A latent class analysis of cancer risk behaviors among U.S. college students ☆

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ABSTRACT

Objective. The purpose of this study is to understand how cancer risk behaviors cluster in U.S. college students and vary by race and ethnicity.

Methods. Using the fall 2010 wave of the National College Health Assessment (NCHA), we conducted a latent class analysis (LCA) to evaluate the clustering of cancer risk behaviors/conditions: tobacco use, physical inactivity, unhealthy diet, alcohol binge drinking, and overweight/obesity. The identified clusters were then examined separately by students' self-reported race and ethnicity.

Results. Among 30,093 college students surveyed, results show a high prevalence of unhealthy diet as defined by insufficient fruit and vegetable intake (>95%) and physical inactivity (>60%). The LCA identified behavioral clustering for the entire sample and distinct clustering among Black and American Indian students.

Conclusions. Cancer risk behaviors/conditions appear to cluster among college students differentially by race. Understanding how risk behaviors cluster in young adults can lend insight to racial disparities in cancer through adulthood. Health behavior interventions focused on modifying multiple risk behaviors and tailored to students' racial group could potentially have a much larger effect on cancer prevention than those targeting any single behavior.

Introduction

Tobacco use, overweight/obesity, physical inactivity, unhealthy diet, and excessive alcohol consumption are among the most common modifiable risk behaviors and conditions for chronic disease, including cancer (Allen et al., 2009; Baan et al., 2007; Cokkinides et al., 2012;

Curry et al., 2003; Simard et al., 2012). Not surprisingly, these modifiable risk behaviors frequently co-occur (Mays et al., 2012; Prochaska et al., 2008; Rebholz et al., 2012), and only a small percentage (<5%) of United States (U.S.) adults currently practice a healthy lifestyle characterized by no tobacco use, healthy diet and weight, regular physical activity, and low alcohol consumption (Reeves and Rafferty, 2005). Racial and ethnic minority groups in the U.S. exhibit appreciable disparities in cancer risk behaviors (Cokkinides et al., 2012) as well as disproportionately higher rates of cancer incidence, prevalence and mortality (Ward et al., 2004; Williams and Jackson, 2005). Detailing the clustering of cancer risk behaviors among racial and ethnic groups has not been done, but may improve understanding regarding disparities in cancer mortality rates.

The transition from adolescence to adulthood is a critical period for developing health behavior patterns that have implications later in life (Jekielek and Brown, 2005; Rindfuss et al., 1987), and young adults in a college setting are particularly susceptible to unhealthy behavior (Grace, 1997; Racette et al., 2008; Wetter et al., 2004). The clustering of unhealthy behaviors among college students has been well documented (Dodd et al., 2010; El Ansari et al., 2011; Emmons et al., 1998; Kwan et al., 2013; Laska et al., 2009; Lv et al., 2011; Moreno-Gomez

et al., 2012; Primack et al., 2012), yet to date, no studies have examined the modifying influence of race/ethnicity on risk behavior clustering in this population.

Using latent class analysis (LCA), we investigated the clustering of cancer risk behaviors in a large population of U.S. college students (Ingledew et al., 1995; Laska et al., 2009). Our primary aim was to identify the extent to which key cancer risk behaviors and conditions, collected during the Fall 2010 wave of the American College Health Association's (ACHA) National College Health Assessment (NCHA), divided into homogeneous clusters according to race/ethnicity.

Methods

Procedure and sample

The NCHA is a long-standing U.S. college student survey that collects data about student health-related habits, behaviors, and perceptions. This self-administered survey is the largest known comprehensive assessment of college student health (American College Health Association, 2003) and has established reliability and validity (American College Health Association, 2006; Arbour-Nicitopoulos et al., 2011). Institutions self-select to participate in the NCHA and only campuses which randomly select students, or survey students

Table 1
Sample characteristics (N = 30,093).

Characteristic	
Age	21.4 (SD = 5.6)
Gender	
Female	64.8%
Male	35.0%
Transgender	0.2%
Race/ethnicity	
White	60.3%
Black	6.9%
Hispanic	7.9%
Asian	12.6%
American Indian	0.7%
Biracial or multiracial	6.0%
Other	1.5%
Unidentified race/ethnicity	2.4%
Enrollment status	
Full-time	94.7%
Part-time	4.8%
Other	0.5%
Year in school	
1st year undergraduate	34.1%
2nd year undergraduate	19.7%
3rd year undergraduate	19.3%
4th year undergraduate	12.3%
5th year undergraduate	4.4%
Graduate/professional	9.3%
Other	0.9%
Type of university	
2-year	5.1%
4-year	94.9%
Campus size	
<2500	5.1%
2500–4999	13.9%
5000–9999	26.9%
10,000–19,999	13.6%
>20,000	40.6%
Locale	
>500,000	14.7%
250,000–499,999	13.9%
50,000–249,999	45.8%
10,000–49,999	16.8%
2500–9999	7.5%
<2500	1.3%
Region	
Northeast	23.9%
Midwest	10.4%
South	40.1%
West	22.1%
Outside U.S.	3.5%

in randomly selected classrooms, are included in the NCHA. The NCHA samples have been shown to be comparable to those obtained by studies that randomly selected students to achieve nationally representative samples (American College Health Association, 2004). In the fall of 2010, 30,093 students from 39 colleges/universities participated in the survey. Sample characteristics are provided in Table 1.

Measures

Five dichotomous cancer risk behaviors/conditions were identified using data from the NCHA: tobacco use, overweight/obesity, physical inactivity, unhealthy diet, and alcohol binge drinking. With the exception of alcohol consumption, these factors were defined according to guidelines for cancer risk reduction (Kushi et al., 2012; United States Department of Health and Human Services, 2010). *Tobacco use* was defined as true (yes) if the respondent reported using cigarettes (or hookah, cigars or smokeless tobacco) on at least 1–2 days during the last 30 days. *Overweight/obesity* was defined as having a body mass index (BMI) of 25 or larger (calculated from self-reported height and weight). *Physical inactivity* was defined as true if the respondent reported engaging in <3 days of vigorous exercise for at least 20 min *and* <5 days of moderate exercise for at least 30 min in the past seven days. *Unhealthy diet* was based on daily fruit and vegetable consumption and defined as true if the respondent reported <5 servings of fruits and vegetables per day (1 serving = 1 medium piece of fruit, 1/2 cup chopped, cooked or canned fruits/vegetables, 3/4 cup fruit/vegetable juice, small bowl of salad greens, or 1/2 cup dried fruit). *Binge drinking* was defined as true if the respondent reported consuming five or more drinks of alcohol in a single sitting during the last 14 days. We focused on binge drinking because it is especially relevant to U.S. college students and may convey greater risk for cancer incidence compared to light or moderate alcohol use (Courtney and Polich, 2009; Hill et al., 2000).

Statistical analyses

Clustering of the five risk behaviors/conditions was investigated using exploratory latent class analysis (LCA), a powerful advancement of cluster analysis (Clogg, 1995; Collins and Lanza, 2010). To determine the smallest number of clusters, we began with a two-class model and successively increased the number of classes by one, fitting a new LCA model to the data at each step until we identified the simplest model that provided an adequate fit. The number of clusters was determined using the Bayesian Information Criterion (BIC: Elliott et al., 2006; Schwarz, 1978). The LCA model assumes the local independence assumption, i.e., risk behaviors are independent from each other within each latent class. To avoid multiple solutions in LCA parameter estimates, each model was run 200 times to search for a global solution. The analysis was conducted using the LCCA package in standard R software (Schafer, 2012). To avoid boundary solutions, which yield extreme probability estimates, parameters were estimated with a stabilizing constant of one. The LCA classes were further investigated by racial/ethnic groups.

Sensitivity analysis

We performed a sensitivity analysis to assess the degree of violation of the local independent assumption. Interactions within a latent class would indicate that the risk factors could be explained not only by latent classes, but also by interactions among the risk factors. The latent classes were first identified based on the posterior class membership probability (Lanza and Rhoades, 2011). Within each race-specific latent class, Poisson regression was fitted for the five risk behaviors/conditions. Next, variable selection was performed with the BIC to report the best model with the interaction terms (through five-way interactions).

Results

The prevalence of the five risk behaviors/conditions was summed for the entire sample and then stratified by racial and ethnic groups (Table 2). A vast majority of students (95.2%) consumed fewer than five servings of fruits and vegetables per day. Physical inactivity was high (64.4%), while the prevalence of tobacco use, alcohol binge drinking, and overweight/obesity was less than 40%. White students reported the highest prevalence of binge drinking (37.5%), while Asian students reported the highest rate of physically inactivity (74.6%). Black students