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Psychographic Segments of College Females and Males in Relation to Substance Use Behaviors

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Abstract

Objectives—A common commercial marketing segmentation technique is to divide a population into groups based on psychographic characteristics (i.e., attitudes and interests). We used this approach to define segments of female and male college students and examine substance use differences.

Method—We administered an online survey to 24,055 students at six colleges in the Southeastern United States (response rate 20.1%, n = 4,840), obtaining complete data from 3,469 participants. We assessed sociodemographics, psychographic factors such as those used by the tobacco industry to define market segments, and substance use (cigarettes, other tobacco products, alcohol, and marijuana). Cluster analysis was conducted among females and males using 15 psychographic measures (sensation seeking, Big Five personality traits, and nine measures adapted from tobacco industry documents), identifying three segments per sex.

Results—Safe responsibles were characterized by high levels of agreeableness, conscientiousness, emotional stability, academic achievement, and religious service attendance. Stoic individualists were characterized by low extraversion, sensation seeking, and openness. Thrill-seeking socializers were characterized by high levels of sensation seeking and extraversion. Among females, thrill-seeking socializers were significantly more likely than safe responsibles to have used any substance in the prior 30 days (odds ratio [OR] = 2.04, 95% confidence interval [CI] [1.65, 2.52]; Nagelkerke R^2 = .084). Among males, stoic individualists (OR = 1.50, CI [1.08, 2.08]) and thrill-seeking socializers (OR = 1.53, CI [1.09, 2.13]) were more likely than safe responsibles to have used substances in the past 30 days (Nagelkerke R^2: .109).

Conclusion—Psychographic segmentation can identify young adult subgroups with differing psychographic and substance use profiles and inform health campaigns and messaging targeting youth.

Keywords

youth; audience; alcohol consumption; health; substance abuse; tobacco cessation

Background and Literature

Substance use and misuse, particularly of tobacco, alcohol, and marijuana, is a growing public health problem associated with an array of health, social, and economic

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consequences. According to the Centers for Disease Control and Prevention (CDC), cigarette smoking accounts for an estimated 443,000 deaths each year in the United States (CDC, 2012). Similarly, there are approximately 80,000 deaths attributable to excessive alcohol use each year in the United States (CDC, 2012). Marijuana use has been linked with a variety of health issues such as increased risk of heart attacks, lung infections, and has been associated with mental illness (National Institute on Drug Abuse, 2012). Additionally, marijuana use has the risk of leading to other illicit drug use such as cocaine and heroin, which are two of the most common types of drugs associated with drug overdose in the United States (CDC, 2010; Kandel, Yamaguchi, & Chen, 1992). In terms of economic costs, cigarette smoking costs the United States more than $193 billion annually, due to lost productivity and health care expenditures (CDC, 2011). The estimated economic cost of excessive drinking in 2006 was US$223.5 billion, due to lost productivity, health care costs, criminal justice costs, and other effects (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011). According to the Office of National Drug Control Policy (ONDCP) in 2000, residents in the United States spent an estimated $10.5 billion on marijuana, with $1.7 billion being spent on marijuana-related violations that same year (ONDCP, 2004). Determining the factors that influence an individual to initiate and develop health compromising behaviors such as tobacco, alcohol, and marijuana use is of great public health significance and is the basis for this study.

In general, college and university students have been found to be at higher risk of developing patterns of unhealthy substance use behaviors (Harrison, Hinson, & McKee, 2009; Reed, Wang, Shillington, Clapp, & Lang, 2007). According to the Spring 2012 National College Health Assessment, 14.3% of students reported smoking cigarettes in the past 30 days, with 4.5% smoking every day; 65.9% reported alcohol consumption in the past 30 days, with 31.6% consuming five or more drinks last time they “partied;” and 15.9% reported smoking marijuana in the past 30 days, with 2.2% using marijuana every day (American College Health Association [ACHA], 2012). These data highlight the strong public health concern regarding young adults, who are at risk of initiating and engaging in unhealthy behaviors. Numerous studies have also found strong associations between the initiation and development of tobacco, alcohol, and marijuana use patterns in young adulthood (Dietz, Sly, Lee, Arheart, & McClure, 2012; Knight et al., 2001; Pinchevsky et al., 2012).

Substance use behaviors have also been found to vary by sociodemographic characteristics, particularly race and sex. Cigarette smoking among young adults aged 18-25 was more prevalent among Whites than Blacks, and Whites were more likely than other racial/ethnic groups to report current use of alcohol. As for illicit drug use (e.g., marijuana), Blacks (10%) were found to have slightly higher rates than Whites (8.7%; Substance Abuse and Mental Health Services Administration [SAMHSA], 2011). In terms of sex, males have higher past month rates of tobacco product use (i.e., cigarettes, cigars, smokeless tobacco, and pipe tobacco) than females (SAMHSA, 2011). Similarly, in comparison to females, males between the ages of 18-25 had higher drinking rates and were more likely to be current users of several different illicit drugs, including marijuana (SAMHSA, 2011). Given the striking sex differences, determining the extent and nature in which male substance use patterns differ from females will be one of the main aspects of this study.

Many interventions aimed at preventing tobacco, alcohol, and marijuana use in young adults have involved traditional public health methods rooted in health behavior models, such as the health belief model (Rosenstock, 1974) and social cognitive theory (Bandura, 1977). While there is merit in employing these strategies, research has demonstrated that developing health campaigns tailored to the characteristics of a specific group not only ensure that health messages appeal to target audiences but also increase the likelihood of

behavior change (Abbot, Policastro, Bruhn, & Byrd-Bredbenner, 2012; Kreuter, Strecher, & Glassman, 1999). The theoretical basis for tailoring messages is based on the elaboration likelihood model (Petty & Cacioppo, 1981). According to this model, a person processes messages through either the central or peripheral route. When an individual processes information through the central route, they carefully scrutinize the message content in order to determine the merits of the argument. Therefore, messages that are personally relevant are more likely to motivate attitudinal and behavioral change (Petty & Cacioppo, 1981). The peripheral route process involves mental shortcuts based on environmental characteristics and involves less analysis of message content. As such, messages that lack personally relevant information may not result in the same behavioral and attitudinal change as observed with central route processing (Petty & Cacioppo, 1981).

For decades, the tobacco and alcohol industry have used segmentation techniques to divide a population into groups by assessing psychographic characteristics. Examples of psychographic characteristics include extraversion, sensation seeking, rebelliousness, peer socialization, and engagement in social activities. These factors are then utilized by the industry to target groups of individuals using a variety of marketing techniques (Philip Morris, 1994; Philip Morris USA, 1996; YAS Segmentation Study [Philips Morris Tobacco Company Web site], 1993). Differential segmentation of the market based on unique consumer behaviors and desires allows the tobacco and alcohol industry to present their products in a way that is identifiable and relatable to specific consumers (Statt, 1997). In the 1990s, many private tobacco industry documents were released to the public as a part of the Master Settlement, revealing the industry's marketing campaigns aimed at young adults (Slater, 1996). By applying segmentation techniques when developing advertising campaigns, the tobacco industry has been able to advantageously design advertisements that entice young adults to use their products (Pollay, 2000). Similarly, alcohol advertising since the 1980s has become more directed toward consumers' desires and dreams (Lin, Casswell, You, & Huckle, 2012). The industry targets youth by associating their products with happiness, adventure, and social approval (Atkin & Block, 1984). By targeting messages toward individuals who are going off to college, these ads are able to more effectively influence attitudes and patterns of substance use behavior among young adults and the greater population (Ling & Glantz, 2002).

In order to prevent the initiation and continuation of health risk behaviors, using this strategy in public health campaigns may influence health behaviors of large groups of individuals with differing personality traits. There has been limited use of segmentation techniques in public health; however, the studies that have employed this technique have demonstrated interesting findings. A classic example is the American Legacy Foundation Truth campaign, which targeted youth through a mass media campaign. An evaluation of the campaign found that exposure to "truth" countermarketing advertisements was associated with an increase in antitobacco attitudes and beliefs and that the campaign accounted for a significant portion of the decline in youth smoking prevalence (Farrelly, Davis, Haviland, Messeri, & Healton, 2005; Farrelly et al., 2002). However, the majority of public health segment targeting has relied on segmentation based on sociodemographic factors. Berg and colleagues (2010) used a different approach, aligning more so with what industry approaches segmentation. In this study, they characterized college students and identified different health behaviors using segmentation based on lifestyle characteristics (e.g., social behavior, relationship preferences, religious practices, and political orientation; Berg et al., 2010), documenting that segment based on these factors was related to the frequency of alcohol use and binge drinking. They also found that messages developed to target-specific segments were reported as being more relevant and salient for the respective segments. Future research should replicate this approach in other samples and examine if these segments differ between sexes.

This study aimed to (1) define segments of female and male college students using psychographic factors and cluster analyses; and (2) examine female and male market segments in relation to substance use behaviors, controlling for sociodemographics. This line of research will provide insight into the benefits of using market research to target subgroups of students with the intent of improving substance use interventions.

Method

Participants and Procedure

In October 2010, students at six colleges in the Southeast were recruited to complete an online survey. These six schools were selected as a convenience sample to represent state universities (two), technical/community colleges (three), rural and urban settings (three of each), and a historically Black university. A random sample of 5,000 students at each school drawn from directory lists using a random number generator were invited to complete the survey, with the exception of two schools with enrollment less than 5,000, in which case all students were invited (n = 24,055). Students received an e-mail containing a link to the consent form with the option of opting out. Students who consented to participate were directed to the online survey. To encourage participation, students received up to three e-mail invitations to participate. As an incentive for participation, all students who completed the survey were entered into a drawing for cash prizes of US$1,000 (one prize), US$500 (two prizes), and US$250 (four prizes) at each participating school. A total of 4,840 (20.1%) students returned the online survey; the current analyses focused on 3,469 participants who had complete data on the variables included in this study. This study was approved by the sponsoring university's Institutional Review Board.

Measures

An online survey containing 230 questions assessed a variety of health topic areas and took approximately 20–25 min to complete. For the current investigation, only the variables listed below were included.

Sociodemographic Characteristics

Sociodemographic characteristics assessed included age, sex, ethnicity, and type of school attended (i.e., 2-year vs. 4-year college). Ethnicity was categorized as non-Hispanic White, Black, or other due to the small numbers of participants who reported other race/ethnicities.

Cigarette Use

To assess smoking status, students were asked, "In the past 30 days, on how many days did you smoke a cigarette (even a puff)?" This question has been used to assess tobacco use in the ACHA surveys, the National College Health Risk Behavior Survey (NCHRBS), and the Youth Risk Behavior Survey (YRBS), and its reliability and validity have been documented by previous research (ACHA, 2012; CDC, 1997). Students who reported smoking at least 1 day in the past 30 days were considered current smokers. This classification is consistent with how the ACHA, SAMSHA, and others have defined "current smokers" (ACHA, 2012; Office of Applied Studies, 2006).

Other Tobacco Use

To assess other tobacco use, students were asked, "In the past 30 days, on how many days did you do the following: Chewing tobacco? Snus? Cigars? little cigars? Cigarillos? Tobacco from water pipe or hookah?" An aggregate variable was created for any other tobacco use in the past month.

Alcohol Use

To assess alcohol use, students were asked, “In the past 30 days, on how many days did you drink alcohol? Consumed five or more drinks on one occasion?” These questions have been used to assess tobacco use in the ACHA surveys, the NCHRBS, and the YRBS, and its reliability and validity have been documented by previous research (ACHA, 2012; CDC, 1997). Those students who consumed five or more drinks on one occasion were categorized as binge drinkers.

Marijuana Use

To assess current marijuana use, students were asked, “In the past 30 days, on how many days did you use marijuana (pot, weed, hashish, hash oil)?” (ACHA, 2012; CDC, 1997). Current users were considered individuals who smoked at least 1 day in the past 30 days.

Market Research

Participants were asked to answer nine questions based on items adapted from Philip Morris tobacco industry surveys designed to assess psychographic characteristics (Holm Group, 1998; Philip Morris, 1994; Philip Morris USA, 1996). These questions assess personality characteristics, self-descriptors and descriptors of friends, future goals, religious service attendance, and other psychographic variables (see Tables 1 and 2). Ordinal variables were assessed on a 5-point scale assessing the extent to which participants agreed (1 = *disagree completely* to 5 = *agree completely*) with a variety of statements (e.g., “Most of my friends drink alcohol,” “I frequently attend religious services”). Thus, higher scores indicate a higher level of agreement with the respective statements. For the single-item assessments from tobacco industry documents, the individual items were used in the cluster analyses. The tobacco industry typically performed hour-long in-person interviews with hundreds of questions for their segmentation studies. However, this study aimed to use a shorter 9-item assessment by borrowing measures from the tobacco industry documents and from the published literature.

Two other published assessments were used in the cluster analyses, including the Brief Sensation Seeking scale (Stephenson, Hoyle, Palmgreen, & Slater, 2003) and the Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003) described below. The Brief Sensation Seeking scale–4 item (BSSS-4; Stephenson et al., 2003) assesses sensation-seeking behavior. It is an abbreviated 4-item scale from an 8-item Brief Sensation Seeking scale (Stephenson et al., 2003). The scale contains items such as “I would like to explore strange places” and “I like new and exciting experiences, even if I have to break the rules.” Responses were on a Likert-type scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Higher total scores indicated greater levels of sensation seeking. Psychometric analyses revealed a Cronbach’s α of .75 in the current study, and it has demonstrated convergent validity and test–retest reliability previously (Stephenson et al., 2003). The TIPI (Gosling et al., 2003) assesses characteristics included in the traditional Big Five personality inventories (i.e., extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience), with 2 items measuring each factor. Each item consists of two descriptors, separated by a comma, using the common stem, “I see myself as … ” Examples of items include “extraverted, enthusiastic,” and “reserved, quiet.” Responses were on a Likert-type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree*. Cronbach’s αs for the subscales in the current study were .68, .40, .50, .73, and .45 for the extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience scales, respectively. For the TIPI and the BSSS-4, aggregated variables were used for overall sensation seeking, extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience.

Statistical Analysis

We performed a hierarchical cluster analysis employing Ward's (1963) method on the 15 total items (9 single-item tobacco industry measures and 6 subscale measures). Since the data contain both nominal and ordinal values, we first calculated the Gower's (1971) general dissimilarity coefficient. Then we performed hierarchical clustering procedures based on the distance matrix products. We adopted the pseudo t^2 statistic (Duda & Hart, 1973) to determine the optimal number of clusters. We performed analysis of variance for continuous variables and χ^2 tests for categorical variables to compare sociodemographics, psychographic factors, and substance use among the segments. We then conducted post hoc comparisons to further explore differences among groups, using Bonferroni tests for continuous variables and pairwise χ^2 test comparisons among categorical variables. After conducting the cluster analysis and bivariate comparisons and examining the nature of each cluster, we organized our descriptions of the clusters to match the style of presentation in tobacco industry reports (Holm Group, 1998; Philip Morris, 1994; Philip Morris USA, 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 binary logistic regression model examining any substance use (tobacco, alcohol, or marijuana) in the past 30 days versus no use for females and males separately. Our primary correlate of interest was market segment. We forced age, ethnicity, and type of school attended into the model. We did this in order to examine the direct relationship between the market segment variable and the outcome of interest (i.e., substance use). Data analysis was performed using Statistical Package for the Social Sciences 19.0, and significance was set at $\alpha = .05$ for all analyses.

Findings

The average age of female students was 21.56 (*SD* = 3.15), with 45.0% (*n* = 1,117) of the sample being White and 39.6% (*n* = 982) Black. The average age of male students was 21.69 (*SD* = 3.15), with 51.3% (*n* = 507) of the sample being White and 30.0% (*n* = 297) Black.

Overall, 19.9% (*n* = 493) of female students reported cigarette use in the past 30 days compared to 28.9% (*n* = 286) of male students, and 12.8% (*n* = 312) of female students reported other tobacco use compared to 29.6% (*n* = 287) of male students. The average number of days of alcohol use was 2.93 (*SD* = 4.52) for females and 4.26 (*SD* = 6.18) for males. Eleven percent (*n* = 271) of females reported marijuana use in the past 30 days compared to 21.8% (*n* = 214) of males.

Both the pseudo t^2 statistic and the pseudo F^2 statistic indicated three psychographically distinct groups among females and among males in this sample. Tables 1 and 2 provide psychographic factors across market segments of female and male college students, respectively. There were significant differences across all psychographic factors for female students ($p < .001$); however, for males, there were no significant differences found for "most friends drink alcohol" ($p = .22$). Tables 3 and 4 provide the sociodemographic and substance use profiles for female and male market segments, respectively. There were significant differences in sociodemographics such as age, ethnicity, and school type among the female and male market segments ($p < .001$). Each market segment is described below.

Safe Responsibles

Safe Responsibles were characterized by high levels of agreeableness, conscientiousness, and emotional stability, high academic achievement, and regular attendance at religious services (see Tables 1 and 2). Within this segment, both females and males had the lowest

rates of tobacco use ($p < .001$; $p = .19$, respectively), alcohol use ($p < .001$; $p = .04$, respectively), and marijuana use ($p < .001$; $p < .001$, respectively; see Tables 3 and 4).

Stoic Individualists

Stoic Individualists were characterized by low extraversion, sensation seeking, and openness and a pessimistic outlook of future occupational and family success (see Tables 1 and 2). Within this group females, had lower rates of tobacco use ($p < .001$), marijuana use ($p < .001$), and binge drinking ($p < .001$) than the thrill-seeking socializers (see Table 3). Among males, this group had the highest rates of tobacco use ($p = .19$), binge drinking ($p = .04$), and marijuana use ($p = .001$; see Table 4).

Thrill-Seeking Socializers

Thrill-seeking socializers were characterized by high levels of sensation seeking and extraversion (see Tables 1 and 2). Among females, this group was also more rebellious. However, among males, this group reported greater conscientiousness and emotional stability, regular attendance at religious services, and optimism about occupational success (see Table 2). Among females, this group had the highest rates of tobacco ($p < .001$), alcohol ($p < .001$), and marijuana use ($p < .001$; see Table 3). Among males, this segment had high rates of binge drinking, similar to stoic individualists (p .04; see Table 4).

Multivariate Analyses—Table 5 presents binary logistic regression analyses predicting substance use in the past 30 days in females and males while controlling for age, ethnicity, and type of school attended. Among females, the thrill-seeking socializers were significantly more likely than the safe responsibles to have used any substance in the prior 30 days (OR = 2.04, 95% CI [1.65, 2.52], $p < .001$). Stoic individualists were marginally more likely to have used substances than the safe responsibles (OR = 1.19, CI [0.98, 1.47], $p = .09$; Model A Nagelkerke $R^2 = .084$; percentage agreement 65.8%). Among males, both the stoic individualists (OR = 1.50, CI [1.08, 2.08], $p = .01$) and the thrill-seeking socializers (OR = 1.53, CI [1.09, 2.13], $p = .01$) were more likely than the safe responsibles to have used substances in the past 30 days (Model B Nagelkerke R^2: .109; percentage agreement 62.6%).

Discussion

The purpose of this present study was to define segments of female and male college students using psychographic factors and to examine these segments in relation to substance use behaviors, while controlling for sociodemographics. Overall, cluster analyses identified three groups based on similar psychographic factors—safe responsibles, stoic individualists, and thrill-seeking socializers.

Safe responsibles were found to be at lowest risk of substance use. These individuals were characterized by qualities such as high academic achievement and regular attendance to religious services. Previous research has linked both of these characteristics to low substance use. Specifically, school failure has been found to be a risk factor for substance use (Bachman, Johnston, & O'Malley, 1981; Hawkins, Catalano, & Miller, 1992; Schulenberg, Bachman, O'Malley, & Johnston, 1994). Given the fact that safe responsibles display high academic performance, it is likely that they are less exposed to the psychological distresses associated with poor academic achievement. It is precisely these types of stressors that tend to put both female and male college students at risk of substance use (Frome & Eccles, 1998; Pomerantz, Altermatt, & Saxon, 2002). It may also be that because they are not using substances at a significant rate, they are able to maintain their academic achievement. Religiosity has been found to have a protective effect against substance use (Brown, Parks, Zimmerman, & Phillips, 2001; Miller, Davies, & Greenwald, 2000), and frequency of

attendance has been found to be inversely related to alcohol consumption and/or illicit drug use (Miller et al., 2000). This group also displayed high levels of agreeableness, conscientiousness, and emotional stability. Individuals who demonstrate these qualities tend to be more trusting, empathic, and in control of their emotions (Lynam, Leukefeld, & Clayton, 2003). Kaplan, Johnson, and Bailey (1988) argued that individuals who are not in control of their emotions or unable to control distressing situations tend to have high expectations that drugs will alleviate their distress. Therefore, based on the psychographic profile of safe responsibles, it is likely that they experience less depression and anxiety, which are two psychological factors found to contribute to the initiation and continuation of substance use (Zuckerman, Eysenck, & Eysenck, 1978).

Thrill-seeking socializers were found to be at the highest risk of substance use. This group was characterized by high levels of sensation seeking and rebelliousness. According to the Cloninger's (1987) theory of substance use, one of the three dimensions of personality is novelty seeking which consists of frequent exploratory activity and exhilaration and has been linked to substance abuse. This is similar to sensation seeking which involves the tendency to seek novel and intense sensation/experiences and the willingness to take risks for the sake of such experiences (Zuckerman et al., 1978). Research has found that characteristics such as rebelliousness and sensation seeking are predictive of drug use and can predict substance use initiation and dependence (Hawkins et al., 1992; Skara, Sussman, & Dent, 2001). The need to conform to peer norms or the thrill of feeling unrestricted are possible reasons why individuals who enjoy taking risks and being adventurous engage in rebellious activities like high levels of substance use (Costanzo & Shaw, 1966).

Stoic individualists were an interesting group as substance use patterns differed between males and females, despite sharing similar psychographic factors such as low extraversion, sensation seeking, and a pessimistic outlook of future occupational and family success. We previously discussed how the first two psychographic factors are related to substance use, and more attention will be focused on the relationship between pessimism and substance use. McLaughlin, Miller, and Warwick (1996) have proposed that an individual's sense of hopelessness can be defined in terms of a system of negative expectations concerning self and future life. Research has shown that having a pessimistic outlook on life can lead to substance use based on an individual feeling hopeless about their future (Bolland, 2003). Therefore, it is not surprising that individuals who display these attitudes engage in substance use behaviors as demonstrated by the findings of our study; however, it is intriguing that females were found to have lower rates of substance use compared to males. Research has found that girls are more likely to internalize feelings and behaviors rather than externalize them as males tend to (Crick & Waxler, 2003). Therefore, these differences in substance use between the sexes may be related to differences in externalizing versus internalizing behavior between males and females. It is possible that males externalize their behavior through substance use and/or rebelliousness, while females internalize their behavior by expressing depressive symptoms of low self-esteem.

This study demonstrating an association between personality traits and rates of substance use among female and male college students has implications for public health research and practice. For example, while safe responsibles are generally at low risk of substance use, it is important to prevent these young adults from engaging in progressively higher levels of substance use patterns by communicating the risk of low level use and progression to higher levels of use. Thrill-seeking socializers, who are at most risk of substance use, may benefit from health messages that target characteristics such as rebelliousness, extraversion, and sensation seeking. This group needs to find healthier ways of inducing pleasure and euphoria that involve group activities, given that these individuals thrive off of social interactions. Also, more unattractive aspects of heavy substance use need to be emphasized

to counter the misperceptions of smoking and drinking as fun or attractive (Berg et al., 2010). As for stoic individualists, if females and males do in fact externalize and internalize their behavior differently, then public health messages must be tailored to reflect these differences between sexes. For males, public health campaigns may benefit from emphasizing alternative ways of externalizing behavior such as through exercise or increased interpersonal communication. Similarly, messages directed toward females may want to focus on other ways of coping with negative affect, such as speaking openly about it with friends or family. It is important that this group first understands that they are using tobacco, alcohol, and marijuana to cope with their emotions or difficult situations, and second how they can find healthier solutions to their problems. In terms of research, examining other measures to include in cluster analyses and testing these messaging approaches and interventions is critical to advancing this line of research.

Limitations

There were several limitations to the study that should be noted. Due to the cross-sectional nature of the study design, causal inference cannot be determined. As with all self-reported data, there is the potential of inaccurate or biased results. The population of college students used in this study were from schools in the Southeast; it is possible that these students differ in their in their psychographic characteristics and substance use behaviors as compared to students in other parts of the country. Therefore, the generalizability and external validity is limited within this study. However, the sample sociodemographics are representative of the students at the selected schools. Second, the survey response rate was 20.1%, which may seem low and raise concerns about responder bias. However, previous online research has yielded similar response rates (29-32%) among the general population (Kaplowitz, Hadlock, & Levine, 2004) and a wide range of response rates (17-52%) among college students (Crawford, McCabe, & Kurotsuchi Inkelas, 2008). We are also unable to ascertain how many participants did not open the e-mail or had inactive accounts, which impacts what the true “denominator” for this response rate may have been. In addition, prior work has demonstrated that, despite lower response rates, Internet surveys yield similar statistics regarding health behaviors compared to mail and phone surveys (An et al., 2007).

The study was limited in the number of psychographic factors included in the segmentation. However, we chose to look at specific factors relevant to our population as well as design questions that would be engaging for the participant. We also did not examine use of other illicit drugs or nonmedical use of prescription drugs, which warrants further investigation given the literature (Arria et al., 2008; McCabe, Boyd, Cranford, & Teter, 2009). Another measurement-related limitation was the low internal consistency for the TIPI, which may be in part due to the 2-item nature of each of the subscales. Finally, it is important to note that reasons for use was not assessed in the current study; thus, further examination of reasons for using substances (e.g., coping, thrill seeking, socialization, or other reasons) is warranted.

Conclusion

The results of this study highlight the utility of cluster analysis to segment student populations based on personality traits and using these segments to predict substance use behaviors. This study also showed how substance use behaviors differed between females and males within the same cluster group, which illustrates that females and males might experience behaviors differently. Based on these findings, health messages can be better tailored to suit the personality of the audience in a way that not only encourages increased awareness and knowledge but promotes sustainable changes in behavior. Additional research is needed to test the efficacy of integrating this novel approach into public health strategies and to determine whether cluster analysis can successfully predict substance use

behaviors in more diverse student populations. Behavioral science research should begin looking into how to improve tailored messages to female and male audiences based on personality traits and psychographic characteristics. Market research and segmentation are valuable tools that can be applied to traditional public health strategies.

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Table 1

Psychographic Factors Across Market Segments of Female College Students.

Variable	Total *N* = 2,480 *M* (*SD*)	Safe Responsibles *N* = 953 *M* (*SD*)	Stoic Individualists *N* = 815 *M* (*SD*)	Thrill-Seeking Socializers *N* = 712 *M* (*SD*)	*p* Value
Sensation seeking	3.31 (0.89)	3.31 (0.90)	3.04 (0.86)	3.61 (0.82)	<.001
Big Five factors					
Extraversion	8.87 (2.87)	9.66 (2.51)	6.26 (1.94)	10.81 (1.87)	<.001
Agreeableness	10.10 (2.27)	11.46 (1.83)	9.49 (2.04)	8.96 (2.10)	<.001
Conscientiousness	11.20 (2.42)	12.68 (1.51)	10.03 (2.48)	10.57 (2.32)	<.001
Emotional stability	9.22 (2.74)	11.57 (1.73)	7.82 (2.19)	7.70 (2.19)	<.001
Openness	10.89 (2.26)	12.02 (1.74)	9.12 (1.99)	11.42 (1.90)	<.001
Tobacco document assessments					
Rebelliousness	2.96 (1.79)	2.14 (1.49)	3.10 (1.65)	3.89 (1.82)	<.001
Change of well-paying job	4.11 (0.97)	4.43 (0.80)	3.72 (1.02)	4.12 (0.95)	<.001
Chance of happy family life	4.30 (0.88)	4.67 (0.63)	3.91 (0.99)	4.26 (0.81)	<.001
Most friends drink alcohol	3.42 (1.38)	3.21 (1.45)	3.31 (1.34)	3.82 (1.23)	<.001
Most friends go on dates	3.75 (1.08)	3.81 (1.11)	3.55 (1.08)	3.89 (1.02)	<.001
Most friends have sexual relationships	3.93 (1.14)	3.90 (1.20)	3.75 (1.14)	4.19 (0.98)	<.001
Most friends get good grades	3.95 (0.86)	4.15 (0.81)	3.69 (0.89)	3.97 (0.80)	<.001
I frequently attend religious services	3.04 (1.48)	3.46 (1.45)	2.80 (1.41)	2.76 (1.46)	<.001
My friends get into fights	1.63 (0.97)	1.44 (0.83)	1.79 (1.02)	1.71 (1.03)	<.001

Note. *M* = mean; *SD* = standard deviation.

Bonferroni post hoc comparisons indicated significant differences found among each group.

Table 2

Psychographic Factors Across Market Segments of Male College Students.

Variable	Total *N* = 989 *M* (*SD*)	Safe Responsibles *N* = 280 *M* (*SD*)	Stoic Individualists *N* = 383 *M* (*SD*)	Thrill-Seeking Socializers *N* = 326 *M* (*SD*)	*p* Value
Sensation seeking	3.51 (0.86)	3.41 (0.86)	3.34 (0.87)	3.80 (0.80)	<.001
Big Five factors					
Extraversion	8.44 (2.84)	6.27 (1.75)	7.59 (2.19)	11.30 (1.75)	<.001
Agreeableness	9.41 (2.29)	10.64 (2.19)	8.30 (1.81)	9.64 (2.27)	<.001
Conscientiousness	10.61 (2.44)	11.64 (1.90)	8.80 (2.07)	11.86 (1.90)	<.001
Emotional stability	10.01 (2.65)	11.43 (2.05)	7.95 (2.01)	11.22 (2.17)	<.001
Openness	10.57 (2.38)	10.89 (2.16)	9.00 (1.96)	12.13 (1.80)	<.001
Tobacco document assessments					
Rebelliousness	3.53 (1.73)	2.99 (1.71)	4.04 (1.54)	3.38 (1.81)	<.001
Change of well-paying job	3.96 (1.03)	4.18 (0.90)	3.49 (1.07)	4.33 (0.85)	<.001
Chance of happy family life	4.10 (0.95)	4.35 (0.79)	3.56 (1.01)	4.52 (0.68)	<.001
Most friends drink alcohol	3.49 (1.33)	3.49 (1.33)	3.41 (1.26)	3.58 (1.40)	.22
Most friends go on dates	3.67 (1.07)	3.74 (1.08)	3.42 (1.05)	3.91 (1.03)	<.001
Most friends have sexual relationships	3.83 (1.13)	3.91 (1.11)	3.58 (1.09)	4.06 (1.14)	<.001
Most friends get good grades	3.70 (0.87)	3.82 (0.77)	3.42 (0.89)	3.94 (0.83)	<.001
I frequently attend religious services	2.80 (1.45)	2.89 (1.53)	2.61 (1.32)	2.95 (1.51)	.004
My friends get into fights	2.02 (1.09)	1.81 (0.98)	2.37 (1.13)	1.80 (1.03)	<.001

Note. *M* = mean; *SD* = standard deviation.

Bonferroni post hoc comparisons indicated significant differences found among each group.

Table 3

Sociodemographics, Psychosocial Factors, and Substance Use Across Market Segments of Female College Students.

Variable	Total *M* (*SD*) or *N* (%)	Safe Responsibles *M* (*SD*) or *N* (%)	Stoic Individualists *M* (*SD*) or *N* (%)	Thrill-Seeking Socializers *M* (*SD*) or *N* (%)	*p* Value
Sociodemographics					
Age (*SD*)	21.56 (3.15)	21.79 (3.24)	21.47 (3.13)	21.35 (3.04)	.01
Ethnicity (%)					<.001
White	1,117 (45.0)	390 (40.9)	369 (45.3)	358 (50.3)	
Black	982 (39.6)	451 (47.3)	296 (36.3)	235 (33.0)	
Other	381 (15.4)	112 (11.8)	150 (18.4)	119 (16.7)	
School type (%)					.04
4 year	1,727 (69.6)	636 (66.7)	585 (71.8)	506 (71.1)	
2 year	753 (30.4)	317 (33.3)	230 (28.2)	206 (28.9)	
Substance use, past 30 days					
Cigarette use (%)					<.001
No	1,986 (80.1)	809 (84.9)	653 (80.2)	524 (73.6)	
Yes	493 (19.9)	144 (15.1)	161 (19.8)	188 (26.4)	
Other tobacco product use (%)					<.001
No	2,126 (87.2)	835 (88.5)	707 (88.9)	584 (83.4)	
Yes	312 (12.8)	108 (11.5)	88 (11.1)	116 (16.6)	
Chew or snus use (%)					.62
No	2,449 (99.5)	944 (99.7)	800 (99.4)	705 (99.4)	
Yes	12 (0.50)	3 (0.30)	5 (0.60)	4 (0.60)	
Cigar product use (%)					.02
No	2,206 (89.8)	859 (90.5)	733 (91.3)	614 (87.2)	
Yes	250 (10.2)	90 (9.5)	70 (8.7)	90 (12.8)	
Hookah use (%)					.01
No	2,377 (96.2)	925 (97.2)	782 (96.7)	670 (94.4)	
Yes	94 (3.8)	27 (2.8)	27 (3.3)	40 (5.6)	
Number of days of alcohol use (*SD*)	2.93 (4.52)	2.49 (4.23)	2.69 (4.49)	3.80 (4.82)	<.001
Binge drink (%)					<.001
No	2,005 (80.9)	814 (85.4)	672 (82.6)	519 (72.9)	
Yes	474 (19.1)	139 (14.6)	142 (17.4)	193 (27.1)	
Marijuana use (%)					<.001
No	2,189 (89.0)	869 (91.9)	729 (90.4)	591 (83.5)	
Yes	271 (11.0)	77(8.1)	77 (9.6)	117 (16.5)	
Overall drug use (%)					<.001
No	1,518 (62.6)	650 (69.4)	510 (64.5)	358 (51.4)	
Yes	907 (37.4)	287 (30.6)	281 (35.5)	339 (48.6)	

Note. *M* = mean; *SD* = standard deviation.

Table 4

Sociodemographics, Psychosocial Factors, and Substance Use Across Market Segments of Male College Students.

Variable	Total *M* (*SD*) or *N* (%)	Safe Responsibles *M* (*SD*) or *N* (%)	Stoic Individualists *M* (*SD*) or *N* (%)	Thrill-Seeking Socializers *M* (*SD*) or *N* (%)	*p* Value
Sociodemographics					
Age (*SD*)	21.69 (3.15)	22.05 (3.41)	21.54 (3.08)	21.57 (2.98)	.08
Ethnicity (%)					<.001
White	507 (51.3)	136 (48.6)	197 (51.4)	174 (53.4)	
Black	297 (30.0)	102 (36.4)	92 (24.0)	103 (31.6)	
Other	185 (18.7)	42 (15.0)	94 (24.5)	49 (15.0)	
School type (%)					.55
4 year	680 (68.8)	199 (71.1)	257 (67.1)	224 (68.7)	
2 year	309 (31.2)	81 (28.9)	126 (32.9)	102 (31.3)	
Substance use, past 30 days					
Cigarette use (%)					.19
No	703 (71.1)	207 (73.9)	260 (67.9)	236 (72.4)	
Yes	286 (28.9)	73 (26.1)	123 (32.1)	90 (27.6)	
Other tobacco product use (%)					.12
No	683 (70.4)	209 (75.2)	257 (68.5)	217 (68.5)	
Yes	287 (29.6)	69 (24.8)	257 (68.5)	100 (31.5)	
Chew or snus use (%)					.69
No	885 (90.4)	255 (91.4)	339 (89.4)	291 (90.7)	
Yes	94 (9.6)	24 (8.6)	40 (10.6)	30 (9.3)	
Cigar product use (%)					.28
No	765 (78.4)	227 (81.7)	289 (76.7)	249 (77.6)	
Yes	211 (21.6)	51 (18.3)	88 (23.3)	72 (22.4)	
Hookah use (%)					.20
No	912 (93.1)	266 (95.3)	350 (92.3)	296 (91.9)	
Yes	68 (6.9)	13 (4.7)	29 (7.7)	26 (8.1)	
Number of days of alcohol use (*SD*)	4.26 (6.18)	3.49 (5.92)	4.72 (6.77)	4.38 (5.62)	.04
Binge drink (%)					.04
No	657 (66.4)	203 (72.5)	246 (64.2)	208 (63.8)	
Yes	332 (33.6)	77 (27.5)	137 (35.8)	118 (36.2)	
Marijuana use (%)					<.001
No	767 (78.2)	239 (85.4)	276 (73.0)	252 (78.0)	
Yes	214 (21.8)	41 (14.6)	102 (27.0)	71 (22.0)	
Overall drug use (%)					.01
No	445 (46.1)	149 (53.6)	159 (42.9)	137 (43.2)	
Yes	521 (53.9)	129 (46.4)	212 (57.1)	180 (56.8)	

Note. *M* = mean; *SD* = standard deviation.

Table 5

Binary Logistic Regression Analyses Predicting Substance Use in the Past 30 Days.

	Model A: Females			Model B: Males		
Variable	**OR**	**95% CI**	***p* Value**	**OR**	**95% CI**	***p* Value**
Market segment						
Safe responsibles	Ref	—	—	Ref	—	—
Stoic individualists	1.19	[0.98, 1.47]	.09	1.50	[1.08, 2.08]	.01
Thrill-seeking socializers	2.04	[1.65, 2.52]	<.001	1.53	[1.09, 2.13]	.01
Sociodemographics						
Age	1.05	[1.02, 1.08]	<.001	1.06	[1.02,1.11]	.008
Ethnicity						
White	Ref	—	—	Ref	—	—
Black	0.35	[0.28, 0.42]	<.001	0.38	[0.28, 0.52]	<.001
Other	0.49	[0.38, 0.63]	<.001	0.61	[0.43, 0.86]	.005
School type						
4 year	Ref	—	—	Ref	—	—
2 year	0.90	[0.74, 1.10]	.31	1.18	[0.88, 1.58]	.28

Note. CI = confidence interval; OR = odds ratio.

Model A: Nagelkerke R^2 = .084; Model B: Nagelkerke R^2 = .109.