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An Epidemiological Perspective on College Student Health and Sleep

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An Epidemiological Perspective on College Student Health and Sleep

It is estimated that some 40% of all young adults aged 18 to 25 years are enrolled in either a two- or four-year college [1]. A figure of approximately twelve million young adults, as college students, attend predominantly 4-year colleges with a recent surge in the overall total number of students coming from a peak in 2-year college enrollments [1]. Estimates of 50% of all 18-25 year olds are labor market participants [1] and an additional some 500,000 students were attending non-degree institutions of higher education.

Considering all students enrolled in college, both full and part time, 65% are white, 13.1% black, 11.4% Hispanic, 6.7% Asian/Pacific Islanders, 1% Native American/Alaskan. Approximately 4% of college students in the United States are non-resident aliens attending the United States for an education. Students graduate with an average $19,000 in student load debt and an additional $3000 in credit card debt [1]. These financial aid sources are used to pay for some of the more popular majors of Business, Social Science and History, Education and Health Sciences. A recent drop in teens working attributed to the desire to accumulate more extracurricular credits to distinguish their applications removes any partial supplements to defray college costs.

College students manage not only their academic studies but also the related social development tasks of establishing independence, developing life skills from the very concrete such a doing one's laundry to the sophisticated of navigating meaningful relationships. A component of establishing independence, for the college student, is values setting a healthy life style with pro-healthy behaviors, practice and self-care. For some the onset of independence of college life is mismanaged with unhealthy excess behaviors that contribute to poor health. Excessive alcohol use, cigarette use, substance abuse, stimulant overuse, unprotected sexual practices and untreated depression and anxiety symptoms make the college student vulnerable to poor health. These factors further complicate academics with stress (30.9%), sleep (23.7%), col/flu/sore throat (23.6%), concern for a troubled friend or family member (17.8%), and depression/anxiety symptoms (15.6%) being the most common [2]. Academics are further impacted by experiencing an emotionally abusive relationship, doing something they would regret or forget later and having unprotected sex after drinking alcohol.

College students reported 52% of the time using exercising to lose weight and 62% eating 1-2 servings of fruit/vegetable per day [3]. Some 46% of college students reported getting enough sleep to feel rested in the morning across 3 to 5 days (Executive Summary, American College Health Association, 2011). Some 55%, on average, of all college students report 4 or more symptoms of clinical depression (i.e. overwhelmed, sadness, hopeless, difficulty functioning) [4].

More recent health data of college students reported that, on average, they were in "good health" indicated by 52% rating of good health this past calendar year [4]. College students receive information from their college/university. College and university administrations provide materials to students through orientation, residence advisors, wellness center and general programming. Table 1 lists some of the common areas where information is disseminated to students. On average, 55% of the time alcohol and other drug information are most common. This is followed by sexual assault, sexually transmitted disease information as the second and third highest, respectively, areas of high need for information. Table 2 summarizes student reportings of weekly substance use of a typical student. The majority of college students (94%) report "partying" for six hours or less with 95% reporting consumption of ten drinks [4].

Large survey reports indicate student's self-knowledge about health protection practices or their recognition of their need to learn more [5-7]. Also, student rating indicate their awareness of health and behavior factors on academic performance. Currently, students prefer the internet for information, health information included [8]. However, there is a discrepancy between parent and college student perceptions of health need.

	Type of Information Received	% Reported Receiving	% Interested in Receiving
55.4	Alcohol and Other Drug Use	82.6%	27.2%
28.1	Cold/Flu/Sore throat	73.0%	44.9%
	Depression/Anxiety	58.7%	43.2%
19.7	Eating Disorders	42.8%	23.1%
	Grief and Loss	27.0%	36.3%
	Injury Prevention	35.4%	31.4%
	Nutrition	75.0%	60.5%
26.4	Pregnancy Prevention	56.1%	29.7%
	Problem Use of Internet/Computer Games	25.6%	21.2%
	Relationship Difficulties	44.0%	43.3%
37.7	Sexual Assault/Relationship Violence Prevention	76.2%	38.3%
30.3	Sexually Transmitted Disease/ Infection Prevention	66.7%	36.4%
19.5	Sleep Difficulties	32.4%	51.9%
	Stress Reduction	75.0%	62.2%
	Suicide Prevention	34.6%	2.7%
29.5	Tobacco Use	48.3%	18.8%
26	Violence Prevention	58.5%	32.8%

Note: Highlighted entries represent areas with largest differences between receiving and interested in receiving information (i.e. need) [4].

Table 1: College Students' Reporting of Receiving Information from College/ University.

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Sleep Quality in College Students

Sleep and daytime functioning among young adults is related [9]. Lichstein et al. [10] reported from their review of studies, that sleep quality was most frequently related to daytime functioning. In statistical analysis, sleep quality accounted for greater explained variance (5 to 8%) than other measures of sleep (e.g. sleep onset latency, wakes after sleep onset, total sleep time, sleep efficiency).

A literature review of this area used search terms of sleep quality, young adults, insomnia, delayed sleep onset phase, sleep disturbance and sleep complaints [2,11-14]. The sleep pattern maturity point and social demands collide in young adulthood making the college student with academic stress, particularly vulnerable to sleep disturbance and its concomitants, [2,15,16]. Whether the social/academic schedules are self-styled by the young adult or not, they are vulnerable to wake day setbacks (e.g. sleepiness, poor performance, less energy) related to sleep loss [2,17]. Sleep quality is measured by a rating scale completed in the morning using a scale of 1=poor, 3=fair, 5=very good. The rated quality of sleep improves over the lifespan with college students/young adults typically rating their sleep as a "3" [10].

An analysis of findings in Table 3 indicates significant experiences of sleep disturbance impacting daytime activities. College students often reported what would be diagnostic signs of sleep disturbance: not feeling rested, early morning awakening and difficulty falling asleep. Another common sleep difficulty was daytime sleepiness [2,18].

The absence of large studies and sometimes imprecise measures in studies of college student sleep preclude it from cohort study designs. However, the adult sleep literature has identified the relative risk for the development of clinical depression in patients that have chronic sleep disturbances [2,19].

Substance	% for weekly use
Alcohol	24.0%
Marijuana	16.4%
Cocaine	7.1%
Methamphetamine	4.1%
Amphetamines	8.4%
Sedatives	7.1%
Hallucinogens	4.9%
Anabolic Steroids	6.8%
Opiates	4.7%
Inhalants	5.7%
MDMA	6.2%
Club Drugs	4.9%
Other illegal drugs	6.7%

Source: National College Assessment Survey [4].

Table 2: College Student Reporting of Typical Student Substance Use.

Type of Sleep Difficulty	% Experienced 3 of last 7 days
Felt not rested when awake	45.5%
Daytime sleepiness during activities	89.1%
Early morning awakening	45.4%
Felt tired, dragged out, sleepy in day	55.2%
Went to bed because felt sleepy	47.3%
Difficulty falling asleep	45.2%
Experienced sleep difficulty resulting in lower exam score	11.3%*

Note: Other factors reported that affected academic performance resulting in lower exam grade were cold/flu/sore throat followed by internet use/computer games followed by participation in extracurricular activities.

Source: National College Student Assessment [4].

Table 3: College Student Reporting of Sleep Difficulties.

College Student Risk Factors

The entrance to the college campus, for some, represents the first movement toward establishing independence. The term "emerging adult" is often used to refer to college students as they are working at the establishment of this independence and building the skills and competence for responsibilities and tasks of adulthood. Developing cognitive and social capacity, while stimulated by the intellectual challenges of the classroom is also encouraged by the exponentially greater number of social situations the emerging adult faces during college life [2].

Suicide

It is estimated that there are 1,100 student suicide deaths annually. This annual rate is one per ten thousand nationwide. For every successful suicide there are 40 failed attempts. Shockingly, some colleges ask those who have disclosed thought of suicide to withdraw, inadvertently keeping students from seeking help. In the last two decades, the average age of onset for depression dropped from 29 to 20. Some 40% of college men and 50% of college women surveyed said that they had experienced depression so severe at some point in time that they could "barely function," 14.9% said that they had been medically diagnosed with clinical depression [7,20].

Eating disorders

It is estimated that across the female lifespan, about 0.5 to 3.7% of girls and women will develop anorexia nervosa. The obsessive fear of weight gain and distorted body image propels the voluntary starvation, purging, vomiting and excessive exercising. Only 10% of eating disorder diagnoses are made [7].

Bulimia nervosa estimates are 1.1 to 4.2% of female population with a common late adolescence stage onset. The recurrent binge eating followed by purging is fitted in the distorted body image. The highest rate of incidence of eating disorders is college aged women. Repeat self-abusers (cutting) were more likely to also be female and have an eating disorder [7].

Alcohol

Some 2.8 million college students drive while intoxicated. The Department of Transportation reports some 1,800 deaths of young adults in alcohol-related driving accidents. Table 4 lists causes of death in the United States and "motor vehicle accident" was the sixth ranking cause of death. Emergency room visits for alcohol overdose are estimated at over 200 per year at some large universities. 18% of US college students suffer clinically significant alcohol-related problems. 4 in 5 sorority or fraternity members are binge drinkers. Some 80% of college students drink [21].

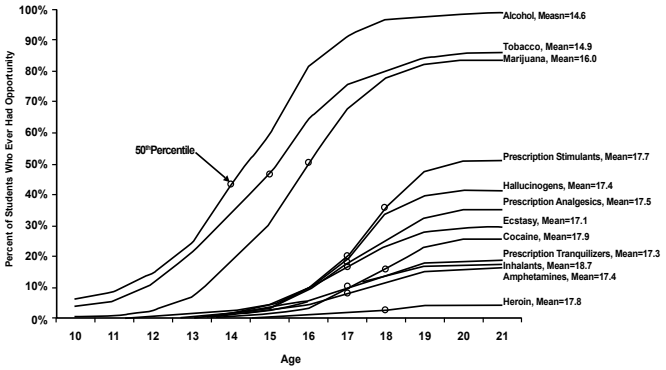
Drugs

Prescription drugs are often used recreationally on college campuses with a rate of approximately 33% of student use [22,23]. Ecstasy, amphetamines, marijuana, often combined with alcohol use is common. It has been found that Ecstasy use is sufficient to precipitate psychotic episodes and has measured long term effecting affecting NMDA receptors and serotonin levels (i.e. resulting in chronic depression, personality changes and early Parkinsonism-like symptoms). Sadly, estimates are as low as 10% of substance abusers seek treatment. An examination of treatment episode data sets provides

a worse scenario with 56% of all heroin treatment participants first used heroin before age 18, 72% of methamphetamine before 18 years old, 30% of 15-17 year olds have used cocaine. The highest rate, 90% of those in treatment, had first used marijuana before the age of 18. In Table 5, the rates of initiation, cessation and continuation of drug use is presented. Marijuana and prescription stimulants are the most commonly used drug of continuation. In Figure 1, the exposure, on average to marijuana and prescription drugs is 16 and 17 years of age, respectively.

College Student Risk Behaviors

Research has documented the effect of lifestyle changes to poor health and mortality. The modification of behavior to health promoting behavior is one of the most effective intervention strategies in health care. Walsh [20] identified the potency of lifestyle factors to both physical and mental health. Therapeutic Lifestyle Changes (TLC) is not included in every major medical treatment algorithm. TLCs include exercise, nutrition and diet, time in nature, relationships, recreation, relaxation and stress management, religious or spiritual involvement and service to others [20]. TLCs have the advantage of being possibly equally effective and less expensive than pharmacological and medical interventions and are typically viewed positively. Additionally, some TLCs have neuroprotective properties (e.g. exercise, diet, meditation) that may have impact on age-related cognitive losses and corresponding neural shrinkage [20].



Source: Arria et al. [30], Source legend: Graphed lines depict the weighted cumulative percent of all students who ever had the opportunity to try a substance by each age, as of the sophomore year of college. Circles on the graph indicate the age by which 50% of all students who were ever exposed to the substance had experienced their first opportunity. The mean age at first opportunity is reported for all students who ever had the opportunity to try a substance. Amphetamines include methamphetamine, but do not include prescription or over-the-counter medications.

Figure 1: Cumulative weighted frequency of exposure opportunity to use alcohol, tobacco, and 10 other drugs, by age in years.

Tobacco	435,000	(19.1%)
Poor diet and physical inactivity	400,000	(16.6%)
Alcohol consumption	85,000	(3.5%)
Microbial agents	75,000	(3.1%)
Toxic agents	55,000	(2.3%)
Motor vehicle	43,000	(1.8%)
Fire arms	29,000	(1.2%)
Sexual behavior	20,000	(0.8%)
Illicit drug use	17,000	(0.7%)
Total	**1,159,000**	**(48.2%)**

From: Mokdah et al. [39].

Table 4: Deaths by cause in 2000.

Drug	Time 1 Nonusers	Initiated Use by Time 2	Time 1 Users	Ceased Use by Time 2	Continued Use at Time 2
Marijuana	1504	12.8%	1460	19.6%	80.4%
Prescription stimulants	2591	11.7%	377	39.3%	60.7%
Prescription analgesics	2642	6.5%	319	58.6%	41.4%
Cocaine	2862	4.1%	99	36.4%	63.6%
Hallucinogens	2700	3.1%	263	43.0%	57.0%
Prescription tranquilizers	2798	3.0%	128	63.3%	36.7%
Inhalants	2833	1.3%	136	67.6%	32.4%
Ecstasy	2877	1.3%	93	69.9%	30.1%
Amphetamines*	2916	0.7%	46	89.1%	10.9%
Heroin	2947	0.2%	5	100.0%	0.0%

Note: Longitudinal data represent lifetime and past-year drug use reported during the first year (Time 1) and second year (Time 2) of college, respectively. Initiation is computed as the number of new users at Time 2 who had never used at Time 1, divided by all nonusers at Time. Cessation is the number of Time 1 users who did not use at Time 2, divided by all Time 1 users. Continuation is the number of students who used at both Time 1 and Time 2, divided by all the Time 1 users.

*Amphetamines include methamphetamine but do not include prescription or over-the-counter medications.

Source: National College Student Assessment [4].

Table 5: Rates of Initiation, Cessation, and Continuation of Drug Use During the First Two Years of College, By Drug (weighted n = 2969).

A challenge to college students has proven to be establishing healthy behaviors. Martinelli [24] modeled college students' cigarette smoking behaviors using self-report measures of self-efficacy, health, locus of control (internal versus external) and behaviors related to the target behavior of smoking. Avoidance of environmental tobacco smoke, both internal and external health locus of control and high self-efficacy have been found to be associated with health promotion behaviors [24]. In an effort to make health promotion more accessible, on line formats have been used. It has been found that the rate of adoption is accelerated when the adopter perceives the innovations' characteristics [25]. The relative advantage (e.g. the CD program is better than using workbooks or pencil and paper tests), simplicity, observability and translatability of an intervention were rated highest by college student participants with eHealth intervention.

Scott-Sheldon et al. [26] reported college student members of Greek organizations as engaging in more risky health behaviors (e.g. alcohol use, cigarette smoking, sexual partners, and sex under the influence of alcohol or drug) than non-Greek organization members. Caffeine use, eating and exercise use variables did not distinguish the groups [26]. Approximately 20% of college students report eating three meals daily [26]. The ACHA board recommends standards for college/university health centers. Services at college/university centers are integrations of physical and mental health care located at the school. Staff training is ongoing and centers are most commonly directed by a Psychologist.

Employment

It is estimated that some 60% of college students work at least ten hours per week [27]. Survey results of college students indicated response association between working more than 20 hours per week with binging, less sleep and lower academic performance. This consequence of long work hours identifies the impact of stress on the college student. Bylund et al. [28] tended to underestimate student work schedule, stress and substance use and overestimate their child's self-reports of general health. College/university health clinics may

benefit from the use of brief screening measures for early detection of excessive substance use [29].

Gralinski-Bakker et al. [15] identified the necessary adaptive functioning of emerging adults in social relations as enhanced by self-views of competence. In effect, resilience in adult years is associated with confidence building and competent social relations in emerging young adulthood.

College Student Functioning

Alcohol and drug exposure/use

College student drinking represents a continuation of patterns starting in high school [30]. This pattern is then expanded by exposure opportunity of college. In a longitudinal study Arria et al. [30] reported average age of exposure opportunity to alcohol, tobacco and drug use. These relationships are presented in Figure 1. Average rates of 43% of heavy alcohol use by college students have been reported in a consensus of studies [31]. In results from Arria et al. [30] longitudinal study reports a lifetime prevalence of lower than 5% prior to college and by sophomore year, prescription stimulants and cocaine quadruples. Table 5 describes the pattern of initiation and cessation of drug use in the longitudinal study by Arria et al. [30]. The highest rates of continuation were marijuana, cocaine, prescription stimulants and hallucinogens [30]. With increased drug use, the risk of potential health-compromising behaviors (e.g. unsafe and unprotected sex) and intimate partner violence increases [21]. Durant et al. [32] conducted a web-based study of college student encounters of fighting while using alcohol and substances, 6.7% of females reported victimization in a fight experience and 5% of males reported fight experiences.

Non-medical prescription stimulant users were more likely to report use of cigarettes, alcohol, marijuana, Ecstasy, cocaine and other risky behaviors [33]. Smith and Wessel [23] identified marijuana as the most widely used illicit drug in the United States and on college campuses. Prozac, Zoloft and Ritalin are the most frequently reported illicit drugs used by college students after marijuana [23].

Health seeking behaviors

Activities of self-reflection about common health and well-being issues identified issues of isolation, shock and anger, use of campus mental health, valuing educators as a source of support [34]. Survey results reported by Baxter et al. [35] reported approximately 27% of health-related information (e.g. nutrition, diet, risky health practices, body fitness). These findings are in contrast to the need to understand health risks. Coronary heart disease (CHD) begins in young adulthood and is the third leading cause of death among adults with identified risk factors of cigarette use, high fat diet yielding high blood cholesterol, sedentary lifestyle and excessive alcohol consumption that all begin in traditional college student age 18-24 years [35].

College students are the most frequent internet users [1]. Sexual health is the most common topic of college students' internet searches of health-related information [36]. Specific disease or medical problem, medical treatments, diet, nutrition, vitamins or nutritional supplements were commonly internet search topics by college students although it is reported that only 51% reviewed the authorship of the source [36]. College students with high fruit and vegetable intake also had better seatbelt and helmet use, physical activity, perceived health, sleep, self-care activities and grades [3]. With cigarette smoking, media smoking literacy, distinguished between those more likely to start or to combine cigarette smoking from cigarette smokers [37]. No relationship between smoking and residence, self-reported academic achievement membership in fraternity/sorority [37].

College Student Sleep

As many college students first become responsible for self-care, difficulties are apt to arise. Sleep disturbance is a common difficulty of college students. Unawareness of sleep hygiene, stress associated with changes in lifestyle, demand of academic life in terms of disciplined study and scholastic performance, socializing, alcohol and substance use, and mental and physical health issues interfere with achieving good sleep quality. Furthermore, poor sleep quality is associated with impaired academic performance [2]. Both insufficient sleep and fragmented sleep reduce sleep quality. A median of 6 hours and 39 minutes of sleep in the college students although 7 to 7½ hours is optimal [19]. Young adults (age 18-25 years) require 7.5 to 8 hours but do not receive this amount [2]. This sleep loss problem is further escalated by changing sleep patterns typical of the poor sleep. That is, sleeping later on the weekends and napping, both of which substantially disturb sleep determinants. While a causal relationship has not been found, an association between poor sleep, low grades, and poor school performance has been identified [2,12].

Young adults' sleep patterns per survey reports sometimes reached criteria for delayed sleep phase [2]. Situational factors that initially start this condition may serve to sustain the pattern. for many young adults, strategies to alleviate their poor sleep quality often worsen the problem, Investigations in this area have examined young adults' sleep and point out that sleepiness develop with maturation due to reduced sleep time [19].

The common practice of extended sleep of weekends that many college students engage in has measured consequences of poor academic performance and mood on two weekdays following weekend [18]. Napping in the afternoon is another frequently used by college students. The temporal placement of the nap is the central problem in that afternoon time (a popular nap time of college students) is particularly salient in reducing necessary sleep propensity to fall asleep at bedtime [38]. Less than optimal sleep is associated with depression [19]. Sleep history interview results and self-report (i.e. Morningness versus Eveningness Scale) findings are used to track sleep difficulties. Results from findings on these measures are predictive of Delayed Sleep Phase disorder.

Students rated their sleep in terms of obtaining enough sleep to feel rested at only 29% for 1 or 2 days each week. Students reported feeling depressed 55% of the time in the last 12 months [4]. With current research investigations yielding a positive association between untreated sleep disturbance and depression, significant attention to College Student Health and Sleep Quality is essential [2,11,12,19].

This overview summary provides a perspective on the epidemiologically based needs of the college student in terms of their health. While not a common population of epidemiological study, the college student population presents as a significant population for further study and intervention. The following is a list of conclusions based on the literature that must be addressed on both research and clinical agendas.

College Student Health Needs

- Priority health issue among student populations: decrease alcohol use, improve sleep.
- Distribute risk factor health information about the student

population: Use internet for dissemination and more interaction means of health promoting information.

- Students' perceptions about peer behavior. Despite the high frequencies of behaviors, little research identifying the commonly held concept of peer pressure or peer approval to behaviors is evident.
- Students' level of self-knowledge about health protection processes: Given that credibility of internet sources of information rarely checked, more valid and more broadly distributed health information disseminated electronically (e.g. messages on Facebook, texts) is needed.

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