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Using Market Research to Characterize College Students and Substance Use Behaviors

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2010

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Abstract

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By Tiffany Ashley Suragh

Objectives: Marketing campaigns, such as those developed by the tobacco and alcohol industry, are based on market research, which defines segments of a population by assessing psychographic characteristics (i.e., attitudes, interests). This study uses a similar approach to define market segments of male and female college students and examine differences in their substance use behaviors (tobacco use, alcohol use, and marijuana use). **Methods:** We administered an online survey to six colleges in the Southeastern U.S. with assessments of sociodemographics, psychographic factors such as those used by the tobacco industry to define their target markets, psychosocial factors (sensation seeking, the big 5 personality traits which are 5 broad dimensions that are used to describe human personality: Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism), and substance use (cigarettes, other tobacco products, alcohol, and marijuana). Overall, we recruited 24,055 college students, yielding 4,840 responses (20.1% response rate), with complete data from 3,469 students. **Results:** Cluster analysis was conducted among females and among males using 15 psychographic measures (sensation seeking, the big 5 personality traits, and 9 measures adapted from tobacco industry documents). This analysis identified three market segments among both genders— Safe Responsibles, Stoic Individualists, and Thrill-Seeking Socializers. Safe Responsibles were characterized by high levels of agreeableness, conscientiousness, emotional stability, high academic achievement, and regular attendance at religious services. Stoic Individualists were characterized by low extraversion, sensation-seeking, and openness. Thrill-Seeking Socializers were characterized by high levels of sensation-seeking and extraversion. Binary logistic regression indicated that the Safe Responsibles had the lowest rates of substance use, while Thrill-Seeking Socializers had the highest rates. Among males, Stoic Individualist substance use rates were significantly higher than for females. **Conclusions:** These findings indicate that market research may be useful in qualitatively identifying different subgroups of young adults, and defining how male and female student populations behave differently in terms of their substance use. This approach may inform the development of interventions and health campaigns targeting young adults.

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I. INTRODUCTION

Substance use (tobacco use, alcohol use, and marijuana use) and misuse continues to be a growing public health problem associated with an array of health, social, and economic consequences. According to the Centers for Disease Control and Prevention (CDC), cigarette smoking accounts for an estimated 443,000 deaths each year (CDC, 2012). Similarly, there are approximately 80,000 deaths attributable to excessive alcohol use each year in the U.S. (CDC, 2012). Marijuana use has been linked with a variety of health issues such as increased risk for 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 U.S. (Kandel, Yamaguchi & Chen, 1992; CDC, 2010). Despite these alarming statistics, in 2011 it was estimated that 68.2 million Americans aged 12 or older were current (past month) users of a tobacco product (Substance Abuse and Mental Health Services Administration, 2011). Among these individuals, 56.8 million were current cigarette smokers; 12.9 million smoked cigars; 8.2 million used smokeless tobacco; and 2.1 million smoked tobacco in pipes. In 2011, it was also estimated that 133.4 million Americans aged 12 or older were current drinkers, and 2.6 million Americans aged 12 or older had used marijuana for the first time within the past 12 months (Substance Abuse and Mental Health Services Administration, 2011).

Not only are there adverse health and social consequences related to substance use there are also economic costs. Cigarette smoking costs the U.S. more than \$193 billion, due to lost productivity and health care expenditures (CDC, 2011). The estimated economic cost of excessive drinking in 2006 was \$223.5 billion, due to lost productivity, healthcare costs, criminal

justice costs, and other effects (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011). According to the Office of National Drug Control Policy, in 2000 the total U.S. expenditures on marijuana were \$10.5 billion (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.

Developing regular patterns of substance use has been found to occur during young adulthood or between the ages of 18 and 25 (Substance Abuse and Mental Health Services Administration, 2011). This time frame coincides with years spent in college or university for a large proportion of individuals. Results from the 2011 National Survey on Drug Use and Health found that adults between the ages of 18 and 25 had the highest smoking rates of any age group in the U.S. (Substance Abuse and Mental Health Services Administration, 2011). Similarly, young adults aged 18 to 22 enrolled full time in college were more likely than their peers not enrolled full time (i.e., part-time college students and persons not currently enrolled in college) to use alcohol in the past month, binge drink, and drink heavily (Substance Abuse and Mental Health Services Administration, 2011). The highest rate of illicit drug use was among 18 to 20 year olds, with marijuana being the illicit drug with the highest rate of past year dependence or abuse in 2010 (Substance Abuse and Mental Health Services Administration, 2011).

Substance use behaviors have also been found to vary by gender, race, and sociodemographics. In 2011, males had higher rates of tobacco product use (i.e. cigarettes, cigars, smokeless tobacco, and pipe tobacco) in the past month than females (Substance Abuse and Mental Health Services Administration, 2011). Similarly, males between the ages of 18 to 25 had higher drinking rates than females, and were more likely than females to be current users of several different illicit drugs, including marijuana (Substance Abuse and Mental Health

Services Administration, 2011). Cigarette smoking among young adults aged 18 to 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, 2011). As mentioned above, males tend to have higher rates of substance use than females, and determining the extent and nature in which male substance use patterns differ from females will be one of the main aspects of this study.

For decades, the tobacco and alcohol industry have used market research, which defines segments of a population by assessing psychographic characteristics (i.e., attitudes, interests) to identify and target certain population groups. There exists great potential for the utilization of market research in public health in order to define populations based on unique personality characteristics, and identify substance use patterns based on these traits. In particular, given the distinct variations in substances use behavior between males and females, more research into these differences is warranted. This study therefore aimed to (1) define market 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. The results gained from this research will provide insight into the benefits of using market research to target subgroups of students with the intent of improving substance use interventions. Data will also highlight any differences in psychographic characteristics and health-behavior profiles between genders, thereby allowing researchers to better target health communication messages for young adult women and men.

II. LITERATURE REVIEW

Substance Use in Young Adults and College Students

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 2.8% consuming 5 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 (ACHA, 2012). This data highlights the strong public health concern regarding young adults, who are at risk for initiating and engaging in unhealthy behaviors. Numerous studies have also found strong associations between the initiation and development of tobacco, alcohol, and marijuana use in young adulthood (Dietza, Sly, Lee, Arheart & McClure, 2012; Knight et al., 2001; Pinchevsky, Arria, Caldeira, Garnier-Dykstra, Vincent & O'Grady, 2012). Dietza and authors collected cross-sectional data from 4401 young adults using telephone interviews in 2010 as part of the evaluation for the Tobacco Free Florida Campaign. The cigarette prevalence in young adults was found to be 20.3%, with males more likely to be smokers (25.1%) than females (15.6%) and non-Hispanic Whites more likely to be smokers than other racial/ethnic groups (23.8%). Significant associations were also found between lifestyle variables (frequent bar/club, drinks per month, and number of friends who smoke) and attitudes/beliefs regarding smoking. Results suggest lifestyles and attitudes/beliefs should be key behavioral targets of prevention programs aimed at young adults (Dietza, Sly, Lee, Arheart & McClure, 2012).

In general, college and university students have been found to be at higher risk for developing patterns of unhealthy substance use behaviors (Harrison, Hinson, & McKee, 2009; Reed, Wang, Shillington, Clapp, & Lang, 2007). Reed and authors examined the concurrent use

of alcohol and tobacco as well as the relationship between alcohol use and smoking initiation among a sample of undergraduate students attending a large public university in the southwestern U.S. Results demonstrated a relationship between smoking and alcohol consumption even after controlling for confounding variables such as age, gender, and race. The researchers found that any amount of smoking was associated with greater alcohol consumption. With over 18 million students enrolled in college and university (Snyder, Dillow, & Hoffman, 2008), it is imperative to better understand the factors that influence substance use behavior in this population, which is the goal of the present study.

Male and Female Substance Use Behaviors

As discussed earlier, males tend to have higher rates of substance use than females. Various socio-cultural factors have been proposed to explain these gender differences (Kloos, Weller, Chan, & Weller, 2009). It has been suggested that men drink more heavily to exert masculinity, nonconformity, and risk taking (Wilsnack et al., 2000). Particularly among male college students, drinking is often associated with social activities and establishing friendships. Alternatively, women may interact with each other at higher levels of intimacy and deal with emotions like depression and anxiety without having to rely on alcohol (Capone, Wood, Borsari, & Laird, 2007). Depressed males have also been found to be at higher risk for substance use than females (Kumpulainen, 2000). These differences in substance use behaviors may reflect differences in how males and females choose to express their emotions and cope with stressful situations. Understanding these differences can inform how we tailor public health messages and interventions.

Tailored Public Health Messages

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 and Social Cognitive Theory. While there is merit in employing these strategies, research has demonstrated that developing health campaigns tailored to unique populations not only ensures that health messages appeal to target audiences but increases the likelihood of behavior change (Abbot, Policastro, Bruhn, & Byrd-Bredbenner, 2012). Previous research studies have found that health promotion campaigns based on psychosocial characteristics enhance the processing and implementation of information (Kreuter, Strecher, & Glassman, 1999). The theoretical basis for tailoring messages is based on the Elaboration Likelihood Model developed by Petty and Cacioppo in the early 1980s (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 an individual's attitude and behavior (Petty & Cacioppo, 1981). The peripheral route process involves mental shortcuts based on environmental characteristics and hardly involves careful 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).

Another model known as the Activation Model is based on the examination of individual needs and personality traits, which in turn determines how well messages will be received by the audience (Stephenson & Southwell, 2006). This model is particularly useful when targeting

sensation seekers who are individuals who desire intense experiences and willing to engage in risky behaviors (Zuckerman, 1994). The use of this model has been successful in designing advertisements aimed at young sensation seekers around issues such as marijuana and condom use (Edgar & Volkman, 2012). Based on this evidence, it is reasonable to believe that tailored messages based on psychographic characteristics using market research may appeal to young adults due to the personal relevance of these messages. Subsequently, it is likely that these messages will result in sustainable health behavior change (Kreuter, Farrell, Olevitch, & Brennan, 2000; Kreuter & Wray, 2003; Rimer & Glassman, 1999; Skinner, Campbell, Rimer, Curry, & Prochaska, 1999). This approach has been successfully used over the years by the tobacco and alcohol industry to market its products towards certain populations.

Tobacco and Alcohol Industry's Marketing Techniques

In the 1990s, many private tobacco industry documents were released to the public, revealing the industry's unique marketing campaigns aimed at young adults. These campaigns were based on market research and segmentation, which is basically the process of categorizing heterogeneous populations into more homogenous subgroups (Slater, 1996). By applying market research to 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 towards 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 towards individuals who are going off to college, these ads are able to increase and establish regular patterns of substance use behavior (P. M. Ling & Glantz, 2002). One of the most interesting aspects of the tobacco industry's marketing campaigns is the measurement of

personality traits or “psychographic” characteristics (Philip Morris, 1994; Philip Morris USA, 1996; YAS segmentation study [Philips Morris Tobacco Company Web site], 1993). 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. 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). These tactics have been remarkably successful at influencing smoking behavior and alcohol consumption in younger adults. In order to prevent the initiation and continuation of these behaviors, public health researchers must employ similar strategies to their interventions. Public health campaigns based on market segment research have the potential to influence the health behavior of large groups of individuals with differing personality traits. By doing so, public health advocates may be able to counter the negative effects of tobacco and alcohol advertising.

Utilization of Market Research in Public Health

There has been limited use of market research in public health; however, the studies that have employed this technique have demonstrated interesting findings. Berg and authors characterized college students and identified different health behaviors using market research (Berg et al., 2010). The study found that the characteristics of each group/segment were related to the frequency of alcohol use and binge drinking. The researchers then went on to develop messages that targeted each segment and found that the tailored messages were well received based on their relevance to the participants (Berg, et al., 2010). Another study looked at the relationship between smoking behavior and psychographic segments among Vietnamese-

American youth. Ling and authors found that segments of the Vietnamese-American population had different attitudes and subsequent smoking risk, and knowing this information could help facilitate the development of targeted tobacco control messages (Ling, Neilands, Nguyen & Kaplan, 2007). Future research is needed to address if similar psychographic segments exist in other college populations and, in particular, if these segments differ between genders. The present study hopes to qualitatively identify subgroups of college students, illustrate their association with health behaviors, and demonstrate the potential of using market research to develop health campaigns that target young adults.

III. METHOD

Participants and Procedure

In October 2010, students at six colleges in the Southeast were recruited to complete an online survey. A random sample of 5,000 students at each school (with the exclusion of two schools who had enrollment less than 5,000) were invited to complete the survey (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 received entry into a drawing for cash prizes of \$1,000 (one prize), \$500 (two prizes), and \$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. The Emory University Institutional Review Board approved this study, IRB# 00030631.

Measures

An online survey containing 230 questions assessed a variety of health topic areas and was approximately 20-25 minutes in length. For the current investigation, only the following variables were included:

Sociodemographic Characteristics

Demographic characteristics for students consisted of age, gender, ethnicity, and type of school attended (i.e., two-year versus four-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 American College Health Association (ACHA) surveys, National College Health Risk Behavior Survey (NCHRBS), and Youth Risk Behavior Survey (YRBS), and its reliability and validity have been documented by previous research (ACHA, 2008; CDC, 1997). Students who reported smoking at least one day in the past 30 days were considered current smokers. This classification is consistent with how the ACHA, Substance Abuse and Mental Health Association (SAMSHA), and others have defined “current smokers” (ACHA, 2009; 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?” Responses included chewing tobacco, cigars, little cigars, cigarillos, and tobacco from water pipe. Variables were created for smokeless tobacco use (chew

or snus), cigar use (cigars, little cigars, cigarillos), and hookah (tobacco from water pipe). 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?” This question has been used to assess tobacco use in the American College Health Association (ACHA) surveys, National College Health Risk Behavior Survey (NCHRBS), and Youth Risk Behavior Survey (YRBS), and its reliability and validity have been documented by previous research (ACHA, 2008; CDC, 1997). Additionally, students were asked if they “consume five or more drinks on one occasion?” (ACHA, 2008; 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, 2008; CDC, 1997). Current users were considered to be individuals who smoked at least one day in the past 30 days.

Market Research.

Participants were asked to answer nine questions based on items from Philip Morris tobacco industry surveys (Holm Group, 1998; Philip Morris, 1994; Philip Morris USA, 1996) designed to assess psychographic characteristics. The questions assessed personality characteristics, self-descriptors and descriptors of friends, future goals, religious service attendance, and other psychographic variables. Ordinal variables were assessed on a five-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. Morris typically performed hour-long in-person interviews with hundreds of questions for their segmentation studies. However, this study aimed to use a shorter nine-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 (REF) and the Ten-Item Personality Inventory (TIPI) (REF) described below. The Brief Sensation Seeking Scale – 4 item (BSSS-4) (Stephenson, Hoyle, Palmgreen, & Slater, 2003) assesses sensation seeking behavior. It is an abbreviated four-item scale from an eight-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 scale ranging from 1 to 5, corresponding to strongly disagree to strongly agree, respectively. Higher total scores indicated greater levels of sensation seeking. Psychometric analyses revealed appropriate internal consistency (Cronbach alpha of 0.75), convergent validity, and test-retest reliability (Stephenson et al., 2003). The Ten-Item Personality Inventory (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 two items measuring each factor. Each item consists of two descriptors, separated by a comma, using the common stem, “I see myself as:” Examples of responses include “Extraverted, enthusiastic,” and “Reserved, quiet.” Responses were on a Likert scale ranging from 1 to 7, corresponding to disagree strongly to agree strongly, respectively. This measure has demonstrated appropriate internal consistency for two-item scales (Cronbach alphas of .68, .40, .50, .73, and .45 for the

Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience scales respectively). For the TIPI and the BSS-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 method (Ward, 1963) on the 15 total items (9 single-item tobacco industry measures, 6 subscale measures). Since the data contain both nominal and ordinal values, we first calculated the Gower's general dissimilarity coefficient (Gower, 1971). 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 ANOVA for continuous variables and Chi-square 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 Bonferonni tests for continuous variables and pair-wise Chi-square 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 males and females 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 SPSS 19.0, and significance was set at $\alpha = .05$ for all analyses.

IV. RESULTS

The average age of female students was 21.56 (SD=3.15), with 45.0% (n=1117) of the sample being White and 39.6% (n=982) Black. The majority (69.6%; n=1727) of female students attended a four-year type of school. 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. Most (68.8%; n=680) of the male students attended a four-year type of school.

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 for females was 2.93 (SD=4.52) 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 F^2 statistic and pseudo t^2 statistic indicated three psychographically distinct groups among men and among women 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” ($p = 0.22$). 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 college students ($p < .001$). 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 ($p < .001$; $p = 0.19$, respectively), alcohol use ($p < .001$; $p = 0.04$, 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 ($p = 0.19$), binge drinking ($p = 0.04$), and marijuana use ($p = 0.001$) (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 ($p=0.04$) (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 college 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% Confidence Interval [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, $p=0.09$). Among males, both the Stoic Individualists (OR=1.50, CI 1.08, 2.08, $p=0.01$) and the Thrill-Seeking Socializers (OR=1.53, CI 1.09, 2.13, $p=0.01$) were more likely to have used substances in the past 30 days than the Safe Responsibles.

V. DISCUSSION

The purpose of this present study was to first define market segments of female and male college students using psychographic factors and cluster analyses and second to examine these segments in relation to substance use behaviors, while controlling for sociodemographics factors. Overall, cluster analyses identified three groups based on similar psychographic factors— Safe Responsibles, Stoic Individualists, and Thrill-Seeking Socializers. While male and female students within each group shared similar personality traits, substance use behaviors differed significantly.

Safe Responsibles were found to be at lowest risk for 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 for 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 et al., 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, Davies, & Greenwald, 2000). Praying as a way of coping has been linked to lower levels of substance use (Piko, 2001), and it is possible that Safe Responsibles use prayer as a method of dealing with stress as opposed to engaging in high levels of tobacco, alcohol, or marijuana use. 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 and his colleagues argued that individuals who are not in control of their emotions or unable to control distressing situations tend to have high expectations that that drugs will alleviate their distress (Kaplan, Johnson, & Bailey 1988). 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 the highest risk for substance use. This group was characterized by high levels of sensation seeking and rebelliousness. According to

Cloninger's theory of substance use (1987), 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, 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, Catalano, & Miller, 1992; Skara, Sussman, & Dent, 2001; Guo, Hawkins & Abbott, 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. This paper has already 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. Past 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, what is intriguing is that females were found to have lower rates of substance use compared to males. The role of gender in the development of psychopathology has long attracted the attention of researchers, and

research has found that girls are more likely to internalize feelings and behaviors rather than externalize them as males tend to do (Crick & Waxler, 2003). Therefore, these differences in substance use between both sexes may be related to differences in externalizing versus internalizing behavior between men and women. It is possible that men externalize their behavior through substance use and/or rebelliousness, while women internalize their behavior by expressing depressive symptoms of low self-esteem.

This study has demonstrated a clear association between personality traits and rates of substance use among female and male college students. Understanding this connection can inform how public health messages are tailored to individuals with unique personality traits, beliefs, and attitudes. For example, Safe Responsibles might benefit from tailored messages that address the risks associated with low levels of substance use. Low levels of tobacco, alcohol, and marijuana use can induce pleasant states (euphoria in the initiation phase) and relieve distress (Cami & Farré, 2003). However, continued use can induce maladaptive changes in the central nervous system that lead to physical dependence, sensitization, craving, and relapse (Cami & Farré, 2003). Therefore, when designing health messages for this group, it is necessary to emphasize how low levels of substance use can be potentially dangerous for one's health. While Safe Responsibles are generally at low risk for substance use, it is important to prevent these young adults from engaging in progressively higher levels of substance use patterns. Another option is to recruit individuals identified as Safe Responsible and utilize them as peer educators on substance use. These individuals can be used to increase knowledge and awareness and encourage healthy behavior among more at risk college students. Peer education programs are based on the premise that peers have a strong influence on individual behavior and are capable of gaining a high level of trust and comfort that enables open discussion of sensitive

topics (Medley, Kennedy, O'Reilly & Sweat, 2009). Therefore, it might be beneficial to have Safe Responsibles describe to their counterparts (i.e. Stoic Individualists and Thrill-seeking Socializers) how they manage to overcome personal challenges and avert the need to use tobacco, alcohol, and marijuana.

Thrill-seeking Socializers, who are at most risk for substance use, need tailored 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 genders. 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 towards 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 secondly how they can find can healthier solutions to their problems.

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 and 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 and 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. The study also only utilized nine items to characterize psychographic factors, despite the fact that tobacco industry documents contain hundreds of questions, and therefore the way in which individuals were segmented to groups was limited. However, we chose to look at specific factors relevant to our population as well design questions that would be engaging for the participant.

Despite the aforementioned limitations, there were many strengths of the study that must be discussed. The results of this study highlight the effectiveness of using cluster analysis to segment student populations based on personality traits, and showing how these characteristics predict substance use behaviors. This study also showed how substance use behavior differed between males and females within the same cluster group, which illustrates that males and females 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.

Future Directions

Additional research is needed to test the efficacy of integrating this novel approach into public health strategies and it needs to be determined 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 male and female 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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COMPETING INTERESTS

The authors declare no conflicts of interest.

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Table 1. Psychographic factors across market segments of female college students

Variable	Total	Safe	Stoic	Thrill-Seeking	p-value
	N=2480 M (SD)	Responsibles N=953 M (SD)	Individualists N=815 M (SD)	Socializers N=712 M (SD)	
Sensation Seeking	3.31 (0.89)	3.31 (0.90)	3.04 (0.86)	3.61 (0.82)	<0.001
Big 5 Factors					
Extraversion	8.87 (2.87)	9.66 (2.51)	6.26 (1.94)	10.81 (1.87)	<0.001
Agreeableness	10.10 (2.27)	11.46 (1.83)	9.49 (2.04)	8.96 (2.10)	<0.001
Conscientiousness	11.20 (2.42)	12.68 (1.51)	10.03 (2.48)	10.57 (2.32)	<0.001
Emotional Stability	9.22 (2.74)	11.57 (1.73)	7.82 (2.19)	7.70 (2.19)	<0.001
Openness	10.89 (2.26)	12.02 (1.74)	9.12 (1.99)	11.42 (1.90)	<0.001
<i>Tobacco Document Assessments</i>					
Rebelliousness	2.96 (1.79)	2.14 (1.49)	3.10 (1.65)	3.89 (1.82)	<0.001
Change of well-paying job	4.11 (0.97)	4.43 (0.80)	3.72 (1.02)	4.12 (0.95)	<0.001
Chance of happy family life	4.30 (0.88)	4.67 (0.63)	3.91 (0.99)	4.26 (0.81)	<0.001
Most friends drink alcohol	3.42 (1.38)	3.21 (1.45)	3.31 (1.34)	3.82 (1.23)	<0.001
Most friends go on dates	3.75 (1.08)	3.81 (1.11)	3.55 (1.08)	3.89 (1.02)	<0.001
Most friends have sexual relationships	3.93 (1.14)	3.90 (1.20)	3.75 (1.14)	4.19 (0.98)	<0.001
Most friends get good grades	3.95 (0.86)	4.15 (0.81)	3.69 (0.89)	3.97 (0.80)	<0.001
I frequently attend religious services	3.04 (1.48)	3.46 (1.45)	2.80 (1.41)	2.76 (1.46)	<0.001
My friends get into fights	1.63 (0.97)	1.44 (0.83)	1.79 (1.02)	1.71 (1.03)	<0.001

Note: Bonferonni post-hoc comparisons indicated significant differences found among each group.

Table 2. Psychographic factors across market segments of male college students

Variable	Total	Safe	Stoic	Thrill-Seeking	p-value
	N=989 M (SD)	Responsibles N=280 M (SD)	Individualists N=383 M (SD)	Socializers N=326 M (SD)	
Sensation Seeking	3.51 (0.86)	3.41 (0.86)	3.34 (0.87)	3.80 (0.80)	<0.001
Big 5 Factors					
Extraversion	8.44 (2.84)	6.27 (1.75)	7.59 (2.19)	11.30 (1.75)	<0.001
Agreeableness	9.41 (2.29)	10.64 (2.19)	8.30 (1.81)	9.64 (2.27)	<0.001
Conscientiousness	10.61 (2.44)	11.64 (1.90)	8.80 (2.07)	11.86 (1.90)	<0.001
Emotional Stability	10.01 (2.65)	11.43 (2.05)	7.95 (2.01)	11.22 (2.17)	<0.001
Openness	10.57 (2.38)	10.89 (2.16)	9.00 (1.96)	12.13 (1.80)	<0.001
Tobacco Document Assessments					
Rebelliousness	3.53 (1.73)	2.99 (1.71)	4.04 (1.54)	3.38 (1.81)	<0.001
Change of well-paying job	3.96 (1.03)	4.18 (0.90)	3.49 (1.07)	4.33 (0.85)	<0.001
Chance of happy family life	4.10 (0.95)	4.35 (0.79)	3.56 (1.01)	4.52 (0.68)	<0.001
Most friends drink alcohol	3.49 (1.33)	3.49 (1.33)	3.41 (1.26)	3.58 (1.40)	0.22
Most friends go on dates	3.67 (1.07)	3.74 (1.08)	3.42 (1.05)	3.91 (1.03)	<0.001
Most friends have sexual relationships	3.83 (1.13)	3.91 (1.11)	3.58 (1.09)	4.06 (1.14)	<0.001
Most friends get good grades	3.70 (0.87)	3.82 (0.77)	3.42 (0.89)	3.94 (0.83)	<0.001
I frequently attend religious services	2.80 (1.45)	2.89 (1.53)	2.61 (1.32)	2.95 (1.51)	0.004
My friends get into fights	2.02 (1.09)	1.81 (0.98)	2.37 (1.13)	1.80 (1.03)	<0.001

Note: Bonferonni 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
<i>Sociodemographics</i>					
Age (SD)	21.56 (3.15)	21.79 (3.24)	21.47 (3.13)	21.35 (3.04)	0.01
Ethnicity (%)					<0.001
White	1117 (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 (%)					0.04
Four-year	1727 (69.6)	636 (66.7)	585 (71.8)	506 (71.1)	
Two-year	753 (30.4)	317 (33.3)	230 (28.2)	206 (28.9)	
<i>Substance Use, Past 30 Days</i>					
Cigarette Use (%)					<0.001
No	1986 (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 (%)					<0.001
No	2126 (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 (%)					0.62
No	2449 (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 (%)					0.02
No	2206 (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 (%)					0.01
No	2377 (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)	<0.001
Binge Drink (%)					<0.001
No	2005 (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 (%)					<0.001
No	2189 (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 (%)					<0.001
No	1518 (62.6)	650 (69.4)	510 (64.5)	358 (51.4)	
Yes	907 (37.4)	287 (30.6)	281 (35.5)	339 (48.6)	

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
<i>Sociodemographics</i>					
Age (SD)	21.69 (3.15)	22.05 (3.41)	21.54 (3.08)	21.57 (2.98)	0.08
Ethnicity (%)					<0.001
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 (%)					0.55
Four-year	680 (68.8)	199 (71.1)	257 (67.1)	224 (68.7)	
Two-year	309 (31.2)	81 (28.9)	126 (32.9)	102 (31.3)	
<i>Substance Use, Past 30 Days</i>					
Cigarette Use (%)					0.19
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 (%)					0.12
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 (%)					0.69
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 (%)					0.28
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 (%)					0.20
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)	0.04
Binge Drink (%)					0.04
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 (%)					<0.001
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)	

Table 5. Binary logistic regression analyses predicting substance use in the past 30 days

Variable	Females			Males		
	OR	95% CI	p-value	OR	95% CI	p-value
<i>Market Segment</i>						
Safe Responsibles	Ref	--	--	Ref	--	--
Stoic Individualists	1.19	(0.98, 1.47)	0.09	1.50	(1.08, 2.08)	0.01
Thrill-Seeking Socializers	2.04	(1.65, 2.52)	<0.001	1.53	(1.09, 2.13)	0.01
<i>Sociodemographics</i>						
Age	1.05	(1.02, 1.08)	<0.001	1.06	(1.02,1.11)	0.008
<i>Ethnicity</i>						
White	Ref	--	--	Ref	--	--
Black	0.35	(0.28, 0.42)	<0.001	0.38	(0.28, 0.52)	<0.001
Other	0.49	(0.38, 0.63)	<0.001	0.61	(0.43, 0.86)	0.005
<i>School Type</i>						
Four-year	Ref	--	--	Ref	--	--
Two-year	0.90	(0.74, 1.10)	0.31	1.18	(0.88, 1.58)	0.28