Using Pittsburgh Sleep Quality Index Scores to Predict Polysubstance Use Among College Students

by

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A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Approved April 2014 by the
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ARIZONA STATE UNIVERSITY

May 2014

ABSTRACT

The effects of over-the-counter drug (OTC) use on college students' health has been debated in the field of psychology with researchers arguing that poor sleep quality among college students is the result of polysubstance use. However, this explanation is not a foregone conclusion. These researchers have not adequately addressed the issue poor sleep quality among college students and its relationship to polysubstance use. This is an important issue because prolonged unsupervised OTC drug use and poor sleep quality can impact long-term health and lessen students' likelihood of being successful in college. This paper addresses the issue of OTC drug use with special attention to sleep quality. Pittsburgh Sleep Quality Index Scores were collected to assess subjective sleep quality and its relationship to OTC drug use. Several other risk factors including binge drinking, marijuana use, and illicit drug use were also accounted for in this model. This study argues that, although the current literature suggests that poor sleep quality is the effect of drug use rather than the cause; the relationships between these factors are still unclear. This study aims to fill a gap in the college drug use literature by establishing a relationship between poor sleep quality and OTC drug use in a college sample.

DEDICATION

I dedicate this work to my fiancé, Sarah Olson, and family. Without your love and support, this would not have been possible. Thank you for your strength and your patience.

ACKNOWLEDGMENTS

I would like to thank my committee chair, Dr. Perla Vargas, for pushing me to succeed. I would also like to thank my advisory committee members Dr. Elias Robles and Dr. Mary Burleson for their input and support. A huge thank you to University Academic Success Programs and specifically my boss, Kim Toms for letting me go a little crazy toward the end.

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BACKGROUND LITERATURE

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Substance Use Among College Students

The focus of current research concerning substance abuse among college students is mostly on prescription medications (Garnier, Arria, Caldeira, Vincent, O'Grady, & Wish, 2010; Sepúlveda, Thomas, McCabe, Cranford, Boyd, & Teter, 2011; Teter, Falone, Cranford, Boyd, & McCabe, 2010) and alcohol use (Hingson, Zha, & Weitzman, 2009; Kremer & Levy, 2008). However, there is growing evidence that over-the-counter (OTC) medications are increasingly used by the 18 to 25 age-group (Conca & Worthen, 2012; Stasio, Curry, Sutton-Skinner, & Glassman, 2008). Part of this increase in use may be due to the perception that OTC drugs are safe. The Federal Drug Administration (FDA) defines OTC medications as "safe and effective for use by the general public without seeking treatment by a health professional" (U.S. Food and Drug Administration, 2012). However, this definition does not account for the multitude of interaction effects that are possible between different types of OTC medications and between OTC medications and prescription drugs (Sihvo, Klaukka, Martikainen, & Hemminki, 2000; Williams & Kokotailo, 2006). The FDA notes that over 300,000-marketed OTC drug products are currently in circulation and that the review process is based on the individual active ingredients and labeling rather than the final drug products (U.S. Food and Drug Administration, 2012). The sheer number of OTC drugs in circulation and the poor regulation of these products are troubling considering how often they are misused (Farley & O'Connell, 2010; Ford, 2009; Shone, King, Wilson, Wolf, 2011). There are many

different types of OTC medications and therefore, their simultaneous consumption is a form of polysubstance use that can be prolonged and unsupervised. For example, OTC medications such as antihistamines and cough suppressants, taken in high doses can have powerful hallucinogenic effects (Conca et al., 2012). In this sense, OTC drug abuse is comparable to illicit drug use. It is possible that a portion of this growth in OTC drug use can be attributed to the FDA's consistent conversion of prescribed drugs to OTC status. Rizzo et al. (2005) note that this is a practice consistent with a national move toward consumerism in health care and that the preference of healthcare consumers in general is to self-medicate.

In the United States, consumers have two legal ways of obtaining drugs: with a prescription provided by a licensed medical professional or by an over-the-counter purchase. In 2000, consumers in the United States spent $33.1 billion on OTC drugs (Consumer Healthcare Products Association, 2014). More than 700 drugs that required a prescription 20 years ago, are now available over-the-counter (U.S. Food and Drug Administration, 2011). The accessibility of OTC drugs gives college students the chance to be active in their self-care, but also exposes them to the potential of dangerous side effects.

OTC Drugs and Self-Medication

Self-medication is a component of self-care and can be broadly defined as the use of non-prescription medication by people on their own initiative (World Self-Medication Industry, n.d.). Self-medication differs from abuse in that its goal is not the deliberate misuse of a medication (e.g., hallucinogenic effects), but rather to help patients become active participants in their care. Self-medication practices begin before the college years,

however. For example, Chambers et al. (1997) stated that 75% of their survey sample of 651 Canadian junior high school students reported self-administering OTC pain medication. The authors also found that somewhere between 6% and 20% of these students may not have been taking the appropriate medication based on their reported symptoms. This study serves as an example that despite the best intentions, OTC drug misuse happens both accidentally and intentionally (Conca et al., 2012). Conca and Worthen (2012), report that deliberate nonprescription drug abuse among certain groups of 18-25 year olds has increased by as much as 17% between 2002 and 2005. The authors note that abuse of OTC drugs can result in lethal overdoses, which require admission to a health care facility for treatment and observation. Additionally, in 2006, the numbers of abusers, and the amounts of OTC drugs that were abused seemed to be increasing in many geographic areas (Williams et al., 2006).

Other studies have confirmed the findings of Chambers et al. (1997) and Conca et al. (2012), showing that a high percentage of college students use or abuse OTC medications regularly. Burak and Damico (2000) surveyed 471 students and found that about 89% reported using at least 1 of 24 commonly advertised medications. The authors discovered that the most commonly used medication by college students was an OTC pain medication (83.86%) (Burak et al., 2000). Additionally, the majority of the students in this sample reported using these analgesics without consulting a physician first, a fact which suggests their familiarity and comfort with this type of medication. In terms of gender specific use, research has found that women purchase and use OTC medications more often than men (Steinman, 2006; Wazaify et al., 2005). The OTC medications being purchased most often are cold and flu medicine (53%), ibuprofen (49.9%), aspirin

(49.2%), cough medications (44.8%), and vitamins (44.8%) (Wazaify et al., 2005). Stasio et al. (2012) found similarly high rates of usage among their sample of college students (N=201), 74% of the participants reported using at least one OTC medication in the past week, while 70.6% reported using an herbal or dietary supplement in the past week, and 61% of students reported using both OTC drugs and herbal or dietary supplements. Stasio and colleagues also analyzed the OTC drug use of college students by academic term. Interestingly, although there were some differences from term to term, there was almost no change in the percentage of students using allergy (30%-31%), cough and cold (11.4%-12.9%), or pain relieving (57%-62.4%) medications based on academic term suggesting that students are using OTC medications year round, not just during "allergy season."

Howland et al. (2002), focused on the use of OTC allergy medications of college seniors. Of their sample, 63% reported moderate to severe allergic symptoms and 91% of the students reporting allergy symptoms used OTC drugs to treat them. Additionally, approximately 55% reported using prescription medications for the treatment of allergies in addition to the OTC drugs. This finding is important for college students because research shows that sedative antihistamines, the most common OTC allergy medication, can reduce cognitive functioning (Kay, 2000; Qidwai, Watson, & Weiler, 2002).

Research on the sleeping patterns of college students (Lund, Reider, Whiting, and Prichard, 2010), has found that OTC drugs were used along with alcohol to help regulate sleep/wake cycles. In fact, participants reporting disturbed sleep were more than twice as likely to report using OTC medications at least once a month to help keep them awake, compared to those with good sleep quality. Additionally, participants with PSQI scores

≥8 were found to use OTC sleeping aids at least once a month, while less than 5% of students with good sleep quality did the same. The students who used more OTC sleeping aids in this study were also found to consume more alcohol.

Alcohol Use

As reported by Lund et al. (2010), college students who are OTC drug users may also engage in alcohol consumption. There is a great deal of concern about alcohol consumption and its associated risk behaviors among college students (Karam, Kypri, and Salamoun, 2007). Alcohol consumption in college is highly prevalent with 70% to 80% of college students reporting having consumed alcohol in the past 30 days (O'Malley & Johnston, 2002). In addition, the National Institute on Alcohol Abuse and Alcoholism (NIAAA, n.d.) argues binge drinking among college students exposes them to deleterious health and safety risks, including car crashes and injury or damage to the liver and other organs. Binge drinking is the leading cause of injury and death among college students and young adults in the Unites States (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002). The National Institute on Alcohol Abuse and Alcoholism (NIAAA, n.d.) defines binge drinking as drinking so much within about 2 hours that blood alcohol concentration (BAC) levels reach 0.08 g/dl. For women this usually occurs after about four drinks and for men, after about five. Binge drinking can also have severe short and long term consequences for college students (Hingson et al., 2009; Rosenberg & Mazzola, 2007). Every year in the U.S., approximately 1,800 college students die as a result of alcohol related injuries, 599,000 students are injured due to drinking, 696,000 students are assaulted by another college student who has been drinking alcohol, and 97,000 students are subjected to date rape or sexual assault associated with alcohol use

(Hingson et al., 2009). Binge drinking among college students has also been found to be associated with an increased likelihood of drug use. For example, college students who drink heavily are five times more likely to use marijuana and eight times as likely to use cocaine as their peers who engage in light drinking (Pedrelli, 2013; O'Grady, Fitzelle, & Wish, 2008). Students who binge drink and use drugs are twice as likely to drink and drive, have blackouts, unplanned sex, and drug-related problems (McCabe, Cranford, Morales, & Young, 2006).

Furthermore, several studies indicate that between 40% and 45% of students engaged in binge drinking in the past two weeks, more than one third of students met diagnostic criteria for alcohol abuse or dependence, and alcohol-related disorders were more common in college students than their peers who did not attend college (Grant, Stinson, Dawson, & Chou, 2004; Wechsler & Nelson, 2001). For example, 36% of 18 to 22 year olds not enrolled in college engaged in binge drinking (i.e., drinking 5 or more drinks on one occasion) compared to an estimated 44% of college students (Grant, Stinson, Dawson, & Chou, 2004; Wechsler & Nelson, 2001). Additionally, in 2010, 44% of students aged 18-22 reported drinking 5 or more drinks on one occasion in the past 30 days. Furthermore, the proportion of 18 to 22 year olds not enrolled in college who engaged in binge drinking is significantly lower (36% vs. 44%). Thus, it is imperative to develop programs to prevent college students from engaging in hazardous drinking behaviors.

Marijuana Use

Many students use marijuana for the first time in college, and the prevalence of marijuana use among college students has risen in recent years (Suerken et al., 2014;

O'Malley et al., 2002). In a national study, O'Malley et al. (2002) found that 46.6% of college students reported using marijuana in their lifetime and 19.4% reported using it within the past 30 days. Furthermore, White et al. (2006) report that, while college students are less likely to use marijuana prior to age 18 than their peers who do not attend college, the prevalence of marijuana use among 18-21 year old college students increases at a higher rate than the prevalence of marijuana use among 18-21 year olds who do not attend college.

Marijuana is one the most commonly used illicit drug on college campuses today (O'Malley et al., 2002; Suerken, Reboussin, Sutfin, Wagoner, Spangler, & Wolfson, 2014). White et al. (2006) found that young adults who reported having more friends who used marijuana appeared to increase their marijuana use during the transition out of high school. This is important because it indicates that the perception of the frequency of marijuana use by one's peers increases marijuana use for the perceiver. On average, students in White's sample reported using marijuana on 11 of the past 90 days. Marijuana use in this study was found to be positively associated with perceived descriptive (i.e., people's perception of how people actually behave) and injunctive norms (i.e., people's perceptions of what behaviors are approved/disapproved of by others) for friends, as well as with social expectancies.

Mednick et al. (2010) conducted a study to determine the spread of sleep loss as an influence of drug use in adolescent social networks. Mednick et al.'s (2010) study consisted of 8,349 adolescents and found that, if a friend in the network sleeps less than 7 hours, then the likelihood of a person in that network sleeping less than 7 hours increases by 11%. Furthermore, if a teen in an adolescent network uses marijuana, the likelihood of

marijuana use by a friend increases by 110%. Thus, the likelihood that an individual in an adolescent network uses drugs increases by 19% when a friend sleeps less than 7 hours. Through a mediation analysis, Mednick et al. found that 20% of the drug use likelihood effect results from the spread of sleep behavior from one person to another.

There is evidence that members of sororities and fraternities are more likely to use marijuana than students not involved in sororities and fraternities (Bell, Wechsler, and Johnston, 1997). On the other hand, research has also shown that athletes are less likely to use marijuana during college than non-athletes (Buckman, Yusko, Farris, White & Padine, 2011; Wechsler, Davenport, Dowdall, Grossman, & Zanakos, 1997; Yusko, Buckman, White, & Padina, 2008). This evidence suggests that the college environment/culture (i.e., easy access, tolerant and permissive peers) may pose a high risk to uptake of alcohol and drug use among college students (Weitzman, Nelson, & Wechsler, 2003).

The impact of marijuana use in college is not inconsequential; its consumption has been associated with lower grade point averages and spending less time studying (Bell, Wechsler, & Johnston, 1997). Additionally, marijuana use has been linked to disruptions to enrollment in college (Arria et al., 2013), reduced rates of degree completion (Fergusson, Boden, & Horwood, 2008; Fergusson, Horwood, & Beautrais, 2003), cognitive impairment (Pope & Yurgelun-Todd, 1996), difficulty concentrating, missing classes, and putting oneself in danger (Arria, Caldeira, O'Grady, Vincent, & Wish, 2008).

Furthermore, it seems that even if college students attempt to quit using marijuana they may continue to experience health risks. Copersino et al. (2006) report that sustained

abstinence from marijuana use leads to sleep disturbances, and that about 77% of marijuana users experiencing sleep problems report using tranquilizers, alcohol, or relapsing to marijuana to improve their sleep quality during a quit attempt. This pattern of poor sleep during abstinence is consistent across substances (Morgan & Malison, 2007; Schierenbeck, Riemann, Berger, & Hornyak, 2008) likely to be experienced by polysubstance users.

Sleep

Sleep Problems & Well-Being

Due to social and academic demands, college students may experience irregular sleeping patterns and poor sleep quality. Poor sleep quality has been linked to increased tension, irritability, depression, confusion, and generally lower life satisfaction (Pilcher et al., 1997). Lund et al. (2010), found that poor sleep quality, as assessed by the Pittsburgh Sleep Quality Index (PSQI), was associated with significantly higher negative moods in a sample of college students. Of the total sample (n= 1,125), only 34.1% of students scored in the good range of the PSQI (PSQI<5). The primary factors contributing to the poor sleep quality of students in this sample were restricted total sleep time, low enthusiasm, and long sleep latencies. Lund et al. (2010) also reports that around 52% of students reported lacking enthusiasm to get things done at least once a week, and 32% reported an inability to fall asleep at least once a week. Participants in the study sample who were categorized as having poor-quality sleep also reported higher levels of stress and significantly more physical illness (Lund et al., 2010). Lastly, 75% of the sample reported feeling "dragged out, tired, or sleepy" at least once a week, and 15% reported falling asleep in class at least once a week.

Poor sleep quality has been identified as an important symptom of many sleep and medical disorders (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The poor quality sleep experienced by college students is well documented (Orzech, Salafsky, & Hamilton, 2011; Trockel, Barnes, & Egget, 2000; Tsai & Li, 2004) For example, Orzech et al. (2011) conducted a survey-based study at a large public university. The authors' sample consisted of 4,513 college students aged 18 to 30 and was a cross sectional study composed of four cohorts of students, beginning October 2005 and ending April 2007. In the 2005 sample, male students were found to have a PSQI mean score of 6.38 (SD=2.82) and female students had a mean score of 6.69 (SD=2.79). Similar levels of poor sleep quality were found by Lund et al., 2010, with 60% of their sample of students identified as poor quality sleepers by the PSQI. The sleep of study participants was generally restricted in terms of sleep duration and particularly on weeknights with 25% of the students reporting getting less than 6.5 hours of sleep a night, and only 29.4% reported getting 8 or more hours of total sleep time. In addition, 20% of all students reported staying up all night at least once in the last month, and 35% reported staying up until 3 a.m. at least once a week. These results show that insufficient sleep is present at alarming levels in the college student population.

Sleep debt is defined as the disparity between the amount of sleep naturally required to function optimally and the amount actually obtained (Prather, Marsland, Hall, Neumann, Muldoon, & Manuck, 2009; Regestein, Natarajan, Pavlova, Kawasaki, Gleason, & Koff, 2010). Evidence suggests that periods of sustained wakefulness of up to 17 hours can lead to decreases in performance that are equivalent to those experienced by someone with a blood alcohol level of 0.05%, the legal limit for driving in many

countries (International Center for Alcohol Policies, 2013; Ferrie et al., 2011). It is estimated that by 2020, 2.3 million people will be killed in motor-vehicle crashes worldwide, and 10% to 20% of these crashes will be due to sleepiness or fatigue (Brown, 2006; Ferrie et al., 2011). Sleep debt is not just a danger to people on the road; disturbed sleep has also been shown to double the risk of a fatal accident at work over a 20-year period (Ferrie et al., 2011).

This is crucial considering that the percentage of full-time college students who were employed from 2001 to 2006 fluctuated between 46% and 49% (Livingston, 2008). Additionally, about 22% of students worked between 20-34 hours per week and about 80% of part time college students are employed (Livingston, 2008). Students who work while in school may also be impacted by the fact that lack of sleep is associated with an increased risk of physical disease (Fujino et al., 2006; Knutson et al., 2006). This fact may be especially critical for college students who are shift workers. There is epidemiological evidence suggesting that shift workers, a population characterized as having a large sleep debt, who are over two times more likely to die from ischemic heart disease, than their day worker counterparts. Further, there is emerging evidence suggesting that poor quality sleep, as measured by the PSQI global score, is associated with metabolic syndrome, a pre-cursor of cardiovascular disease (Hung et al, 2013).

Evidence from health surveys has suggests that sleep disturbances are a problem related to the self-care of young adults who are learning to be on their own for the first time (Sexton-Radek, 2004) and common among college students (Forquer, Camden, Gabriau, & Johnson, 2008; Orzech et al., 2011; Sing & Wong, 2011). Sleep disturbances are defined as any disorder involving initiating and maintaining sleep, disorders of

excessive somnolence, and general disorders of sleep (Cormier, 1990). Interestingly, sleep disturbances have been found to be more prevalent among American females compared to males, and the sleeping problems experienced by these women are known to negatively impact their daytime functioning and physical and psychological well-being (Jean-Louis et al., 2008; National Sleep Foundation, n.d.). Research involving female college students (Lee et al., 2013) found that of their sample (n=103) about 46% experienced a clinically significant daytime sleepiness. On average, the students in this sample experienced sleep disturbances on about three nights during the past week and 68% of the sample was identified as having poor sleep quality based on their PSQI scores (PSQI>5), with an average score of 6.29.

There is also some evidence with non-student samples regarding the effects of sleep disturbances on drug addiction. For example, Morgan et al. (2006) notes that sleep disturbances are related to psychiatric illnesses including substance abuse. Compared to age-matched normative data (i.e., subjects aged 24-49 who met the Diagnostic and Statistical Manual of Mental Disorder's criteria for cocaine dependence), drug users in their sample were found to suffer from impaired sleep with regard to total sleep time, sleep latency, and time awake after sleep onset. However, there are no studies looking at the impact of nonprescription (over-the-counter) drug use on sleep quality. Thus, this study also aims to bridge a gap in the literature.

In addition to increased frequency of sleep disturbances, sleep is becoming progressively shorter with some studies finding that sleep duration has declined by an average of 18 minutes per night over the past 30 years, although researchers are unsure for the reasons behind the decline (Kronholm et al., 2008; Rowshan, Bengtsson, Lissner,

Lapidus, & Björkelund, 2010). Sleep duration is defined as the total amount of sleep obtained by an individual across a 24-hour period. In a large college study, Hicks, Fernandez, and Pellegrini (2001) sampled three separate cohorts of students over 30 years and reported a median sleep duration of 6.65 hours in 2000. The authors also report that in 1978 24% of their sample was dissatisfied with their sleep, in 1988 53% of students were dissatisfied with their sleep, and in 2000 71% of students surveyed were dissatisfied with their sleep (Hicks et al., 2001). Based on this trend, the authors conclude that efforts need to be made to improve students' sleep satisfaction. The trend of shortening sleep is concerning, especially as college students physically make the transition into adulthood. Particularly because sleep duration has been linked with life expectancy and ill-health (Gallicchio & Kalesan, 2009; Kripke, Garfinkel, Wingard, Klauber, & Marler, 2002).

Sleep & Sleep Problems in College Students

Young people face a myriad of changes that may impact their sleep as they make the transition from adolescence to young adulthood. In fact, there are reports stating that nocturnal sleep time decreases as adolescents approach young adulthood (Czeisler, Weitzman, Moore-Ede, Zimmerman & Kronauer, 1980; Richardson, Carskadon, Orav, & Dement, 1982). This change is evident when considering the recommended sleep durations for adolescents and adults. Children and adolescents should get 9-10 hours of sleep per night, and healthy adults should get between 7-8 hours of sleep per night (Centers for Disease Control and Prevention, 2013). In addition to physiological changes, high school students have been found to have later bed times and earlier rising times than they did during childhood (Czeisler et al., 1980; Richardson et al., 1982). Adolescents also show wider variations between weeknight and weekday sleep schedules

as they age (Czeisler et al., 1980; Richardson et al., 1982). As a result, adolescents are noted as being one of the most sleep deprived age groups in the country (Lund et al., 2010). One of the primary reasons for this phenomenon is that pubertal adolescents are experiencing changes in their biological rhythms which delay sleep and wake onset, making it physically more difficult to fall asleep (Crowley, Acebo, & Carskadon, 2007; Taylor, Jenni, Acebo, and Carskadon 2005). Furthermore, even when adolescents meet the recommended number of hours of sleep for their age group, they experience greater daytime sleepiness and a greater physiological need for sleep compared to younger children (Campbell, Higgins, Trinidad, Richardson, & Feinberg 2007; Carskadon, 1990). On the other hand, good sleep quality has been associated with a wide range of positive outcomes such as better health, less daytime sleepiness, greater well-being and better psychological functioning (Steptoe, O'Donnell, Marmot, & Wardle, 2008). Although ubiquitous in the literature, sleep quality is a complex phenomenon that has been poorly defined. The consensus among researchers studying physiological components of sleep is that poor sleep quality is associated with reduced Stage 1, Stage 3, and rapid eye movement (REM) sleep. Sleep proceeds in the cycles of REM and non-REM sleep, with usually four or five of them occurring per night, the order normally being Stage 1→Stage 2→Stage 3→ Stage 2→REM (Cooper et al., 2014). Studies investigating sleep quality in terms of subjective perception of sleep parameters suggest that sleep quality is associated with subjective estimates of the ease of sleep onset, total sleep time, sleep maintenance, restlessness during the night, and perceived depth of sleep (Cooper et al., 2014).

Upholding good sleep quality is important for college students because sleep is essential to maintaining the body's circadian rhythms. Circadian rhythms are defined as

any biological process that displays an internal entrainable oscillation of about 24 hours (Czeisler & Gooley, 2007). These rhythms are essential to maintaining healthy sleep-wake cycles and although circadian rhythms are biologically built into our bodies, they can be adjusted by changes in a person's local environment. The external cues that alter circadian rhythms are called *zeitgebers*. The primary zeitgeber in our environment is the natural dark and light cycle. However, non-photic social zeitgebers exist that can also alter students' circadian rhythms (Stetler, Dickerson, & Miller, 2004). These cues are considered social because they involve participation in a larger community and often occur in the presence of other people (Ehlers, Kupfer, Frank, & Monk, 1993). Some examples of social zeitgebers that the average college student may encounter are late night meals with friends, jobs with odd hours, and various forms of social entertainment. Research suggests that social zeitgebers may play a role in conditioning our biological rhythms (Ehlers et al., 1993; Stetler, 2004). Furthermore, it is believed that social zeitgebers play an important role in humans' health and may contribute to other conditions including depression (Ehlers et al., 1993; Grandin, Alloy, & Abramson, 2006).

Sleep & Depression

According to the World Health Organization (WHO), depression affects nearly 350 million people worldwide (WHO, 2012) and major depressive disorders are estimated to affect approximately 14.8 million American adults (6.7% of the U.S. population over 18) (Kessler, Chiu, Demler, & Walters, 2005). In nearly 80% of patients with depressive disorders, significant levels of sleep disturbances have been documented (Srinivasan et al., 2009).

The American College Health Association (ACHA, 2008) found that 14.8% (13,738) of the students in their sample had been diagnosed with depression at some time in their life. Thirty-four percent (n=4,703) of those with a diagnosis of depression reported being diagnosed in the previous school year and 26.4% (n=3,598) were in therapy for depression and 36.6% (n= 4,975) were taking medication for depression at the time of the survey. Perhaps most concerning is that during the past school year, 1.3% (n=1,187) of students with a diagnosis of depression reported attempting suicide at least once in their lifetime, and 9.3% of the total sample (n=8,700) of students reported seriously considering attempting suicide at least once in their life. Suicide is the third leading cause of death among young adults (Centers for Disease Control and Prevention, 2014) and depression has been established as a risk factor in both suicide and substance abuse (Agerbo, Nordentoft, & Mortensen, 2002; Cooper, Appelby, & Amos, 2002; Garlow, Purselle, & D'Orio, 2003; Nemeroff, Comptom, & Berger, 2001). In 2008, The ACHA reports that 6.4% of male and 6.1% of female college students surveyed have considered suicide in the past year, and 1.5% of male and 1.2% of female respondents have considered suicide in the past 2 weeks.

In addition to risk of suicide, depression can have other significant consequences for students including academic impairment (ACHA, 2008; Heiligenstein, Guenther, Hsu, & Herman, 1996) and dropping out of, or failing, college (Gollust, Eisenberg, and Golberstein, 2008; Kisch, Leino, & Silverman, 2005). In a 2010 study (Regestein et al., 2010), female students (n=339) aged 18-23 at a women's college were surveyed about their sleep schedules, sleep-related factors, and depression symptoms. Of this sample, 20% reported a weekday sleep debt of greater than two hours and about 28% reported

significantly greater sleep debt. Students with a sleep debt of at least two hours or significant daytime sleepiness have a higher Center for Epidemiological Studies Depression scores compared to their well-rested counterparts with a sleep debt of less than 2 hours (28.2 vs. 21.0). In a similar study (Moo-Estrella, Benitez, Solis-Rodriguez, & Arankowsky, 2005) of 638 students, 30% reported having poor sleep and 31.6% reported a high level of sleepiness. Eighty percent of their total sample reported having somnolence during class, and 66% said that sleepiness affected their academic performance. In addition, 15% of students reported suffering symptoms of depression in the past two weeks. Among the students who suffered from symptoms of depression, 50% slept fewer hours in comparison to those without symptoms. However, the relationship between sleep and depression remains unclear (Alfano, Zakem, Costa, Taylor, & Weems 2009; Dueck, Thome, & Hessler, 2012; Dahl & Lewin, 2002).

Some research has questioned the directionality of the relationship between sleep and depression. Alfano et al. (2009) states that the internalizing of problems may give rise to and exacerbate sleep difficulties, because the effects of insufficient sleep include decreased affective regulation. The authors postulate that persistent sleep disturbances may contribute to the development of depressive disorders and an overall reduction in regulatory skills. Similarly, Dueck et al. (2012) states that it is unclear whether sleep disturbances need to be understood as a secondary effect or as the onset trigger for adult mood disorders. This is likely due to the complexity of the relationship between these two health factors. Dahl & Lewin (2002) have suggested that there are causal associations between sleep and depression and that these associations are bidirectional and this uncertainty concerning the direction of the relationship highlights the need for further

research. Although inconclusive in its directionality, the current literature clearly shows that depression is associated with sleep quality (Alfano et al., 2009; Dueck et al., 2012; Dahl et al., 2002). Furthermore, depression has serious consequences for college students, can result in suicide, and is alarmingly common in the college student population (Ehlers et al., 1993; Grandin, et al., 2006). In addition to impacting students who suffer from depression, poor sleep has been associated with health conditions such as diabetes and heart disease.

Medical Conditions Associated with Sleep Problems

The prevalence of Type 2 diabetes has increased dramatically over the last decade (Kiely & McNicholas, 2000; Nieto et al., 2000; Peppard, Young, Palta, & Skatrud, 2000; Shahar et al., 2001; Young & Peppard, 2000). This is of critical importance because diabetes has a direct impact on rapid eye movement (REM) sleep. REM sleep is a physiologic and repetitive behavioral state in which high cerebral energy requirements correspond to a sustained neuronal activity (Maquet, 2000). For diabetics, REM sleep results in an increase in insulin resistance and thus, the sleep patterns of diabetics are often adversely affected (Van Cauter, Polonsky, and Scheen, 1997). Students who are away from home and learning to manage their diabetes in a new environment may be impacted by these bodily fluctuations. In addition to homeostatic changes affecting diabetics during REM sleep, there is a possibility that weight gain can lead to Obstructive Sleep Apnea (OSA) (Bopparaju et al., 2010). OSA is the complete cessation of breathing and it is estimated that this condition may impact at least 2% to 4% of the population. One of the strongest risk factors for OSA is obesity with a high central fat distribution (Bliwise et al., 1988; Guilleminault, Bassiri, & Caskadon, 2005). The National Institute

on Health reports that a national survey conducted in 2005 indicates that 3 out of 10 college students are either overweight or obese (Sparling et al., 2007). Furthermore, the long term impact of diabetes, OSA, and obesity are profound and may result in other illness such as heart disease. This is because heart disease is highly correlated with short sleep duration and sleep disturbances (Cappuccio, Cooper, Strazzullo, & Miller, 2011; Chandola, Ferrie, Perski, Akbaraly, & Marmot, 2010). In a 2010 study (Chandola et al.), short sleep duration and sleep disturbances were both found to be associated with an increased risk for coronary heart disease (CHD) in women as well as men. Patients in this study who experienced both short sleep duration and restless disturbed nights had the highest risk for CHD. The authors state that the effect of short sleep ($\leq$6 hours) on increasing CHD risk is greatest among those who reported some sleep disturbance. This is especially problematic for students who are living in residence halls with other students or who socialize late at night. While CHD is not seen as an immediate risk for college students due to their age, this is certainly concerning in terms of their long-term health outlook (Arts, Fernandez, & Lofgren, 2014). In addition to the health risks posed by shorter sleep durations and sleep disturbances, poor sleep quality can have a profound effect on college students' academic performance because sleep is essential to the learning and memory processes (Killgore, 2010).

Sleep Effects on Memory

The process of acquiring new information, committing such information to long-term storage, and retrieving it when needed relies on sleep. When sleep is hindered, memory processing is correspondingly degraded. Killgore (2010) lists two major roles for sleep in memory processing. First, sleep is important before learning or encoding to

prepare the brain to effectively acquire new information. Second, sleep is important following learning to facilitate the consolidation (i.e., stabilization) and integration (i.e., assimilation of newly learned information) onto existing memory structures. The processes of consolidation and integration are essential to student success at the college level. Eliasson et al., (2010) found that compared to those students with the lowest academic performance (based on grade point average), students with the highest performance had significantly earlier bedtimes and wake times and napping tended to be more common among high performers. Another study (Gaultney, 2010), looked at the prevalence of risk for sleep disorders among college students by gender and age in addition to their associations with grade point average. The authors found that over 500 students out of 1,845 (27%) were at risk for at least one sleep disorder. On a scale of 1 (do not nearly get enough sleep) to 10 (get an ideal amount of sleep), students averaged 6.50. Students who were found to be at risk for sleep disorders were overrepresented among students in academic jeopardy (GPA < 2.0). GPA was significantly correlated with amount of sleep prior to school/work indicating that students who got more sleep before school/work and those who reported more consistent sleep schedules had higher grades.

Study Aims

While public attention has shifted toward an understanding of the importance of good sleep behaviors (Lund et al., 2010; Taylor & Bramoweth, 2010), the sleep habits of college students and the effects of poor sleep on their behavior and health warrant further study. A growing body of research on the sleeping habits of college students supports this notion. The primary focus of this study is to test the relationship of PSQI scores and OTC

drug use. The secondary aim is to establish a relationship between the use of other substances (e.g., alcohol, marijuana, illicit drugs) and OTC drug use. This study can potentially bridge the gap between populations studied by documenting the subjective sleep quality of a sample of 18 to 25 year old college students in relation to polysubstance use. This is important because OTC medications will have a profound impact on the health of college students. By adding OTC drugs to the college health model, this study expands upon the current drug use groundwork to consider additional implications and forms of drug use. Furthermore, this study hopes to encourage other research that can determine the direction of the relationship between OTC drug use and sleep once it has been documented in a college sample.

CHAPTER 2

METHOD

Participants

This study is a cross sectional study designed to obtain self-reported data on the health-related behaviors of college students. The sample consisted of 536 college students from a large university in the southwestern U.S. who completed the survey to satisfy a class requirement. Data were collected between October 22, 2010 and May 6, 2011. Of the sample of 536 college students, 87 non-traditional students over 26 years of age were excluded to allow for comparison with existing research. This yielded a sample of 449 students between 18 to 25 years (M= 22.6, SD=5.969), with the majority being females (74.4%). The study was approved by the University Committee on Human Subjects. No personal identifiers were collected, and after reading the consent form, participants gave passive consent by proceeding to complete the survey.

Measurements

To assess OTC drug use, the survey had the following questions: "In the past month, did you take any over-the-counter medications?" if yes, the follow up question was, "What type of OTC medication did you take?" with a list of the most commonly used OTC drugs, which included allergy medications, cough and cold medications, gastrointestinal, pain relievers, sleeping aids, herbal supplements, performance boosters, vitamins and minerals, and weight control drugs (See Appendix A for the list of medications). The primary outcome variables of interest were *using two or more OTC drugs (OTC 2) and using three or more OTC drugs (OTC 3)*. These variables and their cutoff levels were selected identify habitual polysubstance users, rather than occasional users who reported using only one type of OTC medication in the last 30 days. The independent variables included gender, health insurance status, 30-day drug use for 1) alcohol, 2) binge drinking (6 or more drinks on a single occasion), 3) marijuana, and 4) 12-month binge drinking. Health insurance status was included due in the analyses due to a significant percentage (75.6%) of students being insured at the time of the study (see table 1). Lifetime drug use for other illicit drugs (i.e., cocaine, heroine, methamphetamine, and ecstasy) combined was also included.

Materials

The PSQI was used to assess sleeping patterns (Appendix B). The PSQI is a standardized quantitative measure of sleep quality with demonstrated high levels of consistency, reliability, and validity (Buysse, 1989; Carpenter, 1998). It is composed of 19 self-reported questions grouped into seven component scores. The seven components were scored using the following the algorithm proposed by Buysse (1989). Each

component score is weighted equally on a 0-3 scale with lower scores indicating no problem and higher scores indicating a progressively worsening problem as follows: 1) subjective sleep quality (very good to very bad), 2) sleep latency (<15 minutes to >60 minutes), 3) sleep duration (>7 hours to <5 hours), 4) sleep efficiency (>85% to <65% hours sleep/hours in bed), 5) sleep disturbances (not during the past month to >3 times per week), 6) use of sleeping medications (none to >3 times a week), and 7) daytime dysfunction (not a problem to a very big problem). For clinical use, the authors proposed a cut-off score of < 5 to indicate good quality sleep and ≥5 to indicate poor sleep quality (Buysse, 1989).

The survey included several questions about OTC drug use, developed by Stasio, Curry, Sutton-Skinner & Glassman (2008) in consultation with health care professionals. Several questions from the Center for Disease Control's telephone health survey system (i.e., the Behavioral Risk Factor Surveillance System) (Centers for Disease Control and Prevention, 2013) were also included: To assess lifetime illicit drug use students were asked, "During your life, have you ever used any other drugs including cocaine, heroine, methamphetamine, ecstasy or prescription drugs for reasons other than what it was prescribed to you by a doctor? Marijuana use was assessed by the question "During the past 30 days, how many times did you use marijuana?" Alcohol use and binge drinking (30 day) were assessed by the following two questions: "During the past 30 days, on how many days did you have at least one drink of alcohol?" and "During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?" An additional question about binge drinking over a year long period was

included: “During the past 12 months: How often do you have six or more drinks on one occasion?”

Procedure

All data were collected online. Participants were directed to complete the College Student’s Health Profile Questionnaire. This survey consisted of demographic questions and several standardized health-related measures including the PSQI. Seventy-three students missed at least one question from the PSQI and were excluded from some analyses. Descriptive statistics, chi square, and logistic regression analyses were performed using IBM SPSS 20 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). Differences in proportions between poor and good sleepers by category (i.e., allergy medications, cough and cold medications, gastrointestinal, pain relievers, sleeping aids, herbal supplements, performance boosters, vitamins and minerals, and weight control drugs) were evaluated using Pearson’s chi-square.

Univariate logistic regression analyses were used to determine the independent predictors of OTC drug use at two cutoff levels (i.e., OTC 2 and OTC 3). Since the sample is 64% Caucasian within a narrow age range, gender is the single demographic variable tested as a predictor of OTC-two and OTC-three drug use. Additionally, univariate analyses were conducted with several predictors including: 30-day alcohol use, binge drinking in the last 30 days, illegal drug use, binge drinking in the last 12 months, and marijuana use. Having health insurance and PSQI scores were also entered into the univariate analyses. Specifically, health insurance status was entered because it was

thought that having health insurance would be associated with using less OTC drugs as a result of having access to prescription drugs.

Using the variables found to be associated with an increased risk of OTC drug use, multiple logistic regression analyses were performed for each of the two dependent variables. For the purposes of this study, binge drinking was defined as 6 or more drinks on one occasion during the past 12 months or 6 or more drinks in the last 30 days. Poor sleep quality was defined as a PSQI score of 5 or greater, the clinically recommended cutoff. The Odds Ratio (OR) and 95% confidence intervals (95% CI) represent the estimated effect of the variables presented; ORs greater than 1 indicate increased risk. ORs can be interpreted as percentages. To derive the percent increase from the OR, we use the formula percent increase = (OR-1) x 100.

CHAPTER 3

RESULTS

Most-participants self-identified as Caucasian (64%) with a mean age of 22 years, and were mostly females (74.4%). Fifty percent of the sample was under 21. Approximately 75.6% of participants reported having health insurance at the time of the survey. Health insurance was included in the analyses because it was thought that health insurance would be associated with lower OTC drug use due to access to prescription medications. Sixteen percent reported using (16.3%) illicit drugs (i.e., cocaine, heroine, methamphetamine, and ecstasy) at some point in their lifetime. Sixty-four students (14.3%) reported having used marijuana in the last 30 days. Additionally, 163 students (40.8%) reported participating at least once in binge drinking in the last 30 days. Sixty-six percent of students reported having at least one alcoholic beverage in the past 30 days,

and 43% reported having six or more drinks in the past year. Sixty-two percent were classified as suffering from poor sleep quality.

As shown in table 2, results of the chi square analyses show that a significantly smaller proportion of good quality sleepers compared to poor quality sleepers reported using OTC allergy medications (24% vs. 37.3%, $p < .001$), OTC sleeping aids (2.7% vs. 17.8%, $p < .001$), and herbal supplements (7.7% vs. 16.2%, $p < .01$). No significant differences were observed in the use of OTC cough and cold medications (29% vs. 31.5%, $p= .309$), OTC gastrointestinal medications (5.9% vs. 9.1%, $p= .127$), OTC pain relievers (54.8% vs. 61.0%, $p= .103$), performance boosters (3.6% vs. 5.0%, $p= .314$) vitamins and minerals (33.5% vs. 39.5%, $p= .110$) or OTC weight control drugs (5.4% vs. 5.4%, $p= .574$) among good and poor quality sleepers.

Univariate logistic regression analyses were performed to examine the relationship between PSQI scores and OTC drug use at an alpha level of 0.05. Students who experienced poor sleep quality (PSQI>=5) (OR: 1.552, 95% CI: 1.033-2.332), used alcohol in the last month (OR: 2.081, 95% CI: 1.299-3.333), participated in binge drinking in the last 30 days (OR: 1.513, 95% CI: 1.012-2.262), used illegal drugs in their lifetime (OR: 1.852, 95% CI: 1.116-3.073), had health insurance (OR: 2.624, 95% CI: 1.485-4.638), and were female (OR: 1.67, 95% CI: 1.073-2.622), were significantly more likely to have used two or more OTC drugs in the last 30 days than students who did not report these behaviors and were uninsured/male.

Similarly, students who experienced poor sleep quality (PSQI>=5) (OR: 2.275, 95% CI: 1.367-3.787), used six or more drinks in the last year (OR: 1.096, 95% CI: 1.096-2.831), used alcohol in the last 30 days (OR: 2.834, 95% CI: 1.474-5.452), binge

drank in the last month (OR:2.243, 95% CI: 1.395-3.604), used marijuana in the last month (OR: 1.837, 95% CI: 1.021-3.305), and used illegal drugs in their lifetime (OR: 2.057, 95% CI: 1.183-3.578), were significantly more likely to have used three or more OTC drugs in the last 30 days than students who did not report these behaviors, regardless of gender.

In the first multiple logistic regression analysis (see table 4), students who were female (OR=1.68, 95% CI: 1.073-2.622), with health insurance (OR=2.62, 95% CI: 1.485-4.64), used alcohol in the last 30 days (OR=2.08, 95% CI: 1.299-3.333), binge drank in the last 30 days (OR=2.08, 95% CI: 1.299-3.333), and experienced poor sleep quality (PSQI>=5) (OR=1.55, 95% CI: 1.033-2.332) were found to be 1.5 to 2.6 times more likely to have used two or more OTC drugs in the last 30 days.

After the second multivariate logistic regression analysis, controlling for gender, students with PSQI scores of 5 or greater (OR=2.149, 95% CI: 1.348-3.423) and who participated in binge drinking in the last 30 days (OR=2.243, CI: 1.395-3.604 were found to be more than twice as likely to have used three or more OTC drugs in the last 30 days than students who did not report these behaviors.

CHAPTER 4

DISCUSSION

Conclusions

Based on the literature, it appears that there is a growing interest in studying the behavioral factors that contribute to college student health (Garnier, Arria, Caldeira, Vincent, O'Grady, & Wish, 2010; Sepúlveda et al., 2011; Teter, Falone, Cranford, Boyd, & McCabe, 2010). This study makes an important contribution by describing the

polysubstance use of an 18 to 25 year old sample and establishing a correlation with sleep quality. Overall, the results from this study suggest an association between sleep and polysubstance use. The hypothesis that poor sleep quality would be associated with increased OTC drug use was confirmed in both multiple logistic regression analyses. Although the direction of the relationship between sleep quality and drug use is not clarified by this research, this study adds to the literature and may help to encourage further research on the topic. Furthermore, the results of the chi square analyses indicate that a significant percentage of college students experiencing poor sleep quality are using OTC allergy medications (37.3%), sleeping medications (17.8%), and herbal supplements (16.2%). Furthermore, although there was not a statistically significant difference between good quality sleepers (PSQI<5) and poor quality sleepers (PSQI≥5) in terms of OTC pain medication use, a significant percentage of each group used these types of medications (54.8% and 61% respectively).

Of particular interest are the results of the multiple logistic regression at the OTC-three drug cutoff, which suggest that only PSQI scores and binge drinking in the last 30 days are predictive of OTC drug use. In fact, the findings are consistent with the results of Lund et al. (2010) who found that poor-quality sleepers had higher alcohol consumption and more frequently used alcohol and OTC drugs to help regulate their sleep/wake schedule. The authors call this a stimulant-sedation loop and suggest that students who are trapped in this pattern may be at a higher risk for developing drug dependence. In fact, it is currently estimated that 90% of the adolescents who enter drug rehabilitation programs are self-medicating with drugs to control their sleep and fight fatigue (Bootzin & Stevens, 2005).

Limitations

There are several limitations that should be noted. This study is based on self-reported data rather than direct observation. Additionally, the cross sectional nature of the study prevents conclusions about the causal relationship between PSQI scores of 5 or greater, OTC drug use, and general polysubstance use. Future studies would benefit from using the ideas presented in this study to conduct an experimental research study that looks at the direct impact of sleep deprivation on drug use in a college aged sample.

Additionally, it is not possible to distinguish between substance misuse, abuse, and use in our study sample. With the exception of illicit drug use, binge drinking, and 30 day alcohol use it would be difficult to objectively define subjects' polysubstance use as misuse or abuse based on the responses they provided to the College Behavior Health Questionnaire and PSQI. Lastly, students were only asked about the types of OTC meds that they used during the last 30 days and not the dosages of those medications.

Future Research

It appears that there is a need for further research on this topic, particularly research that looks at low sleep quality as the cause of polysubstance use instead of an effect. Clarifying the direction of the relationship may be essential to taking preventative action during adolescence. The risk for illness experienced by college students who are consistently getting poor-quality sleep is more severe than simply impairing students' ability to function in daily activities and can severely impact their academic performance. The development of a college residence life survey that screens for sleeping problems prior to moving-in on campus may help college staff to identify students who are likely to be in academic jeopardy (GPA< 2.0) after their first semester. College health-care

professionals and residence life staff can greatly benefit from advances to screening methods for sleep difficulties. In the long-term, new research has the potential to greatly improve college students' well-being and their chances at being successful in college.

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TABLES

Table 1. Demographics

Age range	18-25 yrs.
Female	74.4%
Caucasian	63.2%
Health Insurance	75.6%
Poor Sleep Quality (PSQI>5)	62.3%
Depression Diagnosis	19.5%

Table 2. Health Behaviors by Sleep Quality (Good vs. Poor)

Medication type	% Good Sleep Quality (PSQI<5)	% Poor Sleep Quality (PSQI>5)	
N=515	*n* (%)	*n* (%)	*p* value
Allergy	53 (24.0%)	90 (37.3%)	.001
Cough/ cold	64 (29.0%)	76 (31.5%)	ns
Pain	121 (54.8%)	147 (61.0%)	ns
Gastrointestinal	13 (5.9%)	22 (9.1%)	ns
Sleeping aids	6 (2.7%)	43 (17.8%)	<.001
Vitamins/ minerals	74 (33.5%)	95 (39.4%)	ns
Herbal supplements	17 (7.7%)	39 (16.2%)	.004
Weight control	12 (5.4%)	13 (5.4%)	ns

Table 3. Odds of Using Two or More Over-the-Counter Drugs Predicted by Sleep, Substance Use, Health Insurance, and Gender

Univariate Logistic Regression Analyses		
Predictor	OR (95% CI)	*p* value
PSQI	1.552 (1.033-2.332)	.034
Alcohol 30 day	2.081 (1.299-3.333)	.002
6+ drinks 12 months	1.467 (0.863-3.397)	.299
Binge drinking 30 Day	1.513 (1.012-2.262)	.044
Illegal drug use	1.852 (1.116-3.073)	.017
Marijuana use 30 Day	1.565 (0.919-2.665)	.099
Health insurance	2.624 (1.485-4.638)	.001
Gender	1.677 (1.073-2.622)	.023
Multivariate Logistic Regression Analysis		
Predictor Variables	OR (95% CI)	*p* value
PSQI	1.666 (1.071-2.590)	.024
Alcohol 30 day	2.062 (1.214-3.501)	.007
Health insurance	2.977 (1.493-5.936)	.002
Gender	2.053 (1.211-3.481)	.008

Table 4. Odds of Using Three or More Over-the-Counter Drugs Predicted by Sleep, Substance Use, Insurance, and Gender

Univariate Logistic Regression Analyses		
Predictor	OR (95% CI)	*p* value
PSQI	2.275 (1.367-3.787)	.002
Alcohol 30 day	2.834 (1.474-5.452)	.002
6+ drinks 12 months	1.762 (1.096-2.831)	.019
Binge drinking 30 Day	2.243 (1.395-3.604)	.001
Illegal drug use	2.057 (1.183-3.578)	.011
Marijuana use 30 Day	1.837 (1.021-3.305)	.042
Health insurance	1.712 (0.863-3.397)	.124
Gender	1.375 (0.796-2.376)	.253
Multivariate Logistic Regression Analysis		
Predictor Variables	OR(95% CI)	*p* value
PSQI	2.110 (1.238-3.596)	.006
Binge drinking 30 day	2.253 (1.337-3.798)	.002

APPENDIX A

LIST OF OTC DRUGS AND HERBAL OR DIETARY SUPPLEMENTS

OTC Medication
Allergy Benadryl Claritin Contac Sudafed
Cough and cold Alka-Seltzer Cold Dayquil Generic Formula Nyquil Robitussin
Gastrointestinal Metamucil Pepcid Tagamet EX-Lax Zantac
Pain reliever Advil Bayer Excedrin Generic acetaminophen Generic ibuprophen Midol Motrin Tylenol
Sleep aid Alluna Melatrol Melatonin Seditol SerotoninFX Sominex Somnatrol Tylenol PM Vita Sleep
Herbal or Dietary Supplement
Herbal Airborne Bilberry Chamomile Cold-eeze Echinacea Ephedra

Evening primrose oil Garlic Gingko Goldenseal Kava Lemon balm Licorice root Passion fruit St. John's wort Valerian
Performance Booster Kre Alkalyn 1500 Muscle Milk Nitrix Nitroxagen No Xplode Pump Tech Thermonex TZ3 Stack
Vitamins and Minerals Aloe vera (oral) B vitamin Bee Pollen Catechin Flavonoids Green Tea Magnesium Multivitamin N-acetyl-cysteine Omega-3 fatty acid Probiotic capsule Pycnogenol Quercetin Taurine (amine acid) Vitamin C Vitamin E Zinc
Weight Control Advalean Anorex Cortislim Dietrine-CarbBlocker Phentermine Metabo-Speed Xenadrine

APPENDIX B

PITTSBURGH SLEEP QUALITY INDEX

College Student's Health Profile- Corrected

11. Sleep Patterns (PSQI)

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month.

Please answer all questions.

1. During the past month, when have you usually gone to bed at night?

	HH	MM	AM/PM
USUAL BED TIME		:	

2. During the past month, how long (in minutes) has it usually take you to fall asleep each night?

NUMBER OF MINUTES (e.g., 35)

3. During the past month, when have you usually gotten up in the morning?

	HH	MM	AM/PM
USUAL GETTING UP TIME		:	

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed. Enter whole numbers only: for example 5,6,7, etc.)

HOURS OF SLEEP PER NIGHT (e.g., 6)

5. For each of the remaining questions, check the one best response. Please answer all questions.

	Not during the past month	Less than once a week	1-2 times a week	3 or more times a week
Cannot get to sleep within 30 minutes	◯	◯	◯	◯
Wake up in the middle of the night or early morning	◯	◯	◯	◯
Have to get up to use the bathroom	◯	◯	◯	◯
Cannot breathe comfortably	◯	◯	◯	◯
Cough or snore loudly	◯	◯	◯	◯
Feel too cold	◯	◯	◯	◯
Feel too hot	◯	◯	◯	◯
Had bad dreams	◯	◯	◯	◯
Have pain	◯	◯	◯	◯

College Student's Health Profile- Corrected

6. During the past month, how often have you had trouble sleeping because you...

	Not during past month	Less than once a week	1-2 times a week	3 or more times a week
Other reasons	◯	◯	◯	◯

Please describe

7. During the past month, how would you rate your sleep quality overall?

◯ Very good ◯ Fairly good ◯ Fairly bad ◯ Very bad

8. For each of the remaining questions, check the one best response. Please answer all questions.

	Not during the past month	Less than once a week	1-2 times a week	3 or more times a week
During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?	◯	◯	◯	◯
During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	◯	◯	◯	◯

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

◯ No problem at all
◯ Only a very slight problem
◯ Somewhat of a problem
◯ A very big problem

10. Do you have a bed partner or roommate?

◯ No bed partner or roommate
◯ Partner/roommate in other room
◯ Partner in same room, but not same bed
◯ Partner in same bed

College Student's Health Profile- Corrected

11. If you have a housemate, roommate or bed partner, ask him/her how often in the past month you have had...

	Not during the past month	Less than once a week	1-2 times a week	3 or more times a week
Loud snoring	◯	◯	◯	◯
Long pauses between breaths while asleep	◯	◯	◯	◯
Legs twitching or jerking while you sleep	◯	◯	◯	◯
Episodes of disorientation or confusion during sleep	◯	◯	◯	◯
Other restlessness while you sleep	◯	◯	◯	◯

Please specify