Fighting Fire With Fire: Using Industry Market Research to Identify Young Adults at Risk for Alternative Tobacco Product and Other Substance Use

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Abstract

Limited public health research has used psychographic profiling to segment young adults and examine their substance use behaviors. We aimed to conduct market research to identify young adult market segments at risk for alternative tobacco products (ATPs), alcohol, and marijuana use. Substance use; psychographics per the Values, Attitudes, and Lifestyle Scale (VALS); and other key variables were assessed at baseline in a longitudinal study of 3,418 students aged 18–25 from seven colleges/universities in the state of Georgia. Cluster analysis was conducted on VALS factors to identify distinct segments. Regression examined segments in relation to substance use risk. Past 30-day use prevalence for each substance was as follows: cigarettes, 13.3%; little cigars/ cigarillos (LCCs), 11.2%; smokeless tobacco (SLT), 3.6%; e-cigarettes, 10.9%; hookah, 12.2%; alcohol, 63.1%; and marijuana, 19.0%. Five segments were identified, created, and named: Conventionals, Simple Lifes, Open Minds, Confident Novelty-seekers, and Stoic Individualists. Controlling for sociodemographics, Open Minds, Confident Novelty-seekers, and Stoic Individualists (vs. Conventionals [referent]) were more likely to smoke cigarettes. Confident Novelty-seekers were more likely to use LCCs. Simple Lifes were less likely to use SLT. Open Minds and Confident Novelty-seekers were more likely to use e-cigarettes. Open Minds were more likely and Simple Lifes were less likely to use hookah. Open Minds were more likely to use alcohol; Simple Lifes and Stoic Individualists were less likely to use alcohol. Open Minds were more likely to use marijuana. Market research is an effective strategy for identifying young adults at risk for using distinct ATPs and can inform targeted health campaigns and cessation interventions.

Keywords

tobacco use; youth; alternative tobacco; risk factors

Background and Literature

There are direct links between exposure to tobacco marketing and tobacco use. Marketing promotions attract new users, promote continued use, create brand loyalty, and expand tobacco markets (Burton, Clark, & Jackson, 2012; Chen, Cruz, Schuster, Unger, & Johnson, 2002; Choi, Ahluwalia, Harris, & Okuyemi, 2002; Gilpin, White, Messer, & Pierce, 2007; Hanewinkel, Isensee, Sargent, & Morgenstern, 2010; Lovato, Watts, & Stead, 2011; Paynter & Edwards, 2009; Pucci & Siegel, 1999). In recent years, alternative tobacco products (ATPs) such as little cigars and cigarillos (LCCs), snus, dissolvable tobacco products, and electronic nicotine delivery systems or "e-cigarettes" have been introduced to the U.S. market, while water pipes or hookah have increased in popularity (Etter, 2010; McMillen, Maduka, & Winickoff, 2012; USDA Economic Research Service, 2007; Zhu et al., 2013, 2014).

For newly introduced products such as these, advertising is paramount to the product's success (Sethuraman, Tellis, & Briesch, 2011), as the first exposure to a product is highly influential on short-term sales or gains (Vakratsas & Ambler, 1999). Because many U.S. consumers may not be aware of these products (King, Alam, Promoff, Arrazola, & Dube, 2013; Pearson, Richardson, Niaura, Vallone, & Abrams, 2012; Regan, Dube, & Arrazola, 2012), ATP manufacturers have a large market in which their ads may be the consumer's first exposure to these products. The content of the messages companies use to advertise ATPs is also critical, as this may influence who uses them and why they initiate or continue use. Unfortunately, youth and young adults are at the greatest risk for using ATPs (McMillen et al., 2012), undoubtedly due to continued tobacco industry marketing efforts to exploit these groups based on psychographic characteristics (e.g., sensation-seeking; Ling & Glantz, 2002b, 2004).

Traditionally, public health campaigns and interventions have focused on demographics (e.g., race, sex, and age) as the major way of segmenting the population. The shortcoming of this approach is that, even though individuals in a demographic category share some characteristics, there is great variability in psychographics (e.g., lifestyle, values, goals, and beliefs) and motivations for a behavior. Marketing campaigns, such as those developed by the tobacco industry (Anderson, Glantz, & Ling, 2005; Ling, An, & Lein, 2004), are based on market research. Market research divides populations using segmentation based on some type of similarity, such as consumer behaviors, reactions to marketing messages, or psychographic characteristics (Ling et al., 2004; Ling & Glantz, 2002b). This latter approach segments populations by individual attitudes, needs, wants, beliefs, goals, and lifestyles in order to develop targeted marketing messages and strategies (Katz & Lavack, 2002; Sepe, Ling, & Glantz, 2002). This approach has been adopted to some extent in recent years by several federal agencies (e.g., National Cancer Institute, Centers for Disease Control and Prevention [CDC]) and nongovernmental organizations (e.g., American Heart Associations,

National Cancer Society) using such approaches as the Claritas (2016) PRIZM segmentation system for public health campaigns. More specific to the current study, this approach has also been leveraged in antitobacco campaigns as the Truth Initiative (Richardson, Green, Xiao, Sokol, & Vallone, 2010; Thrasher et al., 2004), the Real Cost (Duke et al., 2015), and others (Ling et al., 2014; Lisha, Jordan, & Ling, 2016), demonstrating significant implications for public health promotion.

The "Values, Attitudes, and Lifestyles Scale" (VALS; Strategic Business Insights, 2015) is a proprietary assessment based on several large national surveys of consumer opinion that examines individual psychographic characteristics. The VALS classifies people into eight segments based on level of resources (per measures of socioeconomic status) and primary motivation (per the VALS items). These segments (going from highest to lowest level of resources) include the following: innovators, thinkers, believers, achievers, strivers, experiencers, makers, and survivors. These traits have a strong correlation with consumer preferences about products, activities, and media (Schiffmen, 2004). This scale has been widely used in industry (Schiffmen, 2004; Valentine & Powers, 2013) and to some extent in public health promotion (Berg et al., 2016; Shieh & Cheng, 2007; Vyncke, 2002; Walsh, Rudd, Moeykens, & Moloney, 1993).

Despite the potential of this tool to inform public health campaigns targeting the range of tobacco products on the market, the VALS has not been examined in terms of whether it might determine meaningful segments of young adults, particularly in relation to ATP use behaviors. This is compelling, given the diversification of tobacco products on the market and the range of advertising strategies used to promote them. Moreover, the increasing rates of polytobacco use (Soneji, Sargent, & Tanski, 2014; Sung, Wang, Yao, Lightwood, & Max, 2015) and concurrent tobacco–marijuana use (Schauer, Berg, Kegler, Donovan, & Windle, 2015) that have emerged alongside the emergence of ATPs highlight the need for more sophisticated characterization of tobacco users in order to effectively intervene.

The current study analyzes baseline data from a large-scale longitudinal study of young adult college students, entitled "Project DECOY—*D*ocumenting *E*xperiences with *C*igarettes and *O*ther Tobacco in *Y*oung Adults." Two major goals of Project DECOY are to (1) identify market segments of young adult college students based on their psychographic profiles and (2) examine the longitudinal epidemiology of tobacco use among these market segments over a 2-year period, including the sequencing of tobacco product use change and changes in psychosocial sequelae (e.g., perceived addiction) among different segments. In this article, we address the first major goal related to the identification of psychographically distinct segments of young adults at risk for using the range of tobacco products and other substances (i.e., alcohol, marijuana) using cluster analyses with the VALS as the basis for segment identification.

Method

Study Design

The current study was approved by the Emory University and ICF International Institutional Review Boards as well as those of the participating colleges. The methods employed in

Project DECOY are documented in detail elsewhere (Berg et al., 2016). In short, it involved a 2-year longitudinal cohort study involving 3,418 racially/ethnically diverse young adults attending seven Georgia colleges/universities. Data collection began in fall 2014 and consists of individual assessments every 4 months for 2 years (fall, spring, and summer).

Participants

The primary sampling frame includes seven Georgia campuses, including two public universities, two private colleges/universities, two community/technical colleges, and a historically Black university with representation from rural and urban settings. The rationale for sampling from these institutions was to obtain a broad range of young adults in terms of sociodemographic backgrounds and to contextualize study findings with regard to campus-related factors. Inclusion criteria were as follows: (1) age 18 and 25 (to include the broad range of young adult ages but reduce overall age variability) and (2) ability to read English.

College e-mail addresses were obtained from the registrar's office from each college/university for students meeting eligibility criteria. Three thousand 18- to 25-year-olds were randomly selected from one private and two public universities. The remainder of the schools had 18- to 25-year-old student populations of fewer than 3,000; thus, the entire student population of that age range at those schools was included in recruitment. Our total response rate was 22.9% ($N = 3,574/15,607$). Although this response rate may seem low, the response was over a very short time frame (i.e., 7–14 days at each school, depending on when our recruitment target was met). This strategy was chosen by design, as we wanted to recruit participants who would respond quickly to the request to participate, and thus, they were highly engaged online. This strategy was chosen in order to aid in retention. We employed a graduated compensation schedule ($US 30 for the first two assessments, $40 for the second two, and $50 for the final two), with an additional $100 incentive for participating in all assessments.

Measures

The cluster analysis was based on market research variables. Clusters identified were examined in relation to sociodemographics (age, sex, race/ethnicity, type of college/university attended, and whether the school was urban or rural), personality characteristics, extracurricular activities, mental health, and other health behaviors to further characterize the segments. The segments were then examined in relation to substance use and motives for use.

Market research—The VALS (Strategic Business Insights, 2015), which was used to define the clusters, assesses a range of statements regarding interests and activities that individuals are asked to assess in relation to themselves (1 = *mostly disagree* to 4 = *mostly agree*). In our prior research (Berg et al., 2016), nine factors were identified, accounting for 56.44% of total variance. The nine factors were labeled based on the thematic content of items loading on each factor: novelty-seeking, fashion orientation, tangible creation, social conservatism, intellectual curiosity, feelings of competency, self-focused thinking, narrowed interests, and mechanical interests (Berg et al., 2016). Cronbach's α for items loading on each factor ranged from .61 (narrowed interests) to .89 (fashion orientation).

Personality characteristics—The Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003) was used to assess the traditional Big Five personality factors (i.e., extroversion, agreeableness, conscientiousness, emotional stability, and openness to experience), with 2 items measuring each factor. Each item consists of two descriptors, using the stem, "I see myself as …" (1 = *strongly disagree* to 7= *strongly agree*). Example items include "extroverted, enthusiastic" and "reserved, quiet."

Psychosocial factors—The Patient Health Questionnaire–9 item (PHQ-9; Kroenke & Spitzer, 2002), a depression screening tool, was used to assess frequency of depressed mood ("feeling down, depressed or hopeless"), anhedonia ("little interest or pleasure in doing things"), and other depressive symptoms over the past 2 weeks (0 = *not at all* to 3 = *nearly every day*). Cronbach's α was .85, indicating good reliability (George & Mallery, 2003). Social support was assessed using the Interpersonal Support Evaluation List–12 item (ISEL-12; Cohen, Mermelstein, Kamarck, & Hoberman, 1985), which assesses perceived availability of social support across three domains: appraisal (e.g., "When I need suggestions on how to deal with a personal problem, I know someone I can turn to"), belonging (e.g., "If I wanted to have lunch with someone, I could easily find someone to join me"), and tangible (e.g., "If I were sick, I could easily find someone to help me with my daily chores") on a 4-point scale (0 = *definitely false* to 3 = *definitely true*). Cronbach's αs for the total and subscale scores, respectively, were .85, .73, .69, and .60, indicating questionable to good reliability (George & Mallery, 2003). The total (which demonstrated good reliability) was used in these analyses, as the subscales were highly correlated (*r*s from .46 to .54, *p*s < .001) and demonstrated similar patterns across segments.

Extracurricular activities—Participants were asked about the extracurricular activities in which they participate (see Table 1).

Health-related behaviors—To further characterize the health behavior profiles of young adult market segments, we assessed other health behaviors. Fruit and vegetable (FV) consumption, respectively, was assessed by asking, "About how many cups of fruits/ vegetables (including 100% pure fruit/vegetable juice) do you eat or drink each day?" (Yaroch et al., 2012). An aggregate variable was created, as the two were highly correlated (*r* = .53, *p* < .001) and demonstrated similar trends across segments. Physical activity was assessed by asking, "During the past 7 days, on how many of those days did you do moderate-intensity cardio or aerobic exercise for at least 30 min? During the past 7 days, on how many of those days did you do vigorous-intensity cardio or aerobic exercise for at least 20 min?" (CDC, 2012). Total number of days of aerobic activity are presented, as the two were highly correlated (*r* = .73, *p* < .001) and demonstrated similar trends across clusters. Participants also reported the number of sexual partners in the past year.

Tobacco and other substance use—We asked, "How many days of the past 30 days did you use: cigarettes? flavored little cigars (such as Black and Milds)? cigarillos (such as Swisher Sweets cigarillos)? chewing tobacco, snuff, or dip (such as Redman, Levi Garrett, Beechnut, Skoal, Skoal Bandits, or Copenhagen)? snus (such as Camel or Marlboro Snus)? dissolvable tobacco products (such as Ariva, Stonewall, Camel orbs, Camel sticks, or Camel

strips)? electronic cigarettes or e-cigarettes (such as Ruyan, Blu, or NJOY)? tobacco from a hookah or a water pipe? alcohol? and marijuana (pot, weed, hashish, and hash oil)?" (CDC, 2011). Current users were considered to be individuals who used at least 1 day in the past 30 days.

Data Analysis

We examined differing cluster analytic strategies on the nine VALS factors. After identifying the clusters present in the data, we conducted bivariate analyses to compare psychographic, sociodemographic, other psychosocial variables, and substance use characteristics among the clusters. We also conducted post hoc comparisons to further explore differences among segments, using Bonferroni tests for continuous variables and pairwise χ^2 tests among categorical variables. After examining the nature of each cluster based on bivariate analyses, we organized our descriptions of the clusters to match the style of presentation in tobacco industry reports (Holm Group, 1998; Philip Morris USA, 1994, 1996). The authors reviewed responses to all questions, and descriptive names for clusters were generated based on overall character of their responses, prioritizing questions that differentiated the clusters most. Finally, we developed a series of binary logistic regressions examining use of the distinct tobacco products, alcohol, and marijuana in the past 30 days (vs. no use). We ordered the entry of age, sex, ethnicity, type of school attended, and rural versus urban setting of the school, along with our primary variable of interest—market segment—into the regression model in order to examine the validity of market segment in predicting substance use beyond sociodemographics. Data analysis was performed using SPSS Version 23.0, and significance was set at $\alpha = .05$.

Findings

Participant Characteristics

The sample was an average age of 20.55 ($SD = 1.97$), 64.4% female, and 59.1% White. Past 30-day use prevalence for each substance was as follows: cigarettes, 13.3%; LCCs, 11.2%; SLT, 3.6%; e-cigarettes, 10.9%; hookah, 12.2%; alcohol, 63.1%; and marijuana, 19.0%.

Cluster Analysis Results

The indexes of optimum cluster solutions (i.e., pseudo F-statistic, pseudo t^2 statistic) were variable across cluster methods. The K-means analysis indicated that the pseudo F-statistic peaked at three clusters. The pseudo t^2 statistic indicated an optimum cluster solution of five clusters. Based on preliminary analyses and previous research, K-means cluster analysis was used for further analysis of clusters ranging from 2 to 6. We examined post hoc test results regarding the VALS factor scores across clusters to determine when the addition of another cluster no longer derived a distinct group. Based on this approach, we determined that the optimal number of clusters was five, as the addition of a sixth cluster yielded a relatively redundant cluster. Table 1 and Figure 1a and b provide socio-demographic, psychographic, other psychosocial characteristics, and substance use among the clusters. Each cluster is described below.

Conventionals—This segment was the largest of the five segments, was among the youngest, and had the greatest proportion of females, Blacks, technical college or historically black college and university (HBCU) students, and rural students of the five. This segment had the lowest proportion of homosexuals or bisexuals. In terms of VALS characteristics, they were the highest of the segments in fashion orientation and social conservatism. Regarding personality characteristics and other associated characteristics, this segment was the highest in agreeableness and conscientiousness, was most likely involved in religious-oriented extracurriculars, reported the fewest symptoms of depression, and reported the greatest social support. Because this group had the highest scores on social conservatism, agreeableness, and conscientiousness and the fewest reported symptoms of depression, we coined this group "Conventionals." This segment was the least likely to use cigarettes, SLT, and e-cigarettes.

Simple Lifes—This segment was among the oldest on average and had the highest proportion who were male and White. They were the lowest in fashion orientation per the VALS. Other personality and health characteristics also distinguished this segment; they were among the highest in emotional stability. This segment was the least likely to play collegiate sports, participate in service-oriented extracurriculars, or be in a fraternity/ sorority. Because of this cluster's low concern regarding fashion and several extracurriculars, but was high in emotional stability, we named this group "Simple Lifes." Simple Lifes were the least likely to use hookah and among those least likely to use LCCs or marijuana.

Open Minds—This segment had the lowest proportion of Blacks but the highest of Asians and other racial/ethnic minorities. This segment also had the highest proportion of homosexual/bisexuals and private school students. In terms of VALS characteristics, this segment was the highest in intellectual curiosity and the lowest in social conservatism and narrowed interests. In terms of other characteristics, they had the lowest scores in agreeableness and conscientiousness and the highest in openness to new experiences. They had the highest proportion involved in the performing arts, service-oriented extracurriculars, and fraternities/sororities but the least in religious-oriented extracurriculars. This segment reported the highest level of FV intake and past-year sex partners. Because of this group's high level of intellectual curiosity, interests in general, and openness to new experiences, we named this group "Open Minds." This segment was the most likely to use cigarettes, hookah, alcohol, and marijuana.

Confident Novelty-seekers—This segment had the highest proportion of Hispanics. In terms of VALS characteristics, this segment was highest in novelty-seeking, tangible creation, feelings of competency, self-focused thinking, and mechanical interests. This segment was also the highest in extroversion and most likely to engage in intramural sports, collegiate sports, and student government. This segment also reported the highest physical activity. Because of this segment's high reports of novelty-seeking and feelings of competency, along with their extroversion and involvement in a range of extracurriculars, we named this group "Confident Novelty-seekers." This segment was the most likely to currently use LCCs, SLT, and e-cigarettes.

Stoic Individualists—This segment was among the youngest of the segments. Regarding VALS characteristics, they were the highest in narrowed interests and lowest in novelty-seeking, tangible creation, intellectual curiosity, feelings of competency, self-focused thinking, and mechanical interests. In terms of other personality and health characteristics, they were the lowest in on extroversion, emotional stability, and openness to new experiences; they reported the highest depressive symptoms and the lowest social support. They were the least likely to be involved in the performing arts, intramural sports, and student government. They were the lowest in FV intake and physical activity and had the fewest sex partners in the past year. Because of this group's narrowed interests and low ratings on several of the VALS characteristics, the higher level of depressive symptoms in this group, and their low involvement in social activities, we named this group "Stoic Individualists." This segment was the least likely to use LCCs, alcohol, or marijuana.

Multivariable Modeling of Substance Use

In the logistic regression (Table 2), being Open Minds, Confident Novelty-seekers, and Stoic Individualists (vs. the Conventionals [referent]) predicted cigarette use; being Confident Novelty-seekers predicted LCC use; not being Simple Lifes predicted SLT use; being Open Minds or Confident Novelty-seekers predicted e-cigarette use; not being Simple Lifes but being Open Minds predicted hookah use; being Open Minds but not Simple Lifes or Stoic Individualists predicted alcohol use; and being Open Minds predicted marijuana use.

Discussion

This analyses indicates the utility of market research assessments, specifically the VALS (Strategic Business Insights, 2015), in identifying psychographically distinct segments of the young adult population with different substance use profiles, particularly in relation to ATPs. While previous research has examined market segments in relation to substance use and other health behaviors (Berg et al., 2010, 2011; Ling et al., 2004; Ling & Glantz, 2002a; Ling, Neilands, & Glantz, 2007; Suragh, Berg, & Nehl, 2013), this study is among the first to examine how market research can distinguish ATP users, which is particularly important given the shifting terrain of tobacco use in the United States. This approach provides a unique characterization of market segments of college students that can inform intervention strategies to curb ATP, marijuana, and polysubstance use.

Our prior research (Berg et al., 2016) using only the factors derived from the VALS demonstrated that novelty-seeking was associated with all substance use. In addition, correlates of cigarette use included greater intellectual curiosity and less interest in tangible creation and social conservatism, correlates of LCC use included greater fashion orientation, correlates of SLT use included less intellectual curiosity, correlates of e-cigarette use included less social conservatism, and correlates of hookah use included greater fashion orientation and self-focused thinking and less social conservatism (Berg et al., 2016). These findings, while important in identifying targets for intervention, are limited in their ability to characterize segments of the young adult population.

The current analysis indicated that distinct segments were at particular risk for using certain substances. In the interpretation of these findings, it is critical to reflect both on post hoc

comparisons and on the regression results, particularly related to the findings regarding SLT and e-cigarettes. Sociodemographic correlates were associated with substance use profiles; discussion regarding these sociodemographics correlates in this sample is reported elsewhere (Berg et al., 2016; Haardörfer et al., 2016). While post hoc tests indicated that Confident Novelty-seekers were more likely to use SLT compared to other segments and that Conventionals and Stoic Individualists were less likely to use compared to others, regression results indicated that Simple Lifes were less likely to use SLT. This is counterintuitive, given that this segment included the largest proportion of men and Whites, both of which are risk factors for SLT use (CDC, 2013). Thus, these results are undoubtedly in part due to a large percent of variance in SLT use attributed to these other factors.

Regression results regarding e-cigarette use were in contradiction to the post hoc test results. In post hoc tests, Confident Novelty-seekers were more likely to use e-cigarettes compared to the other segments, with Open Minds more likely compared to the remaining segments and Simple Lifes more likely compared to Conventionals and Stoic Individualists. However, the regression results indicated that Open Minds were the only segment more likely to use e-cigarettes compared to Conventionals. This may be attributable to the fact that other significant correlates (e.g., age, sex, race, and school type) were associated with being Conventionals and Simple Lifes, diminishing effects of segment assignment in the regression model.

The regressions provided support for the predictive validity of market segments in relation to substance use. However, given the impact of including sociodemographics on the regression results, the following interpretation regarding the substance use profiles will rely on the unadjusted rates of use. As such, Open Minds were a particularly high-risk segment for using a range of substances. Across segments, they had the highest unadjusted use rates for alcohol, marijuana, cigarettes, and hookah. Of note, this segment also indicated going out most frequently of the segments, which might be associated with social use of these products, which was also found. In particular, hookah is notably a social experience (Berg, Schauer, Asfour, Thomas, & Ahluwalia, 2011; Berg et al., 2015; Braun, Glassman, Wohlwend, Whewell, & Reindl, 2011; Martinasek, McDermott, & Martini, 2011). They also rated expansion and enhancement motives for alcohol use higher than for other segments, which aligns with their psychographic profile of intellectual curiosity and openness to new experiences. Within this segment, the use of e-cigarettes was also notably high.

Moreover, Confident Novelty-seekers were at high risk, with the highest unadjusted use rates for LCCs, e-cigarettes, and SLT. The recent emergence of LCCs and e-cigarettes may have given way to this segment experimenting with these products. Also, this segment included the largest number of athletes, who are more likely to use SLT (Agaku et al., 2015; Rigotti, Lee, & Wechsler, 2000). Within this segment, the substance used most often was alcohol followed by marijuana.

Conventionals, while relatively at low risk compared to Open Minds and Confident Novelty-seekers, indicated three areas of particular risk—LCC, hookah, and marijuana use. This use profile has been documented previously, particularly prevalent among Blacks (Enofe, Berg,

& Nehl, 2014; Evans-Polce, Lanza, & Maggs, 2016; Haardörfer et al., 2016), which were most represented in this segment.

Simple Lifes and Stoic Individualists had roughly similar unadjusted use rates across substances. However, their psychographic profiles indicated potentially distinct reasons for use. In particular, Simple Lifes had the highest scores in emotional stability, while Stoic Individualists reported the highest levels of depressive symptoms and least social support. Stoic Individualists' lack of interest in a variety of activities (per the VALS) may reflect anhedonia. They also had the lowest FV consumption and physical activity, which has been previously associated with depression (Lopresti, Hood, & Drummond, 2013; Roshanaei-Moghaddam, Katon, & Russo, 2009).

Current findings have implications for future research and practice. First, further research is need to characterize at-risk youth and young adults using similar tactics and examining changes in substance use over time within these groups as well as the stability of group membership per such market research techniques over time. Moreover, research should aim to more fully assess and understand the types of contextual factors that interplay with individual risk factors, given the association between campus environments and distinct tobacco product and other substance use, potentially identifying policy and systems change that might aid in protecting at-risk young adults. Finally, this type of psychographic segmentation could be compared to other types of segmentation (e.g., those based on sociodemographics or health behaviors) and could be compared to determine which are more effective in identifying and reaching these target audiences (e.g., those engaging in high-risk behaviors). In terms of practice, current findings indicated that a widely used industry assessment may have utility in differentiating the users of the various tobacco products and other substances and point to how and where the tobacco industry market their products. These data can inform regulatory efforts and interventions to reduce tobacco and other substance use, particularly ATP use.

Limitations

Limitations to the current study include lack of generalizability due to the sample being drawn from only seven colleges/universities exclusively in the state of Georgia. Additional limitations include selection bias, the self-report nature of the online survey assessments, and a lack of assessment of other potential confounders (e.g., proximity to tobacco retailers, genetic vulnerability to nicotine dependence). Additionally, while cluster analytic approaches rely on some subjective judgments in terms of establishing the number of clusters, the distinct nature of the clusters identified in terms of psychographic characteristics and substance use indicates the validity of this approach and of the five-cluster solution.

Conclusion

This study identified five psychographically distinct segments of young adults and documented distinct tobacco and other substance use profiles across these segments. Thus, using industry market research techniques can identify those at greatest risk for using the range of traditional and ATPs as well as other substances Cutting-edge approaches, such as

this, are needed to inform interventions to address the emerging public health issues of ATP, marijuana, and polysubstance use.

Acknowledgments

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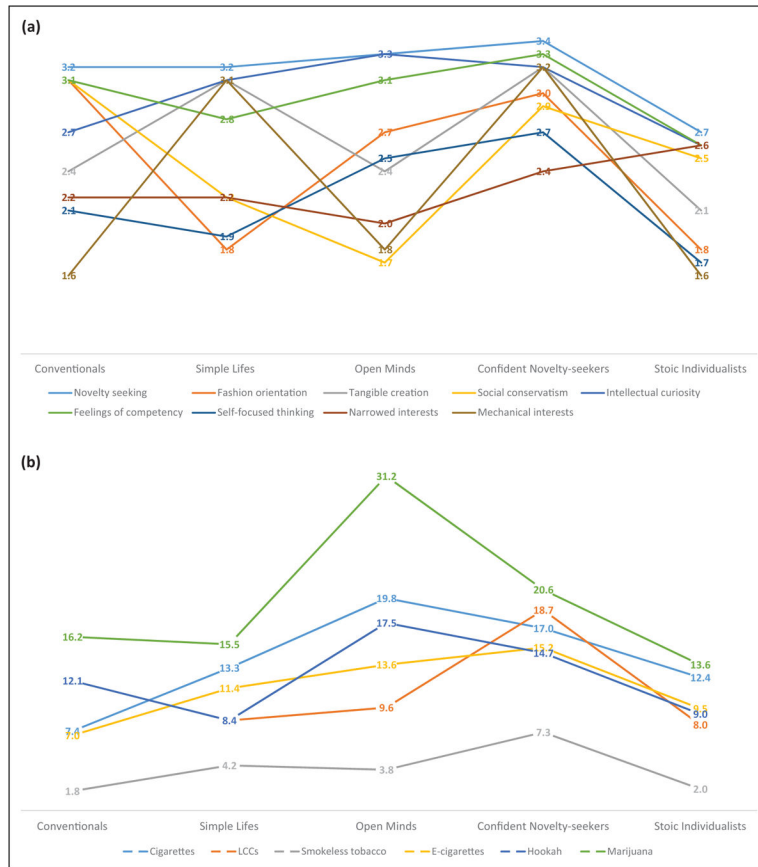
Figure 1.
Psychographic characteristics per the Values, Attitudes, and Lifestyle Scale (VALS) and substance use across clusters. (a) VALS dimensions across segments. Means reported for VALS characteristics (range from 1 to 4). Data points overlap in some instances, although distinct lines are identifiable for each cluster and characteristic in order to identify the corresponding means. (b) Substance use prevalence across segments. Percentage reported for substance use. Alcohol not shown to increase visibility of other substance use profile (but it largely mirrors the pattern for marijuana use). Data points overlap in some instances, although distinct lines are identifiable for each cluster and characteristic in order to identify the corresponding means, with the exception of the line between Conventionals and Simple Lifes for little cigars/cigarillos and hookah (12.1% and 8.4% for both clusters, respectively).

Table 1

Participant Characteristics and Bivariate Analyses Examining Psychosocial and Health-Related Factors Across Clusters.

Variables	Total, N = 3,418 (100.0%) M (SD) or N (%)	Conventionals (C), N = 919 (26.9%) M (SD) or N (%)	Simple Lives (SL), N = 665 (19.5%) M (SD) or N (%)	Open Minds (OM), N = 572 (17.7%) M (SD) or N (%)	Confident Novelty-Seekers (CN), N = 572 (16.7%) M (SD) or N (%)	Stoic Individualists (SI), N = 656 (19.2%) M (SD) or N (%)	p	Post Hoc Comparisons
Sociodemographics								
Age (SD)	20.55 (1.97)	20.40 (1.84)	20.83 (2.04)	20.76 (2.08)	20.47 (1.97)	20.35 (1.90)	<.001	SL, OM > C, SI
Female (%)	2,199 (64.4)	803 (87.4)	286 (43.1)	350 (57.9)	280 (49.0)	480 (73.4)	<.001	C > others, SI > others
Race/ethnicity (%)							<.001	
White	1,996 (59.1)	454 (49.8)	462 (70.6)	399 (66.5)	296 (52.3)	385 (59.7)		SL, OM > others
Black	809 (24.0)	360 (39.5)	79 (12.1)	67 (11.2)	159 (28.1)	144 (22.3)		C > others
Hispanic	254 (7.5)	60 (6.6)	43 (6.6)	48 (8.0)	48 (8.5)	44 (6.8)		OM, CN > others
Asian	212 (6.3)	18 (2.0)	45 (6.9)	59 (9.8)	46 (8.1)	44 (6.8)		OM, CN > others
Other	106 (3.1)	20 (2.2)	25 (3.8)	27 (4.5)	17 (3.0)	17 (3.0)		OM > others
Homosexual/bisexual (%)	295 (8.6)	37 (4.0)	71 (10.7)	90 (14.9)	45 (7.9)	52 (8.0)	<.001	OM > others; others > C
School type (%)							<.001	
Private school	1,319 (38.6)	228 (24.8)	278 (41.9)	376 (62.1)	184 (32.2)	253 (38.7)		OM > others
Public	935 (27.4)	247 (26.9)	190 (28.6)	155 (25.5)	161 (28.1)	182 (27.8)		others > C, OM
Technical college	750 (22.0)	257 (28.0)	153 (23.0)	52 (8.6)	135 (23.6)	153 (23.4)		C > others
Historically Black	410 (12.0)	187 (20.3)	43 (6.5)	22 (3.6)	92 (16.1)	66 (10.1)		C > others
Rural (%)	2,034 (59.6)	617 (67.1)	377 (56.8)	267 (44.1)	378 (66.1)	395 (60.4)	<.001	C, CN > others
VALS factors (SD)								
Novelty-seeking	3.17 (0.49)	3.23 (0.42)	3.15 (0.45)	3.31 (0.42)	3.44 (0.40)	2.74 (0.49)	<.001	a
Fashion orientation	2.53 (0.82)	3.11 (0.54)	1.83 (0.59)	2.71 (0.65)	3.01 (0.60)	1.85 (0.59)	<.001	a Except SL, SI
Tangible creation	2.62 (0.73)	2.38 (0.61)	3.12 (0.56)	2.37 (0.63)	3.21 (0.52)	2.14 (0.63)	<.001	a Except C, OM
Social conservatism	2.54 (0.80)	3.14 (0.43)	2.16 (0.71)	1.69 (0.49)	2.93 (0.65)	2.53 (0.70)	<.001	a
Intellectual curiosity	2.95 (0.56)	2.70 (0.50)	3.14 (0.45)	3.27 (0.44)	3.17 (0.47)	2.62 (0.58)	<.001	a Except OM, CN
Feelings of competency	3.00 (0.53)	3.07 (0.48)	2.90 (0.48)	3.11 (0.46)	3.33 (0.40)	2.61 (0.58)	<.001	a Except C, OM
Self-focused thinking	2.20 (0.71)	2.14 (0.65)	1.95 (0.58)	2.54 (0.64)	2.74 (0.66)	1.72 (0.55)	<.001	a

Variables	Total, N = 3,418 (100.0%) M (SD) or N (%)	Conventionals (C), N = 919 (26.9%) M (SD) or N (%)	Simple Lifes (SL), N = 665 (19.5%) M (SD) or N (%)	Open Minds (OM), N = 572 (17.7%) M (SD) or N (%)	Confident Novelty-Seekers (CN), N = 572 (16.7) M (SD) or N (%)	Stoic Individualists (SI), N = 656 (19.2%) M (SD) or N (%)	p	Post Hoc Comparisons
Narrowed interests	2.28 (0.66)	2.23 (0.61)	2.20 (0.62)	2.01 (0.60)	2.37 (0.69)	2.63 (0.64)	<.001	[a] Except C, SL
Mechanical interests	2.21 (0.92)	1.64 (0.55)	3.10 (0.59)	1.83 (0.60)	3.22 (0.60)	1.59 (0.53)	<.001	[a] Except C, SI
Personality (SD)								
Extroversion	4.09 (1.51)	4.40 (1.42)	3.74 (1.49)	4.39 (1.53)	4.55 (1.29)	3.41 (1.47)	<.001	Others > SL, SI
Agreeableness	4.96 (1.16)	5.12 (1.13)	4.93 (1.14)	4.81 (1.21)	4.87 (1.14)	4.99 (1.17)	<.001	C > others
Conscientiousness	5.51 (1.22)	5.79 (1.18)	5.43 (1.24)	5.30 (1.20)	5.50 (1.18)	5.45 (1.23)	<.001	C > others
Emotional stability	4.84 (1.37)	4.86 (1.35)	5.02 (1.38)	4.71 (1.41)	4.99 (1.32)	4.64 (1.37)	<.001	SL, CN > OM, SI
Openness to experiences	5.21 (1.15)	5.32 (1.09)	5.23 (1.11)	5.48 (1.05)	5.38 (1.16)	4.60 (1.16)	<.001	OM > others; others > SI
Psychosocial factors (SD)								
Depression	6.34 (5.38)	5.97 (5.00)	6.56 (5.67)	6.26 (5.17)	6.24 (5.61)	6.80 (5.54)	.033	SI > C
Social support	36.88 (5.04)	37.34 (5.03)	36.53 (4.90)	37.15 (4.70)	37.09 (5.23)	36.17 (5.25)	<.001	C > SL, OM, SI; OM > CN, SI
Activities (%)								
Performing arts	358 (12.1)	89 (11.6)	77 (12.9)	88 (15.8)	54 (11.5)	50 (8.7)	.007	OM > others; others > SI
Intramural sports	770 (26.0)	167 (21.7)	175 (29.4)	146 (26.2)	160 (34.0)	122 (21.3)	<.001	CN > others
Collegiate sports	233 (7.9)	55 (7.2)	32 (5.4)	40 (7.2)	58 (12.3)	48 (8.4)	.001	CN > others
Student government	265 (8.9)	63 (8.2)	43 (7.2)	62 (11.1)	57 (12.1)	40 (7.0)	.006	OM, CN > others
Religious	667 (22.5)	222 (28.9)	1,177 (19.6)	64 (11.5)	125 (26.6)	139 (24.3)	<.001	C, CN > others
Service oriented	689 (23.2)	164 (21.3)	124 (20.8)	168 (30.2)	110 (23.4)	123 (21.5)	.001	OM > others
Fraternity/sorority	417 (14.1)	93 (12.1)	67 (11.2)	120 (21.5)	72 (15.3)	65 (11.4)	<.001	OM > others
Health behaviors (SD)								
FV intake	2.92 (2.53)	2.71 (2.42)	3.17 (2.45)	3.36 (2.57)	3.20 (2.60)	2.32 (2.54)	<.001	Others > SI
Physical activity	4.17 (3.95)	3.69 (3.81)	4.39 (3.94)	4.36 (3.96)	5.33 (4.14)	3.43 (3.72)	<.001	CN > others
Past-year sex partners	1.18 (1.80)	1.20 (1.63)	1.03 (1.52)	1.42 (2.03)	1.40 (2.13)	0.88 (1.72)	.031	C, OM, CN > SI; OM, CN > SL
Substance use (%)								
Cigarettes	454 (13.3)	68 (7.4)	88 (13.3)	120 (19.8)	97 (17.0)	81 (12.4)	<.001	OM, CN > others; others > C
LCCs	384 (11.2)	111 (12.1)	56 (8.4)	58 (9.6)	107 (18.7)	52 (8.0)	<.001	CN > others; C > SL, OM, SI
SLT	123 (3.6)	17 (1.8)	28 (4.2)	23 (3.8)	42 (7.3)	13 (2.0)	<.001	CN > others; others > C, SI

Variables	Total, $N =$ 3,418 (100.0%)	Conventionals (C), $N =$ 919 (26.9%)	Simple Lifes (SL), $N =$ 665 (19.5%)	Open Minds (OM), $N =$ 572 (17.7%)	Confident Novelty-Seekers (CN), $N =$ 572 (16.7)	Stoic Individualists (SI), $N =$ 656 (19.2%)	p	Post Hoc Comparisons
	M (SD) or N (%)	M (SD) or N (%)	M (SD) or N (%)	M (SD) or N (%)	M (SD) or N (%)	M (SD) or N (%)		
E-cigarettes	371 (10.9)	64 (7.0)	76 (11.4)	82 (13.6)	87 (15.2)	62 (9.5)	<.001	CN > others; OM > C, SL, SI; SL > C, SI
Hookah	416 (12.2)	111 (12.1)	56 (8.4)	106 (17.5)	84 (14.7)	59 (9.0)	<.001	OM > others; CN > C, SL, SI; C > SL, SI
Alcohol	2,153 (63.1)	550 (59.8)	421 (63.4)	487 (80.5)	346 (60.5)	349 (53.4)	<.001	OM > others; others > SI
Marijuana	648 (19.0)	149 (16.2)	103 (15.5)	189 (31.2)	118 (20.6)	89 (13.6)	<.001	OM > others; CN > C, SL, SI

Note. $N =$ 3,418. Bonferroni post hoc tests and pairwise χ^2 tests used to examine differences between groups. VALS = Values, Attitudes, and Lifestyle Scale; FV = fruit and vegetable; LCC = little cigars/cigarillos; SLT = smokeless tobacco.

[a] All differ.

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Table 2

Binary Logistic Regression Models Predicting Substance Use.

Variables	Cigarettes		LCCs		SLT		E-Cigarettes		Hookah		Alcohol		Marijuana	
	OR	p	OR	p	OR	p	OR	p	OR	p	OR	p	OR	p
Sociodemographics														
Age	1.05	.054	0.94	.044	1.03	.570	0.94	.042	0.96	.185	1.04	.022	0.94	.005
Female	0.52	<.001	0.61	<.001	0.03	<.001	0.41	<.001	0.62	<.001	0.83	.024	0.58	<.001
Race/ethnicity														
White	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—
Black	0.41	<.001	2.06	<.001	0.21	.001	0.38	<.001	1.71	.001	0.78	.026	1.88	<.001
Hispanic	0.84	.377	0.66	.134	0.22	.012	1.01	.952	1.74	.004	1.02	.895	1.29	.148
Asian	1.18	.546	0.69	.262	0.57	.215	0.87	.578	1.68	.018	0.79	.121	0.80	.280
Other	1.91	<.001	1.92	.025	0.47	.300	1.22	.510	1.96	.013	0.80	.279	1.44	.141
School type														
Public college	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—
Technical college	2.71	<.001	1.04	.799	2.25	.005	2.30	<.001	0.70	.026	1.26	.026	0.92	.569
Private college	0.85	.226	0.55	<.001	0.84	.445	0.76	.061	0.56	<.001	1.01	.921	1.10	.414
Historically black	1.10	.749	1.57	.027	0.35	.327	1.43	.219	1.26	.271	1.50	.008	2.70	<.001
Rural	1.12	.346	1.16	.283	2.08	.002	1.49	.002	0.74	.017	0.79	.003	0.69	.001
Cluster														
Conventionals	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—	Ref	—
Simple Lifes	1.23	.183	0.83	.320	0.49	.035	1.10	.625	0.67	.034	0.79	.038	1.04	.795
Open Minds	2.85	<.001	1.21	.314	0.82	.575	1.97	<.001	1.74	.001	1.45	.002	2.75	<.001
Confident Novelty-seekers	1.97	<.001	1.65	.002	1.16	.647	1.71	.004	1.22	.490	0.99	.930	1.27	.101
Stoic Individualists	1.52	.019	0.78	.174	0.56	.143	1.20	.341	0.77	.131	0.76	.009	0.91	.541

Note. Nagelkerke's r^2 = .103, .098, .278, .089, .063, .029, and .101, respectively. LCC = little cigars/cigarillos; SLT = smokeless tobacco; OR = odds ratio.