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Factors Associated with Smokeless Tobacco Use and Dual Use among Blue Collar Workers

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ABSTRACT ***Objectives:*** To examine demographic and substance use factors associated with exclusive smokeless tobacco use (SLT) and dual use of both cigarettes and SLT among blue-collar workers. ***Design and Sample:*** This cross-sectional study used data from the United States 2009 National Survey on Drug Use and Health. The sample (n = 5,392) was restricted to respondents who were classified as blue collar workers by self-report primary job title. ***Measures:*** Various demographic variables, tobacco use and other substance use variables were examined. ***Results:*** Respondents in this blue collar sample were 87% male and 64% Non-Hispanic White. An estimated 9.5% (SE = 0.6) of respondents were current SLT users; 5.3% (SE = 0.4) were current exclusive SLT users, and 4.2% (SE = 0.4) were current dual users of both SLT and cigarettes. Factors related to exclusive SLT use were gender, marital status, age, race/ethnicity, type of blue-collar occupation, current binge drinking, and current marijuana use. Significant factors related to dual use were gender, marital status, age, race/ethnicity, type of blue-collar occupation, current cigar smoking, current binge drinking, and current illicit drug use. ***Conclusions:*** Rates of SLT use and dual use are high among U.S. blue-collar workers, indicating a need for targeted, workplace cessation interventions. These interventions may also serve as a gateway for addressing other substance use behaviors in this population.

Key words: blue collar workers, smokeless, smoking, substance use, tobacco.

Background

Behavioral factors such as tobacco use have been strongly associated with cancers of the head and neck (Smith, Rubenstein, Haugen, Hamsikova, & Turek, 2010). Concurrent use of multiple tobacco products like smokeless tobacco (SLT) and cigarettes, which is an increasing public health concern, may increase cancer risk and has not been extensively examined in blue collar populations. Decreasing the prevalence of tobacco use and preventing use in these at risk populations is imperative to decreasing cancer rates.

Recent studies indicate that 3.5% of the U.S. adult population use SLT and that SLT use has been associated with significant morbidity and mortality (Centers for Disease Control and Prevention [CDC], 2011). Rates of SLT use are higher among certain demographic groups such as males, young adults, rural populations, residents of the South or Midwest, individuals with lower educational attainment, and blue collar workers (Dietz et al., 2011; Nelson et al., 2006; Rodu & Cole, 2009).

SLT users are more likely to use cigarettes than non-SLT users (Engstrom, Magnusson, &

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Galanti, 2010; Tomar, Alpert, & Connolly, 2010). This phenomenon, referred to as dual use of SLT and cigarettes, is common among U.S. adult males. In a 2011 national study examining characteristics of tobacco users, over 40% of SLT users also reported use of cigarettes daily or on some days (McClave-Regan & Berkowitz, 2011). Rates of dual use are higher among young males, White males, individuals with lower incomes, and residents of the Midwest or South (McClave-Regan & Berkowitz, 2011).

Both SLT users and dual users are more likely to engage in risky drinking and binge drinking (Engstrom et al., 2010; Noonan & Duffy, 2012). However, the relationship between SLT use and the use of other substances (including marijuana and illicit drugs) has not been extensively studied and warrants further investigation.

Research question

Research suggests that health behaviors tend to cluster together; however, little has been done to understand other health risk behaviors that may co-occur with SLT use (Fine, Philogene, Gramling, Coups, & Sinha, 2004). Furthermore, very few of the aforementioned studies examining associated demographic and substance use factors have focused on blue collar workers, who have higher rates of tobacco use compared to the general public (Dietz et al., 2011). The purpose of this study was to examine the demographic and substance use factors associated with exclusive SLT use and dual use of both SLT and cigarettes among blue collar workers. This information is essential for targeting those at risk and informing tobacco prevention and treatment programs.

Methods

Design and sample

This cross-sectional study used data from the 2009 National Survey on Drug Use and Health (NSDUH), which provides information on illegal drug, alcohol, and tobacco use among the civilian, noninstitutionalized U.S. population aged 12 and older (Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). The NSDUH used a multistage area probability sample to select a representative sample from each of the 50 states in the United States. Participants were interviewed in their place of residence using computer assisted interviewing, which is designed to provide privacy and confidentiality when responding to sensitive survey questions. Respondents received a $30 incentive to complete the survey.

The 2009 NSDUH sample (n = 68,700 respondents) included people living in households and noninstitutionalized group quarters such as shelters, rooming houses, dormitories, and military bases. The survey excluded military personal on active duty and all institutionalized persons such as those in jails and hospitals (SAMHSA, 2013). The overall weighted response rate for the NSDUH survey was 67.2%, the weighted household response rate was 88.8%, and the weighted interviewing response rate was 75.7%. Forty-eight percent of NSDUH respondents were male, and 65% were Non-Hispanic Whites. Response rates and sampling procedures are described in detail by the Substance Abuse and Mental Health Services Administration (SAMHSA, 2013).

The sample analyzed in this study was restricted to respondents who were classified as blue collar workers by self-reported primary job title (n = 5,392). Job titles in the following categories were categorized as blue collar: construction trades or extraction workers; installation, maintenance or repair workers; production, machinery setters, operators or tenders; and transportation and material moving workers.

Measures

Demographic variables of interest included age in years (12–17, 18–25, 26–34, 35–49, 50 and older), gender, race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic, Other), marital status (married, divorced/separated/widowed, never been married), educational level (less than high school, high school graduate, some college/college graduate), and blue collar job title (maintenance/repair, construction, production/machinery, transportation/material moving).

Substance use behaviors of interest included use of cigars, alcohol, marijuana, and illicit drugs (excluding marijuana) in the past 30 days. Past-month binge drinking, defined as drinking five or more drinks (can or bottle of beer, glass of wine or wine cooler, shot of liquor or mixed drink) on the same occasion on at least 1 day in the past 30 days, was also examined.

The outcome variables were: (1) past-month exclusive SLT use (defined as any use of chewing tobacco or snuff in the past 30 days and nonuse of cigarettes in the past 30 days) and (2) past-month dual use of cigarettes and SLT (defined as any use of SLT and cigarettes in the past 30 days, hereafter designated "dual use").

Analytic strategy

All analyses were run using procedures in the Complex Samples module of the Statistical Package for Social Sciences (SPSS, USA) software (Version 19), to account for the complex features of the NSDUH sample (including weighting for unequal probability of selection into the sample and multistage stratified cluster sampling of the target population). Demographic variables and substance use behaviors were assessed for the total sample of blue collar workers (n = 5392), exclusive SLT users (n = 317), and dual users (n = 356). Multivariate logistic regression was used to determine the demographic profiles of exclusive SLT users and dual users as compared to nonusers. All demographic variables were analyzed simultaneously in separate regression models to examine associations with each two outcomes: exclusive SLT use and dual use. In addition, separate multivariate logistic regression models adjusted for all demographic variables were run to examine the associations of various substance use behaviors with exclusive SLT use and dual use respectively. All estimates are weighted except for sample sizes, which are reported below without applying the sampling weights. Variances of weighted estimates were estimated using Taylor Series Linearization, and appropriate methods for subpopulation analysis of complex sample survey data which include defining an indicator variable for the subpopulation of interest (Heeringa, West, & Berglund, 2010) were employed when focusing on blue collar workers only.

Results

Sample characteristics

This sample of blue collar NSDUH respondents (n = 5,392) was predominantly male (86.7%, *SE* = 0.08), Non-Hispanic White (63.9%, *SE* = 1.2), and married (56%, *SE* = 1.0) (Table 1). An estimated 9.5% (*SE* = 0.6) of sample members were current SLT users; 5.3% (*SE* = 0.4) were current exclusive SLT users (reported using SLT but not cigarettes during the past month), while 4.2% (*SE* = 0.4) were current dual users (reported using both SLT and cigarettes during the past month). An additional 31% (*SE* = 1.2) of the sample were current cigarette smokers who did not use SLT.

Factors associated with exclusive SLT use

Demographic variables associated with exclusive SLT use. Results of multivariate analyses are presented in Table 2. Males had 15 times higher odds of exclusive SLT use compared to females (*OR* = 15.77, 95% *CI*: 4.91, 48.57). Individuals who were widowed/divorced/separated had 48% lower odds of exclusive SLT use compared with those who were married (*OR* = 0.52, 95% *CI* = 0.41, 0.75). Compared to workers aged 18–25, the youngest blue collar workers (those aged 12–17 years) had 1.8 times greater odds of exclusive SLT use (*OR* = 1.88, 95% *CI* = 1.09, 3.25), and the oldest blue collar workers (aged 50 or above) had lower odds of exclusive SLT use (*OR* = 0.41, *95% CI* = 0.24, 0.69). Non-Hispanic Blacks (*OR* = 0.10, 95% *CI*: 0.04, 0.28), Hispanics (*OR* = 0.15, 95% *CI*: 0.09, 0.26), and individuals of "Other" race (*OR* = 0.53, 95% *CI*: 0.30, 0.92) had lower odds of exclusive SLT use than Non-Hispanic Whites. Finally, job type was associated with exclusive SLT use, with those working in transportation and material moving (*OR* = 0.55, 95% *CI*: 0.40, 0.77) having lower odds of exclusive SLT use compared with construction workers.

Substance use variables associated with exclusive SLT use. Adjusting for all demographic variables, binge drinkers had 1.7 higher odds of exclusive SLT use compared with nonbinge drinkers (95% *CI*: 1.27, 2.47). Current marijuana users had 43% lower odds of exclusive SLT use compared to nonmarijuana users (95% *CI*: 0.38, 0.87).

Factors associated with dual use of SLT and cigarettes

Demographic variables associated with dual use. Males had seven times higher odds of dual use compared with females (*OR* = 7.40, 95% *CI*: 3.46, 15.85). Individuals who were widowed/divorced/separated (*OR* = 1.92, 95% *CI*: 1.23, 2.99) had 1.9 times greater odds of dual use than those who were married. Respondents who reported their

TABLE 1. *Estimated Demographic and Substance Use Characteristics of the Total Blue Collar Worker Sample, Exclusive Smokeless Tobacco Users, and Dual Users*

	Total sample of blue collar workers (n = 5,392)		Current exclusive SLT users (n = 317)		Current dual users of SLT and cigarettes (n = 356)	
	Est. % (SE %)	n	Est. % (SE %)	n	Est. % (SE %)	n
Demographic characteristics						
Age (years)						
12–17	1.2 (0.1)	305	1.6 (0.4)	24	2.2 (0.6)	26
18–25	13.0 (0.4)	2,237	12.1 (1.9)	124	30.6 (3.2)	224
26–34	19.3 (0.9)	931	27.2 (4.9)	66	29.0 (4.5)	56
35–49	36.0 (0.9)	1,344	37.9 (4.0)	82	26.4 (4.6)	38
50 and older	30.5 (1.2)	575	21.2 (5.0)	21	11.7 (3.8)	12
Gender						
Male	86.7 (0.8)	4,648	99.1 (0.8)	314	99.1 (0.4)	349
Female	13.3 (0.8)	744	0.9 (0.8)	3	0.9 (0.4)	7
Marital status						
Married	56.0 (1.0)	1,994	70.4 (4.0)	145	40.4 (4.4)	81
Widowed/Divorced/Separated	16.1 (0.8)	586	8.3 (2.1)	29	13.9 (3.2)	31
Never married	27.9 (0.8)	2,812	21.4 (3.5)	143	45.8 (4.3)	244
Race/Ethnicity						
Non-Hispanic White	63.9 (1.2)	3,441	86.5 (4.1)	284	91.8 (2.3)	315
Non-Hispanic Black	11.0 (0.8)	525	3.2 (1.7)	4	1.8 (0.7)	9
Hispanic	21.5 (0.9)	1,100	5.7 (3.2)	15	4.0(2.0)	12
Other	3.7 (0.4)	326	4.6 (2.3)	14	2.4 (1.1)	20
Education						
Less than high school	22.1 (1.0)	1,176	10.3 (1.7)	48	17.4 (3.9)	62
High school graduate	45.8 (1.1)	2,284	59.6 (3.9)	156	51.8 (4.3)	170
Some college/College graduate	30.9 (1.0)	1,627	28.6 (4.0)	89	28.5 (4.3)	98
12–17 year olds	1.2 (0.1)	305	1.6 (0.4)	24	2.2 (0.6)	26
Job title						
Construction trades	28.6 (1.0)	1,618	34.9 (4.5)	128	37.6 (4.0)	136
Maintenance/Repair	16.4 (0.9)	852	22.6 (3.8)	58	16.9 (3.3)	63
Production/Machinery	26.0 (1.0)	1,373	21.5 (3.0)	70	23.2 (3.4)	71
Transportation/Material moving	28.9 (1.2)	1,549	21.0 (4.7)	61	22.2 (3.0)	86
Substance use						
Cigarette use						
Yes	35.5 (1.3)	2,139	–	0	100.0 (0)	356
No	64.5 (1.3)	3,253	100.0 (0)	317	–	0
Cigar use						
Yes	7.6 (0.5)	616	5.8 (1.5)	280	19.0 (3.0)	109
No	92.4 (0.5)	4,776	94.2 (1.5)	37	81.0 (3.0)	247
Alcohol use						
Yes	60.8 (1.3)	3,392	73.0 (5.1)	250	80.7 (3.5)	295
No	39.2 (1.3)	200	27.0 (5.1)	67	19.3 (3.5)	61
Binge drinking						
Yes	39.2 (1.3)	2,399	52.6 (5.2)	199	67.7 (4.4)	261
No	60.8 (1.3)	2,993	47.4 (5.2)	118	32.3 (4.4)	95
Marijuana use						
Yes	7.9 (0.5)	690	5.2 (1.5)	31	19.2 (3.4)	89
No	92.1 (0.5)	47	94.8 (1.5)	286	80.8 (3.4)	267
Illicit drug use						
Yes	9.0 (0.5)	758	3.3 (2.1)	13	27.7 (4.0)	122
No	91.0 (0.5)	4,634	96.7 (2.1)	304	72.3 (4.0)	234

SLT use = smokeless tobacco use; Est. % = estimated percent; E = standard error.

TABLE 2. *Results of Multivariate Logistic Regressions for Exclusive Smokeless Tobacco Use and Dual Use Outcomes*

	Exclusive SLT use *OR* (95% *CI*)	Dual use of SLT and cigarettes *OR* (95% *CI*)
Model 1: Demographic characteristics[a]		
Age (years)		
12–17	1.88 (1.09, 3.25)*	0.75 (0.45, 1.23)
18–25 (*reference group*)	–	–
26–34	1.08 (0.77, 1.53)	0.62 (0.44, 0.86)*
35–49	0.81 (0.57, 1.16)	0.25 (0.16, 0.38)**
50 and older	0.41 (0.24, 0.69)*	0.17 (0.09, 0.32)**
Gender		
Female (*reference group*)	–	–
Male	15.44 (4.91, 48.57)**	7.40 (3.46, 15.85)**
Race/Ethnicity		
Non-Hispanic White (*reference group*)	–	–
Non-Hispanic Black	0.10 (0.04, 0.28)**	0.18 (0.09, 0.36)**
Hispanic	0.15 (0.09, 0.26)**	0.10 (0.05, 0.18)**
Other	0.53 (0.30, 0.92)*	0.64 (0.40, 1.03)
Marital status		
Married (*reference group*)	–	–
Widowed/Divorced/Separated	0.52 (0.41, 0.75)**	1.92 (1.23, 2.99)*
Not married	0.76 (0.49, 1.16)	1.23 (0.90, 1.67)
Education		
Less than high school (*reference group*)	–	–
High school graduate or more	1.18 (0.86, 1.65)	0.98 (0.73, 1.32)
Job title		
Construction trades (*reference group*)	–	–
Maintenance/Repair	0.75 (0.54, 1.03)	0.18 (0.60, 1.14)
Production/Machinery	0.82 (0.59, 1.11)	0.09 (0.58, 1.09)
Transportation/Material moving	0.55 (0.40, 0.77)**	0.64 (0.54, 0.96)*
Model 2: Substance use[b]		
(Reference group = No for each category)		
Cigar use: Yes	0.88 (0.60, 1.27)	2.40 (1.84, 3.14)**
Alcohol use: Yes	1.26 (0.86, 1.86)	0.99 (0.63, 1.52)
Binge drinking: Yes	1.77 (1.27, 2.47)*	2.37 (1.62, 3.47)**
Marijuana use: Yes	0.57 (0.38, 0.87)*	0.94 (0.70, 1.27)
Illicit drug use: Yes	0.59 (0.32, 1.08)	1.88 (1.32, 2.68)*

*$p < .05$, **$p < .001$.

[a]Demographic variables were entered into Model 1 simultaneously; separate models were run for exclusive SLT use outcome and dual use outcome.

[b]Substance use variables were entered into Model 2 simultaneously and adjusted for demographic variables; separate models were run for exclusive SLT use outcome and dual use outcome.

race/ethnicity as Non-Hispanic Black (*OR* = 0.18, 95% *CI*: 0.09, 0.36) or Hispanic (*OR* = 0.10, 95% *CI*: 0.05, 0.18) had lower odds of dual use than Non-Hispanic Whites. Older workers had lower odds of dual use compared with younger workers (*OR*s averaged 0.35 with each successive age bracket). Finally, blue collar workers in transportation or material moving jobs had lower odds of dual use compared with those in construction (*OR* = 0.64, 95% *CI*: 0.54, 0.96).

Substance use variables associated with dual use. Adjusting for all demographic variables, current cigar smokers had 2.4 higher odds of dual use (95% *CI*: 1.84, 3.14), illicit drug users had 1.8 higher odds of dual use (95% *CI*: 1.32, 2.68), compared to nonusers of each respective substance. Current binge drinkers had 2.3 higher odds of dual user (95% *CI*: 1.62, 3.47), compared with respondents who were not binge drinkers.

Discussion

This study is one of the first to examine demographic and substance use factors associated with

exclusive SLT use and dual use among blue collar workers. Prevalence of smokeless tobacco use in this sample of blue collar workers was high: 9.5% reported current SLT use. This is over three times the rate of SLT use in the general population and slightly higher than the 7% rate of SLT use in blue collar workers reported by Dietz and colleagues (CDC, 2011; Dietz et al., 2011). Over four percent of blue collar workers in this sample reported that they were current dual users of both SLT and cigarettes. This is slightly higher than what has been reported in the general population; however, it is not surprising, given that blue collar workers have higher tobacco use rates than the general population (Dietz et al., 2011; Lee, Fleming, Dietz, et al., 2007; McClave-Regan & Berkowitz, 2011; Tomar et al., 2010).

The most interesting finding of this study was that illicit drug users had higher odds of dual use compared with nondrug users. The use of tobacco, especially cigarettes, has been associated with illicit drug use in other U.S. populations including adolescents and young adults (Ramo, Liu, & Prochaska, 2012; Ramo & Prochaska, 2012). Illicit drug use by blue collar workers may precede workplace accidents, which represents a safety concern to both workers and the public (Olbina, Hinze, & Arduengo, 2011). Workplace interventions that target tobacco users should include screening for illicit drug use and include prevention initiatives and treatment referrals as necessary.

Tobacco and illicit drug use in blue collar workers have been associated with poor working conditions (including long work hours and work-induced stress) (Cunradi, Lipton, & Banerjee, 2007; Dong, 2005). These work-related factors may perpetuate substance use among blue collar workers. However, current working conditions were not assessed in the NSDUH survey and therefore could not be examined in this study. Future work should explore associations between working conditions with both exclusive SLT use and dual use.

Interestingly, marijuana users had lower odds of exclusive SLT use than respondents who did not use marijuana. Cigarette smoking and dual use have been associated with marijuana use in prior literature (Agrawal & Lynskey, 2009; Ramo & Prochaska, 2012; Ramo et al., 2012). SLT use has been associated with increased risk for marijuana use in adolescent populations (Ary, Lichtenstein, & Severson, 1987), but not in the general U.S. population (Agrawal & Lynskey, 2009). It is unclear why blue collar workers who exclusively use SLT would be less likely to use marijuana, but this may be associated with cultural norms and peer norms among this group of workers that do not promote the use of marijuana (Agrawal & Lynskey, 2009). Further research is needed to validate this finding among blue collar populations.

In this sample, binge drinkers had higher odds of exclusive SLT use and dual use, which is consistent with the findings of other studies (Engstrom et al., 2010; Noonan & Duffy, 2012). Concurrent use of tobacco and alcohol increases cancer risk (Hashibe et al., 2009). Research also suggests that risky alcohol use impedes quit attempts in many tobacco users (Leeman et al., 2008), suggesting that it may be beneficial to use combined interventions and simultaneously target these behaviors in at-risk populations.

Cigar smokers had higher odds of dual use compared to those who did not smoke cigars. Cigarette smoking has been associated with cigar smoking in the literature (Backinger et al., 2008; Richardson, Xiao, & Vallone, 2012). Concurrent use of more than one tobacco product increases the risk of cancer and nicotine addiction. Providers should be diligent about assessing blue collar workers for concurrent use of all forms of tobacco among those that screen positive for SLT use and cigarette use.

Finally, rates of exclusive SLT use and dual use in this sample were considerably higher among workers in the construction trades (35% and 37% respectively) than among respondents with other types of blue collar jobs. Construction workers had higher odds of exclusive SLT use and dual use compared to workers with other job types. Construction workers have high rates of tobacco use compared with other occupation groups (Lee, Fleming, Dietz, et al., 2007). Furthermore, they receive less advice about quitting from their health providers (Lee, Fleming, McCollister, et al., 2007; Okechukwu, Bacic, Cheng, & Catalano, 2012). Construction workers have been the target of many smoking cessation interventions but very few SLT cessation interventions. Targeted SLT interventions and combined interventions for dual use are necessary to reduce rates of tobacco use and subsequent cancer risk in this group.

There are limitations of the current study that must be considered. Data used in this analysis are cross-sectional data, so causality cannot be assumed. Exclusive SLT use as defined in this study combined the use of both snuff and chew, so it was not possible to examine the association of demographic and substance use with these subtypes of SLT product use. We defined dual use as past 30 days use of both SLT and cigarettes, however, the lack of a standardized definition of dual use in the literature makes it difficult to compare our results to those reported by other researchers in the field. Differences in definitions of dual use (i.e., daily use vs. non-daily use of tobacco products) may lead to differences in estimated prevalence of use in this population (Klesges et al., 2011). Finally, the job types used to represent blue collar workers in this study may not be representative of all blue collar jobs. The only NSDUH respondents defined as blue collar workers and included in this sample were those whose self-identified job titles fell in one of four categories: installation, maintenance or repair workers; construction trades or extraction workers; production, machinery setters, operators or tenders; transportation and material moving workers. Because this set of categories may not be representative of the full range of U.S. blue collar occupations, results of this study should be generalized to the entire blue collar workforce only with caution.

This study is novel in that it is one of few to examine the demographic and substance use factors associated with exclusive SLT use and dual use of SLT and cigarettes in a national sample of U.S. blue collar workers. Results of this analysis highlight the high prevalence of both exclusive SLT use and dual use in this population, and provide insight about the demographic characteristics and substance use behaviors associated with exclusive SLT use and dual use. This information is important for tailoring future intervention work.

The high rates of exclusive SLT use and dual use in U.S. blue collar workers indicate a need for targeted cessation efforts in this population. Public health nurses should consider screening individuals who use SLT exclusively and those who are dual users for other substance use behaviors, intervening where necessary with cessation advice and treatment referrals. Future worksite tobacco interventions should focus on targeting demographic factors that increase the risk for tobacco use and addictive processes in blue collar workers. These interventions may also serve as a gateway for addressing other substance use behaviors in this population.

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