation (60.0%) and continuation (66.7%) was to use in smoking-restricted areas.⁶
- The pattern of behavior observed here is consistent with product supplementation rather than replacement.
- The use of SLT specifically to circumvent indoor smoking restrictions may have long-term health implications, as indoor smoking policies may promote smoking reduction or cessation.⁷