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Sleep Quality and Academic Performance in University Students: A Wake-Up Call for College Psychologists

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Both sleep deprivation and poor sleep quality are prominent in American society, especially in college student populations. Sleep problems are often a primary disorder rather than secondary to depression. The purpose of the present study was to determine if sleep deprivation and/or poor sleep quality in a sample of non-depressed university students was associated with lower academic performance. A significant negative correlation between Global Sleep Quality score (GSQ) on the Pittsburgh Sleep Quality Index and grade point average supports the hypothesis that poor sleep quality is associated with lower academic performance for nondepressed students. Implications for both the remedial (assessment and treatment) and preventive (outreach) work of college and university counseling centers is discussed.

KEYWORDS *academic performance, college students, Pittsburgh Sleep Quality Index, sleep quality*

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In addition to air, water, and food, the only other biological necessity our bodies require is sleep (Gregory, Xie, & Mengel, 2004). Sleep is critical for memory consolidation, learning, decision making, and critical thinking (Harrison & Horne, 2000; Mednick, Nakayama, & Stickgold, 2003; Pilcher & Walters, 1997; Smith & Lapp, 1991). Sleep is thus necessary for the optimal operation of key cognitive functions related to academic, and perhaps social, success in higher education.

Both sleep deprivation (inadequate *quantity* of sleep) and poor sleep *quality* (nonrestorative sleep) are endemic in American society and widely recognized as a significant public health issue (APA, 2008; Colten & Altevogt, 2006; Coren, 1997; Morin, 2002; National Sleep Foundation, 2008). Research conducted by the National Commission on Sleep Disorders estimated that 40 million Americans suffer from excessive sleepiness (Jensen, 2003). Perhaps counterintuitively, sleepiness (and other measures of health and well-being) has been shown to be more related to sleep *quality* than quantity (Pilcher, Ginter, & Sadowsky, 1997).

When students arrive at college their sleep habits are often one of their first daily routines to change and not usually for the better (Pilcher et al., 1997). College students typically shift to an irregular sleep–wake cycle characterized by short sleep length on weekdays and phase delays (later wake-up time) on weekends, although this general pattern is influenced by an individual's study and work schedules (Brown, Buboltz, & Soper, 2001; Machado, Varella, & Andrade, 1998). Brown & Buboltz (2002b, p. 33) stated that "twice as many students as people in the general population report symptoms consistent with delayed sleep phase syndrome."

Not surprisingly then, both sleep deprivation and poor sleep quality are particularly prominent in young adult and college student populations (Brown et al., 2001; Jensen, 2003; Lack, 1986; Markel, 2003). One recent study found that university students report at least twice as many sleep difficulties as the general population (Brown et al., 2001).

This problem has worsened in recent decades (Jensen, 2003). The average sleep duration of students in 1969 was 7.5 hours; by 1989 it had decreased to 6.5 hours (Hicks & Pellegrini, 1991). Normative data in 2001 found no change from 1989 in the frequency distribution of hours slept per night, but 71% of students reported dissatisfaction with sleep, up from 68% in 1992 (Hicks, Conti, & Pellegrini, 1991) and only 24% in 1978 (Hicks, Fernandez, & Pellegrini, 2001a, 2001b.)

While college and university psychologists are well aware that depression can negatively impact student academic performance (Fazio & Palm, 1998) and routinely screen for it, sleep deprivation and/or poor sleep quality are rarely screened for but can also negatively impact academic performance (Kelly, Kelly, & Clanton 2001; Medeiros, Mendes, Lima, & Araujo, 2001; Pilcher & Ott, 1998; Trockel, Barnes, & Egget, 2000). One study of college students found that sleep loss results in a preference for cognitive tasks

demanding minimal effort so that adequate performance can be maintained (Engle-Friedman et al., 2003), suggesting that sleep loss may also constrain the academic, extracurricular, and perhaps even the vocational choices of at least some sleep-deprived students.

Sleep quality may even be *more* important than depression and/or psychopathology for academic performance. In contrast to the studies cited previously, which have found that sleep problems negatively impact academic functioning, Svanum and Zody (2001) found that semester grades were *not* strongly associated with depression as assessed by the Beck Depression Inventory and only weakly associated with overall levels of psychopathology.

Despite uncertainties of the relative relationships between depression, sleep, and academic performance, the fact remains that sleep problems are affecting more students. The incidence of sleep deprivation in a college student population is likely as high or higher than the incidence of depression. In the fall 2007 National College Health Assessment Survey sponsored by the American College Health Association (ACHA), 16% of students reported that they had ever been diagnosed with depression (ACHA, 2008). A recent study of one-year prevalence rates among first-year university students at a Canadian university found that 7% of men and 14% of women met the criteria for Major Depressive Disorder (Price, McLeod, Gleich, & Hand, 2006).

In comparison, Brown & Buboltz (2002b, p. 33) stated "at least two thirds of college students report occasional sleep disturbances, and about one third of those report regular, severe sleep difficulties. The problem is even more evident in a recent study that found that only 11% of the students surveyed met the criteria for good sleep quality (Buboltz, Brown, & Soper, 2001). The rest of the sample had moderate-to-severe sleep complaints."

Taken together these research studies suggest that sleep problems may be four to six times more prevalent than depression in the college student population. However, despite the importance of sleep for college success and the prevalence of inadequate sleep among college students, few university psychologists regularly and independently assess whether students are sleep deprived and/or sleeping poorly. To compound matters, many students are themselves unaware that their academic difficulties may be related to their sleep habits (Pilcher & Walters, 1997) and so do not volunteer this information to counselors unless asked, which counselors are unlikely to do unless asking about depressive symptoms.

When sleep problems are found in clients by college psychologists, these problems are often reflexively thought to be the sequalae of depression. However, this may or may not be the case; poor sleep quantity and quality can occur independently of depression, and can even lead to it. Sleep problems have been found to be a precursor to the development of bona fide depression (Pilcher et al., 1997) and mania (Plante & Winkleman, 2008; Wehr, Sack, & Rosenthal, 1987). Jean-Louis, von Gizycki, Zizi, and Nunes

(1998) found a significant main effect of sleepiness on mood; that is, students who fell asleep in school reported higher negative mood states. To further complicate matters, both poor sleep quantity and quality can mimic depressive symptoms (e.g., fatigue, decreased motivation and concentration, irritability).

In short, both sleep problems and depression may be either *primary* or *secondary* (i.e., sequalae of another difficulty or disorder). When it comes to depression and poor sleep quantity/quality, which problem is the chicken and which is the egg may thus differ among clients. Admittedly, it can be challenging to tease this out during an initial consultation with a student, but too many college psychologists do not even stop to ask the question, invariably deciding that the chicken of depression has laid the egg of sleepiness. Primary sleep deprivation and/or poor sleep quality may thus either be missed entirely or misdiagnosed as depression. As a result, sleep quality is seldom a direct target of therapeutic interventions, even when addressing sleep head-on would be the most efficient approach to improving academic functioning and preventing depression in clients with primary sleep problems.

Although a small number of previous studies have linked college student sleep habits to lower academic performance, these studies have had small subject samples, have not assessed sleep quality as well as sleep deprivation, and/or, perhaps most critically, have not controlled for depression. The purpose of the present study was to determine if sleep deprivation and/or poor sleep quality in a sample of nondepressed university students was associated with lower academic performance. Such a finding may serve as a wake-up call to university psychologists that sleep behavior is a significant client variable in its own right and should be part of both our preventive and remedial work. Remedially, it would provide impetus for college psychologists to incorporate an evaluation of sleep quantity and quality in their initial assessments of individual clients to improve diagnosis and treatment planning. Preventively, it would be evidence that there is a need to develop sleep education programs to improve student success and retention.

The purpose of the current study is to examine the relationship between sleep deprivation, sleep quality, and academic performance. It was hypothesized that participants who had higher levels of sleep deprivation and poorer sleep quality would have lower academic performance (as indicated by grade point average [GPA] and course incompletions—drops, withdrawals, and incompletes) than participants with little sleep deprivation and good sleep quality.

METHODS

Participants

A total of 557 undergraduate Introductory Psychology students participated in the study. Of this sample 35.7% ($N = 199$) were male and 64.3% ($N = 358$) were

female. The mean age of the sample was 19.50 ($SD = 2.02$). After screening out depressed individuals, 468 participants remained in the analyses. Of this sample 35.7% ($N = 167$) were male and 64.3% ($N = 301$) were female. The mean age of the remaining, refined sample was 19.46 ($SD = 1.76$).

Measures

Demographic survey

Participants completed a brief demographic survey. This survey included questions about age, gender, GPA, and the number of courses on their transcript that were categorized as "dropped," "withdrawn," or "incomplete." The number of drops, withdrawals, and incompletes (DWIs) was solicited because a student might maintain a satisfactory GPA by withdrawing from courses; thus, DWI was considered a second measure of academic functioning, with a higher number of DWIs suggesting poorer academic functioning.

Goldberg Depression Inventory

The Goldberg Depression Inventory (GDI) is an 18-item self-report measure used to detect the severity of depressive symptomatology (Goldberg, 1993). It has been validated using the Hamilton Depression Inventory (Holm, Holm, & Bech, 2001). The GDI uses a six-point Likert-type scale ranking depressive symptoms from 0 (not at all) to 5 (very much). In an unpublished study, 400 college students were found to have an average score of 19 with a SD of 3; thus a score of 25 or higher indicates significant levels of depressive symptoms (I. Goldberg, personal communication, April 19, 2004).

Pittsburgh Sleep Quality Index

The Pittsburgh Sleep Quality Index (PSQI) is a 19-item self-report measure designed to measure sleep quality over the past month (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI has seven subscale scores that measure subjective quality, latency, duration, habitual sleep efficiency (HSE), disturbance, medication use, and daytime dysfunction as they relate to sleep. These subscales are added in order to determine a global sleep quality score (GSQ). The global score ranges from 0 to 21, in which higher scores indicate poorer sleep quality. The PSQI also asks respondents to report hours slept, asking "During the past month, how many *actual* hours of sleep did you get at night (this may be different than the number of hours you spent in bed)?"

Procedure

Subjects were solicited during a scheduled class meeting of an undergraduate psychology course. In exchange for their participation, subjects were given extra credit regardless of completing the survey. In order to ensure

confidentiality, no identifying information was recorded. Following data collection and entry, participants with GDI scores greater than or equal to 25 were removed from further analysis in order to eliminate students reporting significant depressive symptoms from the subject pool. The remaining participants who had not indicated significant depressive symptoms were included for analysis. Statistical analyses were conducted using SPSS 12.0 software.

RESULTS

Prior to statistical analyses, global sleep quality (GSQ) scores were obtained from the seven PSQI subscales. Detailed instructions describing the procedure for calculating GSQ are described elsewhere (Buysse et al., 1989). Analyses were conducted only on participants who had provided enough information to obtain a GSQ score and who had provided GPA information. Final analyses were conducted with the remaining 415 participants. A significant negative correlation between GSQ and GPA ($r = -.12$, $p = .01$) supports our hypothesis that lower sleep quality is associated with lower academic performance. Table 1 shows this and additional correlations. The correlation between GSQ and GPA was conducted separately for males and females. Correlational analyses revealed a significant correlation between GSQ and GPA for females ($r = -.161$, $p = .004$), but not for males.

The average number of hours slept in our sample was 7.2 (standard deviation 1.2, range 4–12 hours). Turning to sleep quality, higher GSQ scores indicate poorer sleep quality. Seventy percent of our sample obtained GSQ scores two standard deviations above the mean GSQ score for the control group of the original Buysse and colleagues (1989) study. In addition, 52.3% of our college sample obtained GSQ scores above the mean reported by Buysse and colleagues for participants with disorders of hypersomnia. Also, 7.6% of our sample received higher GSQ scores than the mean GSQ score reported by Buysse and colleagues for participants with disorders of initiating and maintaining sleep.

TABLE 1 Intercorrelations Between Sleep, Academic Performance, and Demographic Variables

	GPA	GSQ	Hours slept	Gender	DWI status
GPA	—	−.12**	−.10*	.13**	.26***
GSQ		—	−.37***	.04	−.08
Hours Slept			—	−.05	−.04
Gender				—	.14**
DWI Status					—

N = 417. *$p < .05$. **$p < .01$. ***$p < .001$.

Participants scoring two standard deviations above the mean GSQ from Buysse and colleagues (1989) were compared to all participants scoring below this mark. An independent samples t-test revealed a significant difference in GPA score ($t(413) = 2.15$, $p = .032$), significant difference in GPA such that those that are above 2 SDs had significantly lower GPAs ($M = 3.22$, $SD = .54$) compared to those below this mark ($M = 3.35$, $SD = .47$). Similar analysis was conducted by gender. A significant difference was found for females above 2 SDs compared to females below this mark ($t(269) = 2.12$, $p = .035$) such that those above 2 SDs had significantly lower GPAs ($M = 3.26$, $SD = .04$) compared to those below this mark ($M = 3.40$, $SD = .05$). No significant differences were found between males above and below 2 SDs, $t(142) = .83$, $p = .409$.

To further understand the relationship between sleep and academic performance, a multiple regression analysis was conducted. Variables included as predictors in the analysis were GSQ, hours slept, gender, and DWI. Results indicated that together participants' GSQ scores, number of hours slept, gender, and DWI status significantly predicted GPA, $F(4, 412) = 12.31$, $p < .001$. Adjusted r^2 indicated that 9.8% of the variance in GPA was explained by this model. Results also suggested that GSQ scores ($\beta = -.16$, $p = .001$), number of hours slept ($\beta = -.15$, $p = .003$), and DWI status ($\beta = .23$, $p < .001$) were each significant predictors of GPA. Although gender was significantly correlated with GPA (see Table 1), when entered in the regression analysis, the presence or absence of DWI became the strongest predictor while gender (although close) was not a significant predictor of GPA ($\beta = .092$, p = .051). In addition, the model had predictive accuracy as it significantly predicted reported GPA, $r = .33$, $p < .01$.

DISCUSSION

To our knowledge, this is the first study to have found a relationship between poor sleep quality and lower academic performance using a large sample size and, importantly, for nondepressed students alone (controlling for depression). The significant negative correlation between GSQ score and GPA supports our initial hypothesis that poor sleep quality is associated with lower academic performance for nondepressed students. This hypothesis is also supported by the finding that in our subject population nondepressed students with clinically poor sleep quality had significantly lower GPAs than nondepressed students with clinically good sleep quality. Strikingly, 70% of our sample had clinically poor sleep quality, defined as GSQ scores two standard deviations above the mean of the control group of the original Buysse and colleagues (1989) PSQI validation study.

The finding that sleep quality is an important component of academic success is alarming given the research cited earlier finding that a significant

proportion of college students do not receive adequate and/or good quality sleep. Our study also found that the sleep habits of many college students are quite poor, highlighting the need to consider sleep *quality* as well as quantity.

The average number of hours slept in our sample was 7.2, which is somewhat higher than the 6.5-hour average found in other recent surveys but still less than the mean of 8 hours one would expect in a normal distribution of sleep duration.[1] However, 70% of the nondepressed students in our sample had sleep *quality* scores that were poorer than the normal control samples in the original Buysse and colleagues (1989) study.

Not only are many, perhaps most, college students not sleeping well, over half of our subjects were sleeping as badly or worse than Buysse and colleagues' sample of individuals with diagnosed sleep disorders. Thus, even if GPA were not affected, these results reflect evidence of significant sleep quality disturbance among college students, which may have other deleterious cognitive, social, and medical effects.

There were some intriguing sex differences in the findings. A significant correlation between sleep quality and academic performance was present for females, but not for males. Similarly, females whose sleep quality was significantly below average when compared to Buysee and colleagues' (1989) original sample had significantly lower GPAs, but this did not hold true for males. Taken together, these results suggest that the relationship between sleep quality and academic performance may be more robust for female students. It is unclear why this might be so.

The work of university counseling centers is often divided into remedial and preventive interventions. The present research has implications for both. As noted in the introduction, all too often college psychologists assess the sleep habits of a client only if depression is reported by the student or suspected by the clinician. If this is not the case, many counselors neglect asking about sleep habits, even if academic functioning is part of the client's presenting problem. Yet, our findings suggest that many of these nondepressed students will have poor sleep quality, and, further, it is highly probable that such poor sleep quality will negatively impact their academic functioning.

Thus, if a nondepressed student is struggling academically, a counselor may falsely identify some factor other than sleep problems as causal. Therapeutic efforts may thus miss a key target and ignore a relatively simple corrective intervention (i.e., improving sleep hygiene) and instead focus on secondary or ancillary factors. Furthermore, even if these other factors are contributory (or, for that matter, primary), interventions aimed at them (be they cognitive, behavioral, insight-oriented, etc.) will often have their effectiveness blunted or reduced in a sleep-deprived individual or an individual with poor sleep quality.

Thus, college psychologists should routinely assess the sleep habits of all clients, but especially of those struggling academically. At a bare

minimum, sleep habits should be inquired about during the initial consultation. If poor sleep appears to be problematic or contributory to presenting concerns and/or academic functioning, clients should be provided with patient education about the importance of sleep, be given information on sleep hygiene, and be encouraged and helped to improve their sleep habits. Jensen (2003) has provided useful suggestions for college psychologists interested in more thorough assessment and treatment of sleep problems.

The regression analysis has significant predictive value—by using GSQ, hours slept, and DWI status, one can predict GPA. The regression analysis indicates that individuals who sleep for fewer hours and who have poor sleep quality (as indicated by the GSQ score) are also more likely to exhibit poor academic performance. Additionally, individuals with a history of course incompletion are more likely to exhibit poor academic performance. Simply put, students with a history of incompletes and poor sleep quality are particularly at risk for poor grades. Clinicians should be particularly alert in working with clients who fit this profile and should investigate these clients' sleep habits as a possible target of intervention.

Turning to prevention, our results suggest that counseling centers, perhaps in collaboration with health services, should provide psychoeducational information aimed at educating students about the importance of good sleep quality for academic success and providing advice on how to achieve it. As noted, inadequate sleep is a major public health problem in America, including on college campuses. Thus, a public health campaign is needed, and college psychologists can play a leading role in sending a "wake-up call" about sleep to the students they serve. Brown and Buboltz (2002a) have provided a useful starting place in this regard, outlining the key ingredients for such a student sleep education program.

Limitations and Directions for Future Research

Because this was correlational research, we cannot infer directionality of effect (i.e., that poor sleep quality *caused* lower grade point average). We only know that the variables were significantly associated in the predicted direction. Thus, it is possible that students with academic difficulties engage in other behaviors that in turn cause poor sleep (e.g., substance abuse).

Furthermore, if the directionality is indeed what we suspect (i.e., poor sleep quality causing poor academic performance) it is possible that this is an indirect or mediated effect rather than a direct effect caused by the cognitive and motivational deficits associated with poor sleep. That is, poor sleep quality may lead to other behaviors (e.g., truancy from class for daytime napping, substance use as a sleep aid, etc.) which in turn could cause poor academic performance.

Other methodological limitations include the fact that our sample was composed primarily of first-year students, which may limit generalizabilty to all college students. Also, we did not independently check the grade point average reported by students against their college transcripts but relied on subject self-report.

Future research should examine whether academic performance can be predicted on the basis of sleep quality. A prospective study would measure the GSQ of nondepressed first-year students in the middle of their first semester and study the degree to which end-of-year GPA can be predicted from these GSQ scores. Such predictive ability would strengthen the argument advanced here that poor sleep quality contributes to decreased academic performance for nondepressed students.

NOTE

1. The average number of hours slept for all of the students in the initial sample (including those subsequently screened out for depression) was 7.0, with a standard deviation of 1.2 and a range of 2 to 12.

REFERENCES

American College Health Association. (2008). *American college health association national health assessment: Reference group executive summary fall 2007*. Baltimore: American College Health Association.

American Psychological Association. (2008). Why sleep is important and what happens when you don't get enough. Retrieved from http://www.apa.org/topics/whysleep.html.

Brown, F., & Buboltz, W. (2002a). Applying sleep research to university students: Recommendations for developing a student sleep education program. *Journal of College Student Development*, *43*, 411–416.

Brown, F., & Buboltz, W. (2002b). Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students. *Behavioral Medicine*, *28*, 33–39.

Brown, F., Buboltz, W., & Soper, B. (2001). Prevalence of delayed sleep phase syndrome in university students. *College Student Journal*, *35*, 472–476.

Buboltz, W., Brown, F., & Soper, B. (2001). Sleep habits and patterns of college students: A preliminary study. *Journal of American College Health*, *50*, 131–135.

Buysse, D., Reyonds, C., Monk, T., Berman, S., & Kupfer, D. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research*, *28*, 193–213.

Colten, H., & Altevogt, B. (Eds.) (2006). Sleep disorders and sleep deprivation: An unmet public health problem. Report issued by the Institute of Medicine of the National Academies. Washington, DC: The National Academies Press.

Coren, S. (1997). *Sleep thieves*. New York: Free Press.

Engle-Friedman, M., Riela, S., Golan, R., Ventuneac, A., Davis, C., Jefferson, A., & Major, D. (2003). The effect of sleep loss on next day effort. *Journal of Sleep Research*, *12*, 133–124.

Fazio, N. & Palm, L. (1998). Attributional style, depression, and grade point averages of college students. *Psychological Reports*, *83*, 159–162.

Goldberg, I. (1993). *Questions and answers about depression and its treatment*. Philadelphia: Charles Press.

Gregory, J., Xie, X., & Mengel, S. (2004). SLEEP (sleep loss effects on everyday performance) model. *Aviation, Space and Environmental Medicine*, *75*, A125–A133.

Harrison, Y., & Horne, J. (2000). The impact of sleep deprivation on decision making: A review. *Journal of Experimental Psychology: Applied*, *6*, 236–249.

Hicks, R., Conti, P., & Pellegrini, R. (1992). The incidence of sleep problems among type A and type B college students: Changes over a ten-year period (1982–1992). *Perceptual and Motor Skills*, *75*, 746.

Hicks, R., Fernandez, C., & Pellegrini, R. (2001a). Self-reported sleep durations of college students: Normative data for 1978–79, 1988–89, and 2000–01. *Perceptual and Motor Skills*, *93*, 139–140.

Hicks, R., Fernandez, C., & Pellegrini, R. (2001b). Striking changes in the sleep satisfaction of university students over the last two decades. *Perceptual and Motor Skills*, *93*, 660.

Hicks, R. & Pellegrini, R. (1991). The changing sleep habits of college students. *Perceptual and Motor Skills*, *72*, 1106.

Holm, J., Holm, L., & Bech, P. (2001). Monitoring improvement using a patient-rated depression scale during treatment with anti-depressants in general practice: A validation study on the Goldberg Depression Scale. *Scandinavian Journal of Primary Health*, *19*, 263–266.

Jean-Louis, G., von Gizycki, H., Zizi, F., & Nunes, J. (1998). Mood states and sleepiness in college students: Influences of age, sex, habitual sleep and substance use. *Perceptual and Motor Skills*, *87*, 507–512.

Jensen, D. (2003). Understanding sleep disorders in a college student population. *Journal of College Counseling*, *6*, 25–34.

Kelly, W., Kelly, K., & Clanton, R. (2001). The relationship between sleep length and grade-point average among college students. *College Student Journal*, *35*, 84–86.

Lack, L. (1986). Delayed sleep and sleep loss in university students. *Journal of American College Health*, *35*, 105–110.

Machado, E., Varella, V., & Andrade, M. (1998). The influence of study schedules and work on the sleep-wake cycle of college students. *Biological Rhythm Research*, *29*, 578–584.

Markel, H. (2003, September 2). Lack of sleep takes its toll on student psyches. New York Times, F6.

Mediros, A., Mendes, D., Lima, P., & Araujo, J. (2001). The relationships between sleep–wake cycle and academic performance in medical students. *Biological Rhythm Research*, *32*, 263–270.

Mednick, S., Nakayama, K., & Stickgold, R. (2003). Sleep-dependent learning: A nap is as good as a night. *Nature Neuroscience*, *6*, 697–698.

Morin, C. (2002). Contributions of cognitive-behavioral approaches to the clinical management of insomnia. *Primary Care Companion Journal of Clinical Psychiatry*, *4*, 21–26.

National Sleep Foundation. (2008). *Sleep in America Polls*. Available at http://www.sleepfoundation.org/site/c.huIXKjM0IxF/b.2417353/k.6764/Sleep_in_America_Polls.htm.

Pilcher, J., Ginter, D., & Sadowsky, B. (1997). Sleep quality versus sleep quantity: Relationships between sleep and measures of health, well-being and sleepiness in college students. *Journal of Psychosomatic Research*, *42*, 583–596.

Pilcher, J., & Ott, E. (1998). The relationship between sleep and measures of well-being in college students: A repeated measures approach. *Behavioral Medicine*, *23*(4), 170–178.

Pilcher, J., & Walters, A. (1997). How sleep deprivation affects psychological variables related to college students' cognitive performance. *Journal of American College Health*, *46*(3), 121–126.

Plante, D., & Winkleman, J. (2008). Sleep disturbance in bipolar disorder. *American Journal of Psychiatry*, *165*, 830–843.

Price, L., McLeod, P., Gleich, S., & Hand, D. (2006). One-year prevalence rates of major depressive disorder in first-year university students. *Canadian Journal of Counseling*, *40*(2), 68–81.

Smith, C., & Lapp, L. (1991). Increases in number of REMS and REM density following an intensive learning period. *Sleep*, *14*, 325–330.

Svanum, S. & Zody, Z. (2001). Psychopathology and college grades. *Journal of Counseling Psychology*, *48*(1), 72–76.

Trockel, M., Barnes, M., & Egget, D. (2000). Health-related variables and academic performance among first-year college students: Implications for sleep and other behaviors. *Journal of American College Health*, *49*, 125–131.

Wehr, T., Sack, D., & Rosenthal, N. (1987). Sleep reduction as a final common pathway in the genesis of mania. *American Journal of Psychiatry*, *144*(2), 201–204.