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# Characteristics of Tobacco Use In the Lumber Industry

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**ABSTRACT:** Cessation interventions for adult smokeless tobacco users may benefit from an improved understanding of the demographic, psychosocial, and tobacco-dependence characteristics of this group. In the current study, 143 employees of the Pacific Lumber Company were interviewed and completed questionnaires about their tobacco-use product preference (smokeless tobacco only, cigarettes only, both, and former user), demographic, psychosocial, and to-

bacco-dependence characteristics. Results of a multivariate discriminant analysis revealed that smokeless-tobacco-only users were younger and reported engaging in more exercise than did the other three groups; however, they also reported greater dependence on tobacco than did smokers. Formal cessation clinics similar to those that are being used effectively with smokers, and which are age appropriate, may be an effective treatment for adult smokeless tobacco users.

To optimize the success of tobacco use cessation strategies, the characteristics of the tobacco-using population should be matched with appropriate program components.<sup>1</sup> Improvements in quit rates for smokers are partially due to the more tailored, appropriate program components used in formal cessation programs.<sup>2</sup> Similarly, an improved understanding of smokeless tobacco users and how they differ from smokers may enhance the efficacy of tobacco cessation efforts. Yet, little is known about adult

smokeless tobacco users, their dependency characteristics, or other characteristics, which may impact their success in eventually quitting.<sup>3</sup>

Unlike populations who smoke, smokeless tobacco users tend to cluster closely around certain demographic and sociological variables: The highest use is among white males who participate in outdoor activities (e.g., lumber mill workers, athletes,<sup>4-5</sup>) suggesting the need for a more focused cessation program. A few studies of self-reported or biochemically measured nicotine dependence suggest similar levels of dependence between cigarette smokers and smokeless tobacco users.<sup>6-8</sup> However, very few studies of this type have been attempted. Almost all research on the psychosocial and demographic correlates of smokeless tobacco use has been completed with adolescents, and this research has emphasized variables associated with habit acquisition, rather than maintenance and quitting.<sup>9</sup>

Additional research is needed to discern similarities and differences in de-

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***A total of 146 employees  
(143 males; 3 females)  
from Pacific Lumber  
Company (PALCO)  
participated in this study.***

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mographic, psychosocial, and dependence characteristics among adult smokeless tobacco users and cigarette smokers in order to improve cessation rates for both types of tobacco users. The current study was conducted at the Pacific Lumber Company (PALCO) where 20% of all California lumber mill workers are employed, 17% of whom use smokeless tobacco only, 13% of whom smoke cigarettes only, and 4% of whom use both products.<sup>11</sup> In a previous study of this population, smokeless tobacco users reported that they dipped approximately seven times per day, the rough equivalent of 1.5 packs of cigarettes a day.<sup>11</sup> Smokers at PALCO used less tobacco, averaging only 17 cigarettes per day. Thus, it might be expected that smokeless tobacco users in this population would self-report greater nicotine dependence than would smokers. In addition, smokeless tobacco users, in general, may have greater difficulty in quitting (remaining abstinent) than cigarette smokers, and users of both products may be the most dependent of all.<sup>9</sup> Level of dependence is an important factor in the planning of cessation interventions.<sup>3,9</sup>

The purposes of the present study were to assess whether or not former tobacco users and current tobacco users from PALCO (cigarette, smokeless or both) differed from one another on demographic and psychosocial characteristics and to assess how the different types of current tobacco users differ in their dependence on tobacco products. It was plausible that former users would be distinguishable from current users on most scales of psychosocial health. For example, it was expected that former users would report lower perceived stress and risk taking and greater participation in health behaviors, such as exercise. It was further expected that users of both substances would be more likely to report a prefer-

ence for risk taking, perhaps engage in more detrimental health practices, and report greater physical dependence on tobacco than would users of only one substance.<sup>7,10</sup> However, because so few previous smokeless tobacco users have focused on adult populations, it was not known whether such results would replicate with this population. It was further not known how demographic variables (i.e., age, marital status) might influence statistically the psychosocial and dependency items examined. An examination of nonredundant correlates of different tobacco-using groups was accomplished through use of multiple discriminant analysis. By uncovering nonredundant variables that discriminated among tobacco-using groups, it was thought that a refinement of current adult smokeless tobacco cessation programming would be achieved.

#### **METHOD**

##### **Subjects**

A total of 146 employees (143 males; 3 females) from Pacific Lumber Company (PALCO) participated in this study. Of the 146 participants, 21 (14%) used both smokeless tobacco and cigarettes, 42 (29%) used smokeless tobacco only, 43 (29%) were cigarette smokers only, and 40 (27%) were employees who had successfully quit using tobacco (34 of whom previously used cigarettes only). Participants were mainly European Americans ( $n=139, 95\%$  of the sample) and the average number of years of education was 12.67 ( $SD=1.51$ ).

##### **Procedure**

All current and former tobacco users at PALCO were identified.<sup>11</sup> In the present study, an attempt was made to interview and administer questionnaires to approximately equal numbers of employees (about 25% subsamples) from among the four tobacco-use categories: chewers only, smokers only, users of both products, and quitters. Approximately 25% of the chewers, smokers, and quitters were randomly sampled and scheduled for an interview where they would also complete questionnaires. Ten of these employees failed to attend the interview, resulting in a 93% response rate. Due to the fewer employees reporting use of both cigarettes and smokeless tobacco, extra effort was made to reach all of these employees in this

group. However, only 45% (N=21) of the employees who used both tobacco products completed the interviews and questionnaires. A total of 28% of all tobacco users at PALCO were interviewed.

Employees were interviewed about their demographic characteristics and tobacco-using status as well as nicotine dependence, and they then completed questionnaires containing items that asked about their psychosocial well-being. Participants were instructed that their participation was voluntary and that they could withdraw at any time for any reason without penalty. They were also informed that their responses would remain confidential, and would only be seen by research personnel from the University of Southern California. Each participant was reimbursed \$10 for costs (e.g., time and inconvenience) associated with his or her participation. The interviews and questionnaire administration took place during nonworking hours in a location that was private and convenient to most employees (a hotel adjacent to the worksite).

### Measures

**Demographic scales.** All employees were asked their gender, age, marital status, and education. Items used to measure psychosocial well-being were dichotomous (yes, no).

**Psychosocial scales.** Risk taking. Employee risk taking was measured with binary items developed from questions and concepts used in similar health behavior research.<sup>10</sup> Employees were asked (a) if they liked to take chances, (b) if it was worth getting into trouble in order to have fun, and (c) if they enjoyed doing things people say should not be done.

**Stress.** Three binary items measured the perceived stress employees reported in the past month: (a) if they had been upset because something happened, (b) if they were unable to control important things in their life, and (c) if they had been nervous or stressed.<sup>12</sup>

**Health behaviors.** Six binary items were derived from behavioral risk-factor research.<sup>13,14</sup> These items asked whether or not the subjects rated themselves as (a) able to sleep well, (b) always eating breakfast, (c) handling stress, (d) not eating fatty foods, (e) getting a lot of exercise, and (f) not being a heavy drinker. Finally, subjects were asked about their perceived

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health status (using a 4-point Likert scale).

**Health as a value.** Four binary items were used to indicate whether or not employees valued their health: (a) if they believed that health was everything, (b) if there were many other things that were valued more than health, (c) if health was of minor importance in a happy life and, (d) if there were few things more important than good health.<sup>15</sup>

**Self-esteem.** Five binary items were used to measure self-esteem.<sup>16</sup> Employees were asked (a) if they were a good person, (b) if they had a number of good qualities, (c) if they were able to do things as well as most others, (d) if they had a positive self-attitude, and (e) if they were satisfied with themselves.

**Sense of coherence.** Understanding, control, and involvement in life activities were the binary items that constructed the sense-of-coherence scale.<sup>17</sup> Employees were asked if (a) they understood their world and did not feel crazy in new situations, (b) if they could meet the demands in their life through with skills and social support networks, and (c) if they were particularly involved in certain activities in their life.

**Social approval to quit.** If subjects used tobacco, they were asked (on one item) if they thought that quitting tobacco would make them liked better, less, or the same by others.

### Dependence Level

Five rating scale items were used in questionnaires that asked employees the following: (a) if they used tobacco within the first 30 minutes of waking, (b) if they would like to quit tobacco (coded as yes or no), (c) how difficult they felt it would be to quit (coded as not difficult versus a little

**TABLE 1**  
**Group Comparisons on Demographic Items**

Item	Groups				F
	Former Users	Current Chewers	Current Smokers	Current Both	
Demographic Items					
Mean age (yrs)	46.8	33.7	44.3	37.1	16.61***
Mean education (yrs)	13.0	12.6	12.8	12.0	1.08

Note: +.06, \*.05, \*\*.01, \*\*\*.001

difficult or as very difficult), (d) if they felt that they were addicted to tobacco (coded as yes or no), and (e) if they believed that they could quit using tobacco (coded as yes or no).<sup>17</sup> Two open-ended response items asked how often a quit attempt had been made in the past year and the length of time since their last quit attempt.<sup>9</sup> Subjects also were asked if they had ever switched tobacco substances while trying to quit.

#### Analysis

Bivariate analyses (chi-square or one-way F-tests) were performed on each item that had sufficient response variation ( $N > 4$ , i.e., less than 95% of the subjects in one response category). This ruled out from analysis two of five demographic items: gender (there were only four females in the total sample) and marital status (only two of the former tobacco users were unmarried, eight current chewers-only, nine current smokers-only and six users of both products). Among the psychosocial items, 11 included cell sizes that were too small to analyze. These included two of three risk-taking items (i.e., "It is worth getting in trouble to have fun" and "I enjoy doing things people say should not be done"), all five of the items that measured self-esteem, one of four items that assessed health as a value (i.e., "health is of minor importance in a happy life"), one of seven health behavior items that assessed drinking, and two of three items that measured sense of coherence ("I am able to meet the demands in my life" and "I am very involved in certain things in my life"). For the excluded risk taking and self-esteem items, a majority of subjects within and across groups reported that they were low in

risk-taking (95.2% and 98.6% for the two items) and high in self-esteem (five items, mean=96.6%). All subjects also reported that they were not heavy drinkers (94.5%) and were high on sense of coherence (two items, mean=97.6%).

A first set of analyses involved prediction of tobacco-use status among four groups (current chewer-only, current smoker-only, users of both products, and former users). The fifteen psychosocial variables with sufficient cell sizes were used as concurrent predictors of tobacco-use status, examined one at a time. Next, those variables found to be significant in the bivariate analyses were retained for use in a multivariate four-group discriminant analysis. Canonical loadings were calculated for each item to examine the direction and extent to which the items discriminated the groups. Loadings over .3 were considered meaningful. Percent correct classification by variable was also calculated. A second set of analyses involved prediction of tobacco-use status among the three current tobacco-using groups (current chewer-only, current smoker-only, and users of both products) from eight tobacco-use dependence-related items, along with demographic and psychosocial items that had shown univariate differences in the four-group discriminant analysis. Finally, those variables found to be significant in the bivariate analyses were retained for use in a multivariate three-group discriminant analysis.

#### RESULTS

The bivariate results on the four groups are shown in Table 1. Analysis was possible on two of the four demographic items, on 15 of the 26 psychosocial items, and on

**TABLE 2**  
**Group Comparisons on Psychosocial Items**

Items	Percent Means				$\chi^2$
	Former Users	Current Chew	Current Smoke	Current Both	
I like to take chances	14.2	35.7	26.1	47.6	8.77*
I was upset last month	41.5	54.7	38.1	47.6	2.69
I felt out of control last month	9.8	21.4	26.2	19.0	3.82
I was nervous last month	24.4	53.7	38.1	52.4	8.68*
Perceived good health	32.4	31.0	22.1	47.6	3.12
I sleep well	87.8	69.0	73.8	71.4	4.60
I always eat breakfast	48.8	46.3	30.9	28.6	4.58
I handle stress	82.9	71.4	78.6	95.2	5.28
I never eat fat	36.6	26.2	36.6	19.0	3.05
I get alot of exercise	36.6	76.2	62.0	71.4	15.20***
Without health I have nothing	85.4	90.5	92.9	85.7	1.52
I care about health more than other things	85.4	62.0	73.8	75.0	5.92
There are few things more important than health	77.5	51.2	52.4	52.4	7.82*
I understand the world	82.1	68.3	71.4	61.9	3.30
I would be liked more if I quit		45.2	34.8	23.8	6.66

Note: +.06, \*.05, \*\*.01, \*\*\*.001

all eight of the dependence items that assessed differences between groups.

As shown in Table 2, age, risk taking, stress (nervousness), exercise and one health-as-a-value item ("Few things are more important than health") discriminated the groups. Former users were oldest, followed by current smokers, users of both products, and chewers. Users of both substances responded that they liked to take chances most often, followed by current chewers, current smokers, and former users, in that order. The stress item "I was nervous in the last month" was reported as occurring most often with current chewers and users of both substances, followed by current smokers and former users. Exercise was reported most often among both current chewers and current users of both substances, followed by current smokers and former users. Health was valued as important most often by former users, with relatively little difference between the other three different types of tobacco users.

Five of the eight items measuring nicotine dependence were significantly different among the three tobacco-using groups (Table 3). A relatively greater percentage of subjects who used tobacco during the first 30 minutes of the day

were chewers, followed by smokers, and users of both products. Reports of most confidence in being able to quit tobacco were highest among users of both products, followed by chewers and smokers. Subjects who had attempted to quit more than once in the last 12 months were most often chewers and users of both substances; smokers attempted to quit less often. Chewers and users of both substances attempted to quit more than once in the past year, significantly more often than did smokers. Use of another type of tobacco substance during a quit attempt was reported most frequently by users of both substances. Smokers tried chewing during a quit attempt twice as often as chewers tried smoking during a quit attempt.

Sixty-two percent of subjects could be correctly specified into one of the four groups (i.e., former user, current chewer, current smoker, current user of both) entering the retained variables from the bivariate analysis into a multivariate discriminant analysis. Chewers were the most accurately specified (73.8%), followed by smokers, (65.0%) users of both products (38.1%), and former users (9.5%). The items that predicted tobacco status best were age ( $r^2 = .47$ ,  $F = 13.10$ ,  $p < .001$ )

**TABLE 3**  
**Group Comparisons on Dependence Items**

Item	Percent Means			$\chi^2$
	Current Chewer	Current Smoker	Current Both	
Dependence Items				
Tobacco use within last 30 minutes of the day	76.2	32.6	19.0	24.5***
I would ever like to quit	59.5	53.5	66.7	1.0
It is very difficult to quit	57.1	62.0	85.7	5.3
I am very addicted	28.6	32.6	14.3	2.4
I believe I could quit	50.0	37.2	71.4	6.6*
More than 1 quit attempt in the last year	56.1	30.2	57.1	7.0*
Less than 1 year since last quit	57.9	27.8	50.0	7.1*
Other tobacco use during quit attempt	4.7	9.3	80.9	54.3***

Note: +.06, \*.05, \*\*.01, \*\*\*.001

and exercise ( $r^2=.30$ ,  $F=4.60$ ,  $p<.005$ ). The variance accounted for by the other items became nonsignificant after controlling for the variance attributable to age and exercise. Figure 1 illustrates the position of each variable in relation to the group classified.

Seventy-five percent of subjects could be correctly specified into a tobacco-type category (i.e., chewer, smoker, user of both products) when entering the retained variables from the bivariate analysis of both psychosocial and dependence items in a multivariate discriminant analysis. Smokers were the most accurately specified (84%), followed by users of both products (80%), and chewers (63%). Variables that predicted tobacco status best were age ( $r^2=.30$ ,  $F=4.23$ ,  $p<.05$ ), tobacco use within the first 30 minutes of the day ( $r^2=.38$ ,  $F=6.86$ ,  $p<.05$ ), the recency of quit attempts ( $r^2=.34$ ,  $F=5.12$ ,  $p<.01$ ), and use of another tobacco type during a quit attempt ( $r^2=.63$ ,  $F=27.36$ ,  $p<.001$ ), as depicted in Figure 2. Other items, which were previously found to be significant, were statistically redundant with these variables, but are shown in Figure 2 as a point of reference.

#### DISCUSSION

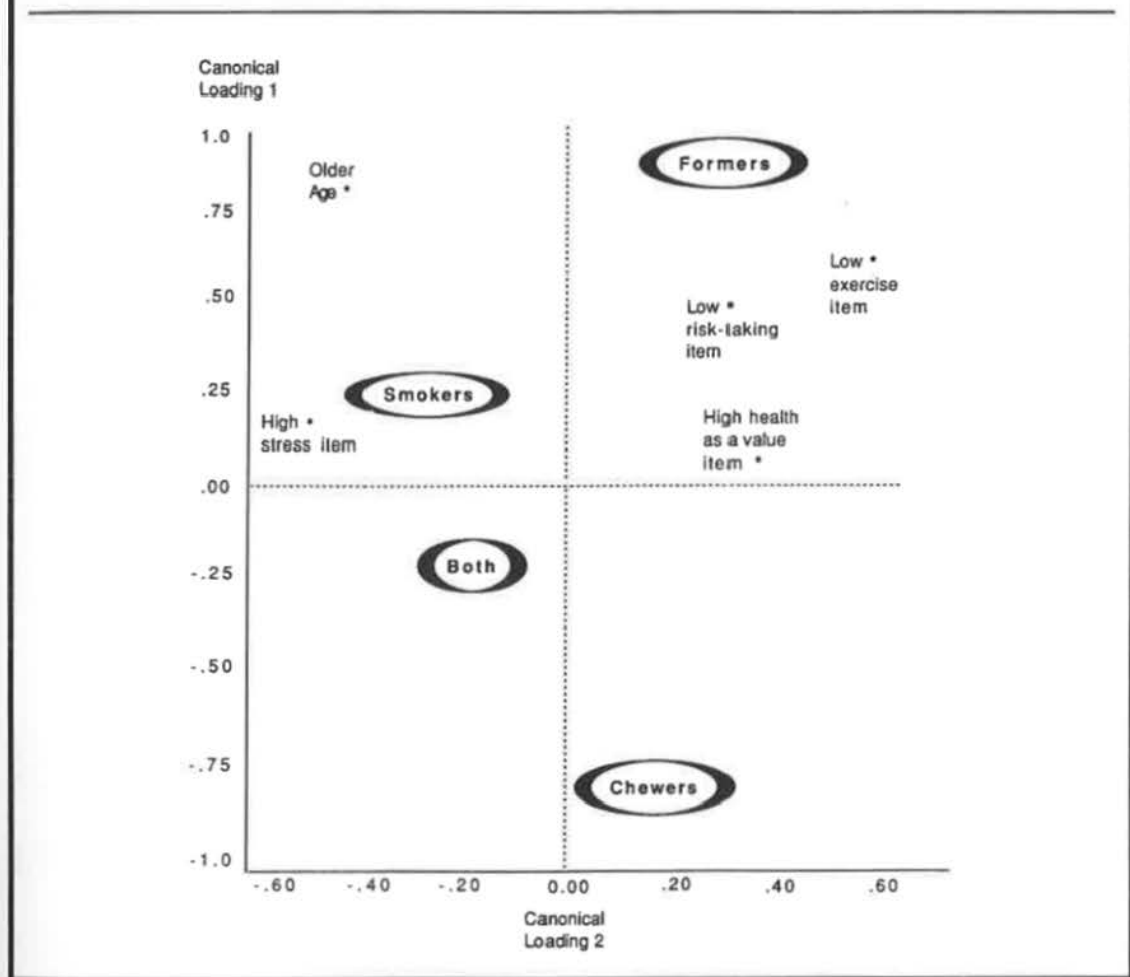
Chewers were the youngest of the three types of tobacco users. This was true if they used smokeless tobacco only or if they also used cigarettes. This finding is consistent with other studies that report that many younger smokeless users

switch to cigarette smoking later in life in order to satisfy their nicotine addiction.<sup>5,19</sup>

Bivariate comparisons between the four groups on the psychosocial items indicate that former tobacco users are older, take fewer risks, are less nervous, exercise less, and have a greater sense of coherence than do the tobacco users. In addition, users of both products were higher in risk taking and perceived stress than were the other tobacco-using groups. However, after entering all variables into a multiple discriminant analysis, only age and exercise discriminated the groups. This suggests that psychosocial characteristics are strongly correlated with age. Although these are cross-sectional data, one may speculate that as users grow older they switch from smokeless tobacco to cigarette smoking and eventually quit use. On the other hand the correct classification of the former users was low. Perhaps other unmeasured variables (e.g., job stability) more completely differentiate former users from current users.

Chewers and users of both products reported higher exercise levels than did smokers, which was expected, given that smoking is prohibited in the wooded areas, where several of the younger employees are engaged in rigorous physical activity. Older subjects, who tend to work indoors more often, may smoke rather than chew due to the less restrictive smoking policies that are in place there

**FIGURE 1**  
**Discriminant Function Analysis of Former and Current Tobacco Users**



or to conform with norms of indoor tobacco use. However, exercise was not a redundant predictor with age. That is, those who used smokeless tobacco products participated in greater physical exercise, regardless of age. This finding is consistent with previous studies, which have reported a less sedentary lifestyle is associated with use of smokeless tobacco. Outdoor occupations, which require physical activity, appear to also socially (or for safety reasons) facilitate chewing tobacco use.

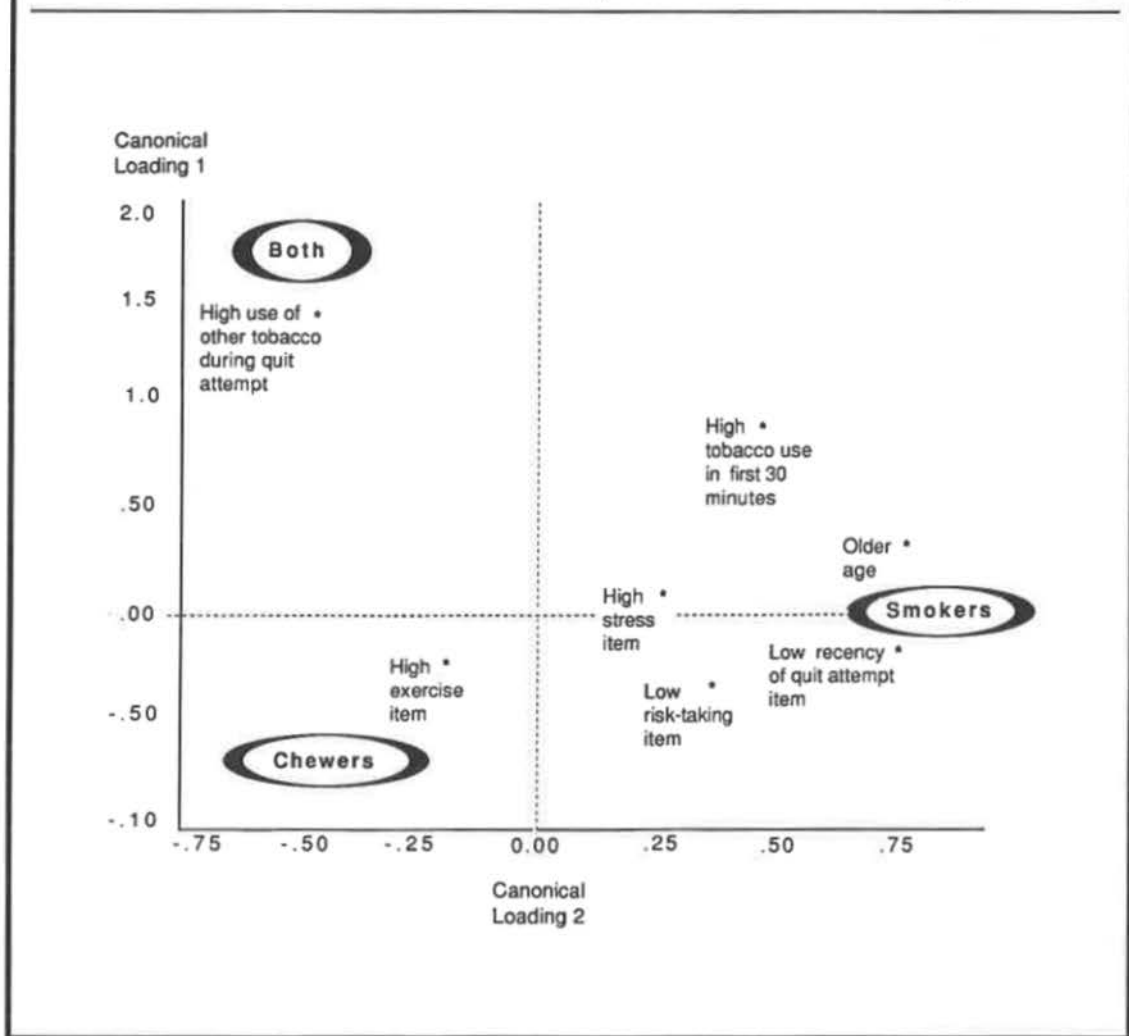
Multivariate comparisons among the three tobacco-using groups on the dependence items revealed that smokeless to-

bacco users were most likely to report that they began using within the first 30 minutes after waking, an item that has previously been validated as a predictor of dependence level.<sup>18</sup> However, smokeless tobacco users were just as likely as smokers to have attempted quitting within the past year. These items suggest that, although smokeless tobacco users may be more dependent on tobacco than smokers, they are also more motivated to give up the habit.

Although current chewers and smokers rarely used alternative types of tobacco during a quit attempt, the 5% to 10% cross-over rate is still a concern.



**FIGURE 2**  
**Discriminant Function Analysis of Tobacco Use Type**



Some evidence exists suggesting that many smokers coming into tobacco cessation clinics have been able to give up smoking, but then were unable to quit smokeless tobacco, after having switched tobacco products.<sup>7</sup> The potential for the opposite problem has also been noted, where younger chewers and users of snuff switch to cigarette smoking to satisfy their nicotine addiction when they reach adulthood.<sup>19</sup> Users of both substances have previously been found to be particularly resistant to cessation efforts, more so than addiction to either product in isolation.<sup>7</sup>

The multivariate discriminant analysis revealed that the pattern of simple bivariate results was intercorrelated, so that some of the psychosocial items, which distinguished the groups of former and current tobacco users (stress, risk taking) were confounded with age and exercise. Similarly, the dependency items used in the multivariate analysis of current users were also confounded with age, suggesting age is a good proxy for other behavioral characteristics related to tobacco use.

These data are among the largest to investigate correlates of smokeless to-

bacco use in adults and the first to investigate these effects in a worksite setting. Still, future studies should consider including an even larger sample with more sensitive and varied measures to permit the use of less error prone constructs in measuring the tobacco users' characteristics. Despite these limitations, the results from this study indicate that smokeless tobacco users may benefit from formal cessation clinics with pharmacologic adjuvants in the same way as dependent smokers do. Furthermore, many characteristics that have been previously associated with tobacco use are highly correlated with age. Cessation programs that utilize specific strategies (i.e., cognitive, psychosocial, and behavior-modification principles) should consider using age-appropriate program components (i.e., reasons for quitting being to please new family member, to gain lower health insurance costs, or to please employer), because age accounted for the largest portion of the variance in smoking status among the population presented here.

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