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THE IMPACT OF SLEEP QUALITY AND DURATION ON COLLEGE STUDENT ADJUSTMENT AND HEALTH

by

Robert L. Krenek, Jr., M.S.

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

COLLEGE OF EDUCATION
LOUISIANA TECH UNIVERSITY

FEBRUARY
2006

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LOUISIANA TECH UNIVERSITY

THE GRADUATE SCHOOL

January 19, 2006
Date

We hereby recommend that the dissertation prepared under our supervision by Robert Krenek entitled The Impact of Sleep Quality and Duration on College Student Adjustment and Health be accepted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy

Supervisor of Dissertation Research

Head of Department

Psychology & Behavioral Sciences
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Recommendation concurred in:

Advisory Committee

Approved:

Director of Graduate Studies

Dean of the College

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ABSTRACT

College years are a time of change and transition that involves complex challenges in academic, social, personal/emotional, and institutional adjustment. Stress, anxiety, and tension are often associated with college transition and adjustment; stress and worry have been related to poor sleep quality. Studies have found that college students have more sleep problems than the general public. Research has shown that poor sleep has adverse effects on cognition, mood, and other physiological and psychological aspects of human functioning. Recent research has indicated that sleep quality may be more important than amount of sleep. Relationships have been found between sleep problems and various psychological difficulties and cognitive deficits in college students. Research suggests that sleep problems can have detrimental effects on various components of college adjustment. However, studies examining the relationship between sleep and dimensions of college adjustment are limited. The purpose of the present study was to examine the relationship between college students' sleep quality, their adjustment to college, and their physical/mental health. The relationship between sleep quality and college adjustment was assessed using the Pittsburgh Sleep Quality Index, the Sleep Quality Index, a sleep habits questionnaire, and the College Adjustment Scales (CAS). The relationship between sleep quality and general physical/mental health was assessed

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using the above sleep measures and Version 2 of the SF-36 Health Survey. Because significant gender differences were found in the initial analysis, results were analyzed separately for males and females. Males scored significantly higher than females on five scales of the CAS, including Academic Problems, Anxiety, Career Problems, Suicidal Ideation, and Substance Abuse. Results indicate that relationships exist between sleep quality and college adjustment and between sleep quality and general physical/mental health. In general, it was found that male students who have poor sleep quality report higher levels of anxiety, depression, interpersonal problems, academic problems, and self-esteem problems. Male students who have poor sleep quality rate themselves as having lower levels of personal health and report more limitations in physical health due to physical problems. They also report more limitations in usual role activities due to physical health problems, higher levels of fatigue, more limitations in social activities due to physical or emotional problems, more limitations in usual role activities due to emotional problems, and higher levels of psychological distress. Female students who have poor sleep quality report higher levels of anxiety, depression, interpersonal problems, and academic problems. They rate themselves as having lower levels of personal health and higher levels of fatigue. They also report more limitations in social activities due to physical or emotional problems, more limitations in usual role activities due to emotional problems, and higher levels of psychological distress. The relationship between college students' sleep duration and their adjustment to college and physical/mental health was not found to be significant. Findings have implications for students with sleep difficulties and college adjustment and/or health problems. Students should be informed that poor

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sleep quality might lead to adjustment and/or health problems. Attempts should be made to identify those at risk for poor sleep quality. The results of this and other studies suggest that sleep hygiene education should be offered to all students due to the high prevalence of sleep problems in the college population.

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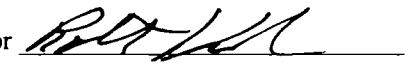
Author 

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CHAPTER 1

INTRODUCTION

United States college enrollment is at an unprecedented high, and students are reporting increased confidence that they will graduate (Strage & Brandt, 1999). However, more than 40% of college students leave colleges or universities not having a degree (Tinto, 1987, 2000). Not only is the number of students finishing college decreasing, but those reporting emotional and psychological stress is at an all time high (Sax, Astin, Korn, & Mahoney, 1999; U.S. Department of Education, 1995). College years are often a time of significant change and transition involving complex challenges in academic, social, and emotional adjustment (Chickering & Reisser, 1993). Some students adapt to those challenges, but others have difficulties adjusting.

College adjustment has been viewed as a multidimensional construct that includes academic, social, personal/emotional, and institutional adjustment (Baker & Siryk, 1984). Researchers also have investigated predictors of college adjustment including psychological separation from parents (Hoffman, 1984; Holmbeck, & Andrei, 1993; Lapsley, Rice, & Shadid, 1989; Lopez, Campbell, & Watkins, 1986; Rice, Cole, & Lapsey; 1990) and family structure (Arnstein, 1980; Fulmer, Medalie, & Lord, 1982; Hoffman & Weiss, 1987; Holmbeck & Andrei, 1993; Kenny & Donaldson, 1991; Lopez, Campbell, & Watkins, 1988). Students who view separating from parents in a positive way tend to adjust to college better than students who do

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not (Holmbeck & Andrei, 1993; Rice, Cole, & Lapsley, 1990). However, absolute separation from parents appears to make the transition to college difficult (Christie & Dinham, 1991; Lopez, Campbell, & Watkins 1986; Nora & Cabrera, 1996). Adjustment to college appears to be facilitated by parental attachment with a differentiated family structure encouraging individuation (Kenny & Donaldson, 1991). The positive effect of parental attachment has been shown across diverse racial and ethnic groups (Kenny & Perez, 1996). Relationships also have been found between college adjustment and parenting styles (e.g., Garbarino & Strange, 1993; Kenny, 1987, 1990), mastery-orientation (e.g., Strange & Brandt, 1999), perfectionism (Chang & Rand, 2000; Mann, 2004), coping strategies (Brooks & DuBois, 1995), masculinity and femininity traits (Sharpe & Heppner, 1991), level of self-esteem (Bettencourt, Charlton, Eubanks, Kernahan, & Fuller, 1999), and teacher as well as mentor relationships (e.g., Cotterell, 1992; Munch & Blyth, 1993).

Like the increase in college student stress and attrition, sleep problems also have become prevalent, as well as costly to society. The total estimated yearly cost of insomnia has ranged from $92.5 to $107.5 billion, which includes lost productivity, increased alcohol use resulting from insomnia, costs related to accidents, and costs associated with medical, psychiatric, and medication treatments (Stoller, 1994). In fact, 51% of American adults in a 2001 National Sleep Foundation survey (National Sleep Foundation, 2001) reported having one or more symptoms of insomnia at least a few nights each week during a 12-month period. Chronic insomnia in the general population has been reported by approximately 10% to 15% of individuals (Ford & Kamerow, 1989; Mellinger, Balter, & Uhlenhuth, 1985; Ohayon, 2002), and

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occasional or mild insomnia has been reported by 25% to 35% (Mellinger, Balter, & Uhlenhuth, 1985; Ancoli-Israel & Roth, 1999). Women and older individuals report even higher rates (Ohayon, 2002; Ohayon, 1996). Moderate or severe insomnia has been noted by 25% to 35% of patients in general medical practice (Hohagen, Rink, Kappler, Schramm, Riemann et al., 1993), and regular pharmacologic hypnotic use for sleeping problems has ranged from 4% in the United States (Mellinger, Balter, & Uhlenhuth, 1985; National Sleep Foundation, 2001) to 11.7% in France (Ohayon & Caulet, 1996).

A significant increase in sleep difficulties and disorders has been reported since the 1950s when careful examination of sleep problems was undertaken (Carskadon & Taylor, 1997). In 1993, the National Commission on Sleep Disorders Research submitted to Congress results of a comprehensive investigation detailing the social and economic impact of sleep disorders and the state of knowledge about sleep problems (Carskadon & Taylor, 1997). Results of the investigation indicated that about 40 million United States residents have primary chronic sleep disorders and millions more have recurring or intermittent sleep difficulties. Statistical projections suggest that by the year 2010, 79 million Americans will have sleeping problems and 40 million will experience excessive sleepiness. Findings also highlighted serious gaps in sleep research as well as the extremely high social and economic costs of sleep problems. Based on the National Commission on Sleep Disorders investigation of the general public, sleep problems of college students across the United States will most likely increase, and college students will probably experience unique problems associated with sleep difficulties.

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While the specific purpose of sleep is unclear, theorists have suggested that sleep has restorative properties (Reich, Geyer, & Karnovsky, 1972; Adam & Oswald, 1977; Hartman, 1973), replenishes neurotransmitters (Hobson, 1995; Siegel & Rogawski, 1988), facilitates nervous system development (Hobson, 1995; Roffwarg, Muzio, & Dement, 1966), and reinforces and consolidates memory (Antrohus, 1986; Hobson, 1995; Steriade & Mc Carley, 1990; Wood, Bootzin, Kihlstrom, & Schacter, 1992). During the last several decades, five distinct stages of sleep have been identified (Hobson, 1995). An important sleep stage, known as rapid eye movement (REM), appears to be critical to memory, learning, and actually sustaining life.

Whereas research has not confirmed the exact role of sleep, studies indicate that poor sleep has adverse effects on cognition, mood, and other physiological and psychological facets of human functioning (Pilcher, Ginter, & Sadowsky, 1997). Compared to individuals without insomnia, those reporting chronic insomnia tend to experience higher work absenteeism, impaired job performance, lower levels of well-being and general functioning, reduced quality of life, more health care use (Kuppermann, Lubeck, Mazonson, Patrick, Stewart et al., 1995; Simon & Von Kerf, 1997), and greater psychiatric and medical morbidity (Ford & Kamerow, 1989; Foley, Monjan, Brown, Simonsick, Wallace et al., 1995).

During the last two decades, researchers have examined sleep patterns, habits, and difficulties of college students. Studies have shown that college students have more sleep problems than the general population (Brown, Buboltz, & Soper, 2001; Coren, 1994; Lack, 1986). Numerous potential contributors to sleep difficulties in

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college students have been identified, including certain foods and chemicals, sleep schedule variation, and stress (Caldwell, 2003; Lack, 1986; McCann & Stewing, 1987).

Stress, anxiety, and tension are often associated with the transition to college and frequently lead to failing grades or withdrawal from school (Tinto, 1993). Transition and adjustment problems can result in high social and economic costs to families, the community, and to students themselves (Evans, 2000; Tinto, 1993; Yorke, 1999). Most high school students anticipate the transition to college with its increased independence and freedom. However, independence and freedom often cause the most anxiety for first-year college students (Peel, 2000). College students, especially those living away from home, must become responsible for various aspects of daily life, including sleep habits and patterns, and must adjust to significant social and academic requirements (Kleeman & Richardson, 1985; Russell & Petrie, 1992). Adjusting to the various demands of college has the potential to create high levels of stress (Darlaston-Jones, Cohen, Haunold, Pike, Young et al., 2003), and stress and worry have been associated with poor sleep quality (McCann & Stewing, 1987). Because students are attempting to adjust to various demands at college, many do not get adequate sleep during the week. Due to lost sleep during week days, students often sleep later on weekends in order to "catch up" (Machado, Varella, & Andrade, 1998). Inconsistent sleep schedules have been related to delayed sleep phase syndrome (DSPS), a circadian rhythm disorder that is associated with delayed sleep onset and significant morning drowsiness (Buboltz, Brown, & Soper, 2001; Lack, 1986).

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Factors other than irregular sleep schedules have been related to poor sleep in college students. For example, college students often use high levels of caffeine, nicotine, and alcohol, all of which severely lessen sleep quality (e.g., Caldwell, 2003; Riedel, Durrence, Lichstein, Taylor, & Bush, 2004; Roehrs & Roth, 1997). Many college students use sleep medication to improve sleep patterns, and pharmacological treatments may worsen immediate sleep problems and have shown little effectiveness in treatment of long-term sleep difficulties (Morin & Wooten, 1996).

Previous research has indicated that sleep problems in college students are related to various cognitive deficits and psychological difficulties. Sleep problems have been associated with significant impairment in learning and memory, academic performance, and overall cognitive ability (De Koninck, Lorran, Christ, Proulx, & Coulombe, 1989; Lack, 1986; Schredl, Weber, & Heuser, 1998). Rapid eye movement (REM) sleep appears especially important for cognitive skills (Pilcher & Walters, 1997). More specifically, as an individual progresses through a night of sleep, REM periods also increase in length, which suggest that the most important portion of sleep in the learning process is the last half of a full night's sleep (Smith & Lapp, 1991). Consequently, students are probably inhibiting memory consolidation and ability to learn new material when they consistently deprive themselves of the last two hours of sleep. Lower life satisfaction, decreased psychological well-being, and higher levels of tension and depression have been associated with poor sleep habits and quality in college students (Pilcher et al., 1997). Poor sleep quality has been related to negative mood states (Bonnet, 1985; Gau, 2000; Lacks & Morin, 1992; Pilcher & Huffcutt, 1996); sleep deprivation of only one night has been

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associated with increased impulsiveness, anxiety, sensitivity, and excitability (Sicard, Jouve, & Blin, 2001; Vein, Dallakyan, Levin & Skakun, 1983).

Research has found associations between sleep difficulties and physiological illnesses. For example, sleep loss appears to adversely affect maintenance of a healthy immune system (Irwin, McClintick, & Costlow, 1996). Sleep disordered breathing, which frequently causes sleep difficulties (Thorp & Yager, 2001), has been associated with significantly more bodily pain in five-year old children and lower health-related quality of life in 5-17 year olds (Rosen, Palermo, Larkin, & Redline, 2002) as well as decrements on a general health survey with 30-60 year old adults (Finn, Young, Palta & Fryback, 1998). Sleep difficulties have been associated with cardiovascular disease (Appels & Mulder, 1984) and gastrointestinal disorders in adults (Elashoff, VanDerventor, Reedy, Ippoliti, Samloff et al., 1983), more illnesses and lower general health scores in junior high students (Tanaka, Taira, Arakawa, Masuda, Yamamoto et al., 2003), and cardiovascular disease and limitations in activities of daily living in adults over 65 years of age (Asplund, 2000; Newman, Enright, Manolo, & Haponik, 1997).

Research investigating the relationship between sleep and college adjustment is limited, but suggests that sleep problems can have detrimental effects on various components of college adjustment. The few studies to date focus mainly on academic performance (Wolfson & Carskadon, 2003). However, as noted previously, college adjustment has been viewed as a multidimensional construct, consisting not only of academic adjustment but institutional, social, and personal/emotional adjustment as well (Baker & Siryk, 1984, 1989). Given the high prevalence of sleep problems and

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attrition among today's college students, it behooves researchers to examine the relationship between sleep habits and patterns and successful, as well as unsuccessful, college adjustment. Increased knowledge of the relationship between sleep and college adjustment could ultimately enhance student coping skills in adjusting to college. Several psychological treatments have shown effectiveness in improving sleep quality (Morin, 2004; Morin, Culbert, & Schwartz, 1994; Morin & Wootin, 1996; Murtagh & Greenwood, 1995). Consequently, the purpose of the present study is to examine the relationship between sleep quality and duration and various components of college student adjustment. Investigating the relationship between sleep and adjustment ultimately could result in improved sleep in college students along with better adjustment to the varied and many demands of the college environment.

Statement of the Problem

Sleep researchers have developed reliable and valid methodologies, such as polysomnography, actigraphy, and the Multiple Sleep Latency Test (MSLT) to examine sleep habits and patterns (Wolfson & Carskadon, 2003). However, as noted by Wolfson and Carskadon, the sleep field has not been as systematic in studying the relationship between sleep and other areas of human functioning, such as the various aspects of school and college adjustment. College adjustment has been conceptualized as having several components, including academic, institutional, social, and personal/emotional adjustment (Baker & Siryk, 1984, 1989). While early investigations mainly examined academic ability as a predictor of retention and adjustment, subsequent studies found that no more than half the variance in deciding

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to drop out of college was accounted for by academic performance (Pantages & Creedon, 1978). Investigations indicate that social adjustment may be as influential as academic factors in predicting persistence (Mallinckrodt, 1988; Pantages & Creedon, 1978). Institutional commitment, which involves resolve to complete a degree and attachment to an institution, has also been linked to college adjustment (Baker & Siryk, 1984, 1998). Moreover, anxiety has been consistently shown to predispose students to drop out of college (Pappas & Loring, 1985), and depression has been found to be the most common psychological disorder among college students (Sherer, 1985). Many college students also question their social relationships, self-identity, and future goals (Chickering & Reisser, 1993), resulting in inner turmoil, personal crises (Henton, Lamke, Murphy, & Haynes, 1980), and subsequent difficulties adjusting to college.

Only a few studies have examined the relationship between sleep and adjustment, and most of those studies focused largely on the association between sleep and academic performance (Wolfson & Carskadon, 2003). Moreover, while a few studies have included college students, most sleep research examining student adjustment has involved children and adolescents in elementary, middle, or high school. A few studies have found relationships between sleep/wake patterns and habits and academic performance in college students. For example, Kelly, Kelly, and Clanton (2001) surveyed college students and found that long sleepers (9 hours/night) reported significantly higher Grade Point Averages (GPAs) than short sleepers (< 6 hours/night), indicating that more total sleep time is related to better grades. Trockel, Barnes, and Egget (2000) found that sleep habits in college students, especially wake-

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up times, accounted for most of the variance in GPAs. Trockel et al. reported that the most significant finding was the association between earlier rise and bedtimes and higher GPAs, which moderately support the hypothesis that sleep habits account for variance in academic performance. In a study involving college students with delayed sleep phase syndrome (DSPS), which consists of delayed sleep-onset and late weekend wake-up times, Lack (1986) found that students with DSPS reported significantly lower grades than students without DSPS. Lack concluded that lower academic performance might result from chronic insufficient sleep and a sleep/wake pattern associated with DSPS.

Most sleep research has focused on sleep length (i.e., quantity), though recent research indicates that sleep quality may be more important than amount of sleep (Pilcher et al., 1997). Due to a lack of research, the sleep field does not have a clear understanding of the relationship between sleep and various dimensions of college adjustment. Consequently, mental health professionals in colleges and universities working with students having sleep problems lack essential information about the relationship between poor sleep and various components of college adjustment. Additional research in this area could further clarify the relationship between sleep and various dimensions of college adjustment, help formulate new theories about sleep and adjustment, and add to the existing sleep and adjustment research knowledge base.

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Justification

Attending college involves a period of learning, development, and career advancement. Most students experience some level of stress related to the demands inherent in a college or university environment (Darlaston-Jones et al., 2003). College students also experience significant pressures due to increased competition for jobs and the changing job market, which exacerbates stress and anxiety (Stone & Archer, 1990). Sleep problems and other disorders may result. In fact, daily sleep habits are one of the first behaviors that change for first-year college students (Pilcher et al., 1997). Research has indicated that while only about a third of college students report no sleep problems, close to a third report frequent or persistent sleep disturbances (Coren, 1994). Studies indicate that during the last several decades, college students' sleep habits have changed significantly. The median hours of sleep time reported by college students fell from 7.8 to 6.7 hours (14%) between 1969 and 2001 (Hicks, Fernandez, & Pellegrini, 2001a). A sample of 1,839 students during the 1978-1979 academic year reported sleeping an average of 7.3 hours, whereas a similar student sample 10 years later reported sleeping an average of only 6.9 hours (Hicks, Mistry, Lucero, Marical, & Pellegrini, 1990), a 5% reduction. Lessened college student average sleep time has been accompanied by a decrease in consistency of normal habitual sleep. A total of 16% of students in 1978 reported sleeping consistent time lengths, whereas only 6.6% in 1992 reported consistency in sleep length (Hicks, Johnson, & Pellegrini, 1992). A significant difference also was noted in the number of students reporting sleep problems. Some 26.7% of students reported having sleep problems in 1982, whereas 68.3% reported sleep problems in 1992 (Hicks, Conti, &

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Pellegrini, 1992). Possibly, the most remarkable finding is the increase in sleep dissatisfaction. Twenty-four percent of students reported dissatisfaction with sleep in 1978, and 71% reported dissatisfaction in 2000 (Hicks, Fernandez, & Pellegrini, 2001b).

Relationships between sleep and health issues have been found in college students. College students reporting shorter sleep-onset latencies and fewer sleep difficulties have fewer physical health, social, and mental problems (Jenkins, Buboltz, Fowler, & Rosielle, 2002, June). Yet, only one night of sleep loss adversely affects college students in multiple domains of functioning including learning, memory, grade point average, and general cognitive functioning (Harrison & Horne, 2000). It is also related to various psychological difficulties (Caldwell, 2003; Dinges, 1989; Jenkins & Buboltz 2001, May; Pilcher et al., 1997; Pilcher & Walters, 1997; Schredl, Weber, & Heuser, 1998).

As noted by Wolfson and Carskadon (2003), "although sleep medicine practitioners have long had a strong sense that irregular sleep schedules or inadequate sleep may lead to poor school performance, the current database has reached a level that makes it useful to draw research-based conclusions about the impact of sleep on school performance" (p. 491). However, research examining associations between sleep and other aspects of college adjustment is lacking. Previous studies suggest that sleep habits and patterns are related to lower levels of academic performance. Nevertheless, other components of college adjustment, including social and emotional/personal adjustment as well as institutional attachment as they relate to sleep, have been under researched, especially with a college population. Additional

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studies investigating how sleep problems impact multiple dimensions of adjustment could produce more knowledge about the relationship between sleep and students' academic, social, and other domains of functioning. As the body of sleep research increases, mental heath professionals working with college student populations can increase their understanding about the nature of sleep problems; and use that knowledge to facilitate students' adjustment to the demands of the college environment.

A variety of relaxation, behavior, and cognitive interventions have been shown to improve poor sleep (Morin, 2004; Morin, Culbert, & Schwartz, 1994; Morin & Wooten, 1996). Some treatments require counselor or therapist guidance, but numerous simple and fairly accessible interventions such as exercise and bright light therapy, which involves using a bright light to regulate sleep circadian rhythm, can be used independently by most college students.

Further research examining the relationship between sleep and college adjustment is warranted given the prevalence of sleep problems in the college population, the detrimental effects of poor sleep on college students, and the lack of studies examining associations between sleep and college student adjustment. Hence, the purpose of this study is to examine the relationship between sleep and various dimensions of college adjustment. Information obtained from this study could add to the sleep database, particularly identifying relationships that may exist between sleep and college adjustment. This study could also produce information that can be used to develop psychological interventions designed to address sleep problems as they relate to difficulties adjusting to a college or university environment.

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Review of the Literature

College Student Adjustment

The adjustment process, as well as psychosocial antecedents of adjustment, has been the focus of studies on student adjustment to college. Some investigators have delineated four dimensions of adjustment including academic, social, personal/emotional, and institutional attachment (Baker & Siryk, 1984). Each dimension is manifested behaviorally. For example, getting help from university counseling services is negatively related to personal/emotional adjustment, being elected to an academic honor society is positively related to academic adjustment, and becoming part of a social network in the college setting is positively correlated with social adjustment.

Researchers have also investigated predictors of college adjustment including psychological separation from significant others such as parents (Hoffman, 1984; Holmbeck, & Andrei, 1993; Lapsley et al., 1989; Lopez et al., 1986; Rice et al., 1990) and family structure (Arnstein, 1980; Fulmer, Medalie, & Lord, 1982; Hoffman & Weiss, 1987; Holmbeck & Andrei, 1993; Kenny & Donaldson, 1991; Lopez, Campbell, & Watkins, 1988). Tinto (1988) stressed the importance of separating psychologically from parents, and using concepts described by Van Gennep (1960) explained social and academic integration as a stage-like rite of passage characterized by separation, transition, and incorporation. The implications of Tinto's views appear significant as emotional, functional, conflictual, and attitudinal distance from parents (Hoffman, 1984; Lapsley et al., 1989) as well as normative distance from past communities (Elkins, Braxton, & James, 2000; Tinto, 1988) seem to facilitate

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psychological well-being and adaptive behavior in the college environment. Students who view separating from parents in a positive way tend to adjust to college better than students who do not (Holmbeck & Andrei, 1993; Rice et al., 1990). However, absolute separation from parents appears to make the transition to college difficult (Christie & Dinham, 1991; Lopez et al., 1986; Nora & Cabrera, 1996). Adjustment to college appears to be facilitated by parental attachment with a differentiated family structure encouraging individuation (Kenny & Donaldson, 1991).

The positive effect of parental attachment has been shown across diverse racial and ethnic groups (Kenny & Perez, 1996). However, the adjustment process may be different for non-minority and minority students as stress related to minority status tends to undermine minority students' college adjustment (Smedley, Myers, & Harrell, 1993). Minorities and non-minorities may differ in terms of the relative impact of peer and family social networks on college adjustment (Kenny & Stryker, 1996), but all college students likely will benefit from feeling connected to family along with parental support for attending college.

Several gender differences have been found in relation to the process of adjusting to college. Female students in general have been found to be more closely tied to parents (Berman & Sperling, 1991; Kenny & Donaldson, 1991; Lapsley et al., 1989; Lopez et al., 1986) which may accelerate higher levels of female college adjustment (Kenny & Donaldson, 1991; Lopez et al., 1986).

Adjustment is not just affected by student-family relationships. Transition to college may be influenced by peer social networks (Kenny & Stryker, 1996) and minority status (Smedley et al., 1993). Additional family-based conditions of college

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adjustment have been described by Holmbeck and Andrei (1993) who suggested that adjustment difficulties result from dependency denial in men but separation anxiety in women.

First-year well-being and college integration may also be related to students' self-produced outcomes and sense of self-direction (Martin & Dixon, 1989, 1994). Students' first year experience may be complicated by the significant disparity between actual adjustment and expectations of adjustment (Baker, McNeil, & Siryk, 1985). Students entering college having expectations that differ from actual experiences tend to perform lower academically than more realistic students (Baker et al., 1985; Baker & Schultz, 1992). Whereas a better understanding of the demands of college appears to facilitate transition to college, Chizhik (1999) found that more information about college increased students' disillusionment, indicating that solving adjustment problems is far from being a straightforward process.

College adjustment has been conceptualized as a multidimensional construct (Baumgart & Johnstone, 1977; Bean & Creswell, 1980; Kowalski, 1977; Munro, 1981; Timmons, 1978; Wright, 1973) that consists of academic achievement, social adaptation, psychological well-being, and students' general perception of the college experience (Baker & Siryk, 1984; Holmbeck & Andrei, 1993). Baker & Siryk (1984) discussed the usefulness of college adjustment as a dependent variable and stressed the importance of college adjustment scales in identifying college students requiring counseling or other services.

The college experience involves demands that vary in kind as well as degree (Baker & Siryk, 1984). Demands in the college environment require different coping

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responses or "adjustments" that also vary in effectiveness. In reference to academic adjustment, students must learn to cope with protracted and intense academic work. Regarding social adjustment, students must learn to adapt to the social demands of a college or university, which is a social as well as an academic community consisting of many individuals generally comparable in age living in close proximity over a prolonged period of time. Another set of demands requiring coping responses relates to the college experience as a pressure-filled circumstance. Commitment to a goal or institution is another set of demands inherent in the college experience.

Components of college student adjustment include academic, institutional, social, and personal/emotional adjustment (Baker & Siryk, 1984, 1989). Many studies have centered on academic ability as a predictor of retention and adjustment, but subsequent research has found that no more than half the variance in deciding to leave college was accounted for by academic performance (Pantages & Creedon, 1978). Thus, college adjustment appears to consist of more than academic ability. Additional dimensions of college adjustment include having a sense of purpose, being motivated to learn, meeting academic demands, and being generally satisfied with the college environment (Baker & Siryk, 1984, 1989). Formative identity development continues during college years, including creating career plans and future goals (Arnett, 2000).

Social Adjustment. Studies have indicated that student social adjustment may be as influential as academic factors in the prediction of persistence (Mallinckrodt, 1988; Pantages & Creedon, 1978). Crucial components of the social environment include formation of a social network, integration into college social life, and management of new social freedoms (Gerdes & Mallinckrodt, 1994). Freshman year

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crises often involve social adjustment difficulties, including homesickness and loneliness (Lockets & Spandrel, 1976; Rich & Scovel, 1987). Perception of insufficient social support has predicted both European as well as African American student attrition (Mallinckrodt, 1988). Researchers have suggested that an important element of commitment to an academic institution is integration into the social environment (Gerdes & Mallinckrodt, 1994).

Institutional Commitment. Institutional commitment has been associated with college adjustment (Baker & Siryk, 1984, 1989). Commitment may be defined as a firm resolve to finish a college degree and strong attachment to an institution (Baker & Siryk, 1984; Bean, 1980; Munro, 1981). Commitment variables have shown a significant direct effect on persistence, whereas demographic variables have shown more indirect effects that interact with institutional commitment or academic and social integration in predicting persistence (Pascarella & Chapman, 1983).

Personal/Emotional Adjustment. Personal or emotional problems involve overall psychological distress, depression, anxiety, somatic distress, and low self-esteem (Gerdes & Mallinckrodt, 1994). Depression is the most common psychological disorder among college students (Sherer, 1985). Anxiety also has been consistently shown to predispose students to leave college (Pappas & Loring, 1985). Moreover, many college students question their social relationships, self-identity, and future goals (Chickering & Reisser, 1993). These questions often cause inner turmoil and result in personal crises (Henton et al., 1980), creating difficulties in adjusting to college.

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Factors Related to College Adjustment

Separation-Individuation. To pinpoint predictors of college student emotional adjustment, previous theories stressed the importance of developing autonomy and individuation as a critical developmental task during late-adolescence (Arnstein, 1980; Chickering, 1969). These theories postulated that college students who have a strong and healthy sense of self are better at adjusting to the college transition which requires independent functioning, such as developing internal motivation to stay current with class assignments, waking up in time for classes or other requirements, consistently attending classes, and negotiating a novel and frequently complicated social world.

Psychological separation theory postulates that to become a well-adjusted adult, late adolescents need to separate and individuate from their parents (Hoffman, 1984). Specifically, adequate self-development depends on the capacity to form a self-identity that is independent of parents. Psychological separation has been conceptualized as being multidimensional consisting of various elements, including conflictual independence, attitudinal independence, functional independence, and emotional independence (Hoffman, 1984).

Several studies examined the relationship between parent-student psychological separation and college student adjustment (Hoffman, 1984; Hoffman & Weiss, 1987; Lapsley et al., 1989; Lopez, Campbell, & Watkins, 1988). These studies generally indicated that emotionally dependent and conflicted family relationships predict significant variance in college student adjustment. Conflictual independence has been defined as "freedom from excessive guilt, anxiety, mistrust, responsibility,

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inhibition, and anger in relation to mother and father" (Hoffman, 1984, p. 171). Hoffman postulated that failing to develop adequate levels of conflictual independence results in inadequate and insecure feelings that interfere with the capacity to adapt socially and to sustain close relations with others. Inadequate levels of conflictual independence have been associated with difficulties forming a social network (Hoffman, 1984).

In the 1970s and 1980s, studies indicated a relationship between higher levels of separation-individuation and better academic and social adjustment to college, as well as lower levels of depression and loneliness (Hoffman, 1984; Hoffman & Weiss, 1987; Lapsley et al., 1989; Levine, Green, & Millon, 1986; Lopez et al., 1986, 1988; Rice et al., 1990). In these studies, separation-individuation was defined mainly as an individual's not having negative feelings related to the separation process, including anxious or guilt feelings or expectation of rejection. Researchers viewed separation-individuation as a developmental process beginning with separating from significant individuals, such as parents or peers, and extending to individuation and development of a coherent, autonomous self.

Parental Attachment. During the early 1990s, exclusively focusing on separation-individuation as a predictor of college student adjustment was criticized from several perspectives (Kenny, 1990). From an adolescent developmental viewpoint, it was argued that adolescent development generally progresses better if the adolescent develops autonomy that is accompanied by a continuing supportive, close parent-adolescent relationship (Grotevant, 1989; Grotevant & Cooper, 1985). Adolescents who strive too much to separate from parents tend to be isolated and

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withdrawn and are at higher risks of developing behavior problems (Ryan & Lynch, 1989). From a feminist viewpoint, Kenny and a colleague (e.g., Kenny, 1987; Kenny & Donaldson, 1991) stressed that heavily emphasizing separation-individuation as the critical dynamic in college student adjustment is a male-centric developmental perspective. They asserted that development of independence in females progresses best with maintenance of strong ties with significant others, the developmental goal being interdependence rather than independence (Gilligan, 1982; Josselson, 1988).

Balancing an exclusive focus on separation-individuation, researchers have explored secure attachment with parents as a comparable or superior predictor of college student adjustment (Armsden & Greenberg, 1987; Kenny, 1987, 1990; Kenny & Donaldson, 1991; Larose & Boivin, 1998; Rice, Fitzgerald, Whaley, & Gibbs, 1995; Vivona, 2000). Attachment has been defined as sustaining the parent-child emotional bond throughout the life span (Rice et al., 1995). As a result of a secure attachment with parents or significant others, the child develops positive self-worth and expects interactions with others to be positive and supportive (Griffin & Bartholomew, 1994). Students with secure parental attachments tend to feel comfortable getting social support and "refueling" from their parents during the college transition when trying to deal with novel academic and social challenges (Kenny, 1987, 1990). In support of these ideas, studies have indicated that college students with secure parental attachments have higher levels of emotional, academic, and social adjustment (Bradford & Lyddon, 1993; Holmbeck & Andrei, 1993; Larose & Boivin, 1998; Schultheiss & Blustein, 1994b); lower levels of loneliness, but higher levels of social connectedness with peers (Blain, Thompson, & Whiffen, 1993;

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Brack, Gay, & Matheny, 1993), and lower levels of alcohol use, anxiety, and depression (Armsden & Greenburg, 1987; Cavell, Jones, Runyan, Constantin-Page, & Velasquez, 1993; Vivona, 2000). In a longitudinal study, Rice et al. (1995) found that attachment security in first-year students predicted higher levels of college adjustment two years later. Several studies have indicated that paternal and maternal attachment relationships have differential effects on college student adjustment (Blustein, Walbridge, Friedlander, & Palladino, 1991; Brack et al., 1993; Schultheiss & Blustein, 1994b).

Parental Attachment and Separation-Individuation. Several researchers have suggested that college development and adjustment are predicted better with an additive combination of separation-individuation and secure parental attachment (Blustein et al., 1991; Holmbeck & Andrei, 1993; O'Brien, Friedman, Tipton & Linn, 2000; Rice et al., 1995; Schultheiss & Blustein, 1994a; Schultheiss & Blustein, 1994b). However, gender differences have been found when examining the effects of parental attachment and separation-individuation. For example, Blustein et al. (1991) found that the best predictor of the career developmental process for both males and females is the combined effects of secure parental attachment and separation-individuation. However, secure parental attachment and separation-individuation predicted later vocational development for women but not for men (O'Brien et al., 2000). The best predictor of women's college development and men's college adjustment was the combined effects of secure parental attachment and separation-individuation (Schultheiss & Blustein, 1994b). Moreover, the best predictor of women's identity formation was found to be the combined effects of

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secure parental attachment and separation-individuation, whereas men's identity formation variables were associated only with separation-individuation (Schultheiss & Blustein, 1994a).

Research examining parental attachment and separation-individuation suggests either an additive model or a mediational model in terms of their effects on college student adjustment (Mattanah, Hancock, & Brand, 2004). With an additive model, college student adjustment is predicted better with the presence of secure parental attachment as well as separation-individuation rather than only one of these constructs. With a mediational model, secure parental attachment results in healthier feelings about adolescent separation-individuation, which then results in higher levels of college student adjustment. This mediational model is consistent with attachments theorists' argument that secure parent-child attachment relationships lay the foundation for developing a differentiated, complex view of self, including the capacity to view the self as effective and autonomous (Fonagy & Target, 1997; Liable & Thompson, 2000; Sroufe, 2002). A mediational model is also consistent with feminist theorists who argue that secure relational bonds facilitate the separation-individuation process (e.g., Gilligan, 1982; Josselson, 1988).

In a recent study, secure parental attachment relationships, along with healthy levels of separation-individuation, predicted positive academic, social, and personal-emotional college adjustment with the use of a mediational model, one that indicated separation-individuation mediated the effects of secure parental attachment on college student adjustment (Mattanah et al., 2004). This finding supports the idea that secure, lasting bonds with others facilitate rather than impede the process of individuation

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(Gilligan, 1982; Grotevant & Cooper, 1985; Josselson, 1988). Mattanah et al. (2004) found that secure parental attachment predicted similar levels of positive college student adjustment for men as well as women and that separation-individuation mediated the effect of secure attachment to a similar degree across genders. This finding is contrary to some theories, which postulate that the individuation process progresses differently for males and females, suggesting that unlike females, males strive for independence or separation within relationships (Chodorow, 1990; Gilligan, 1982).

Parenting Styles and Child and Adolescent Adjustment. Studies have consistently indicated that an authoritative parenting style is related to better child adjustment (Baumrind, 1967, 1973, 1989; Baumrind & Black, 1967). Authoritative parenting consisting of high standards, open communication, high emotional support, and appropriate autonomy has been related to the development of childhood instrumental competence, which consists of a combination of agency, interpersonal capacity, and cognitive competence. Children of parents using authoritative parenting have shown higher levels of self-efficacy and more developed skills and strategies for dealing with everyday challenges, whereas children of neglecting-rejecting parents have shown lowest levels of instrumental competence (Baumrind, 1973; Baumrind & Black, 1967).

Associations between parenting style and child functioning have also been shown to continue into adolescence (Baumrind, 1991). Baumrind found that adolescents whose parents used an authoritative style displayed the highest levels of cognitive motivation and competence, achievement orientation, and mathematics as

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well as verbal achievement, but the lowest levels of behavior problems. Dornbusch, Ritter, Leiderman, Roberts, and Fraleigh (1987) also found that high school students who perceived their parents using more authoritative and less authoritarian or permissive parenting achieved higher grades than their peers who perceived their parents as less authoritative and more authoritarian or permissive. These findings were found across different family structures, parental educational levels, ethnic backgrounds, and gender.

Emotionally supportive but demanding parenting has been related to higher levels of self-regulatory skills and propensities (Strage, 1998) and intrinsic motivation for school success (Ginsburg & Bronstein, 1993), while more restrictive parenting has been related to lower cognitive self-worth (Wentzel, 1991), extrinsic motivation (Ginsburg & Bronstein, 1993) and lower levels of self-regulatory abilities (Strage, 1998). Similarly, higher levels of parent involvement in their children's daily lives have been related to the development of higher levels of internal control over academic arenas (Grolnick & Ryan, 1989). The impact of parental involvement appears more influential with authoritative parenting and might be harmful when nonauthoritative parenting predominates (Steinberg, Lamborn, Dornbusch, & Darling, 1992). Associations have also been found between adolescents' educational and career aspirations and their perceptions of their parents' aspirations (Marjoribanks, 1997) and expectations (Patrikako, 1997).

Other studies have supported the positive impact of authoritative parenting and the negative influence of less supportive, more restrictive parenting. In a study involving mostly European American adolescents, three dimensions of authoritative

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parenting, namely parental acceptance, autonomy granting, and behavioral control, were all associated with improved grades one year later (Steinberg, Elmen, & Mounts, 1989). Another longitudinal study found similar results in a larger sample of adolescents with diverse ethnic backgrounds (Lamborn, Mounts, Steinberg, & Dornbusch, 1991; Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994). Parenting that involved high levels of acceptance-involvement as well as high levels of strictness-supervision was related to higher levels of psychosocial maturity and school competence, but lower levels of problematic behavior and internalized stress. Authoritative parenting was also related to sustained positive academic self-concept during a one-year period, whereas neglectful parenting was associated with the highest decrease in work and school orientation during the same one-year period.

Parenting Styles and College Student Adjustment. Strong relationships have also been found between family parenting styles and college student psychological and academic functioning (Garbarino & Strange, 1993; Kenny, 1987, 1990; Strage & Brandt, 1999). While fewer studies have investigated the effects of parenting styles on college students, theory and research suggests that parenting continues to impact college students even if they have no daily contact with their parents. Attachment theorists propose that children construct an "internal working model" of self, their attachment figure, and their relationship to their attachment figures as a consequence of accumulated experiences over time (Bowlby, 1969; Bretherton & Waters, 1985) and that this mental structure determines the self-concept during adolescence and even into adulthood. Studies of the long-term impact of parent-child attachment relationships support this theory in that adults' self-perceptions and cognitive as well

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as social-emotional functioning in various realms outside of the family appear to be conditioned by early parent-child relationships (Kobak & Sceery, 1988; Main, Cassidy, & Kaplan, 1985). Studies have shown that college students reporting secure relationships with their parents have higher levels of social-emotional adjustment and an easier high school to college transition (Kenny & Donaldson, 1991; Lapsley, Rice, & FitzGerald, 1990; Lapsley et al., 1989; Larose & Boivin, 1998). The impact of secure parent-child relationships has been found to have similar positive effects for students residing in dormitories as well as those living with their parents, indicating that the impact of secure parent-child relationships continues even if students do not have daily contact with their parents (Strage & Brandt, 1999).

During the last two decades, several studies have investigated the relationship between parental attitudes and behaviors and college student adjustment. Assuming that social exploration and behavioral regulation are fundamental college student adjustment mechanisms, some studies have focused on the adaptive roles of parental control and attachment. Studies have generally demonstrated that college students who have parents providing high levels of security and adequate levels of supervision are more likely to report higher levels of college adjustment (Holmbeck & Andrei, 1993; Kenny & Donaldson, 1991; Lapsley et al., 1990; Palladin-Schultheiss & Blustein, 1994; Rice & Whaley, 1994), social competence (Kenny, 1987; Rice, Cunningham, & Young, 1997), and academic achievement (Anderson, Linder, & Bennion, 1992; Hetherington, 1992; Melby & Conger, 1996). Studies also indicate that parental attachment and control make unique and independent contributions to adolescent perception of social support (Flaherty & Richman, 1986), personal identity

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(Quintana & Lapsley, 1987), and delinquent behaviors (Gove & Crutchfield, 1982; Seydlitz, 1993). However, adaptive mechanisms appear to be different for parental control than for attachment. Secure attachment promotes psychosocial development by allowing adolescents to sustain positive models of self and others and to freely explore their physical and social environment (Bowlby, 1982). Conversely, parental control contributes to greater autonomy and to psychosocial adjustment by establishing a structure and operational framework, which increases adolescents' capacity to regulate their behavior and accurately evaluate the risks of exploration (Barber, Olsen, & Shagle, 1994).

The relationship between parental attachment and college student adjustment has been specifically explored in several studies. Perceived attachment security has been related to emotional, academic, and social adjustment at the beginning and end of the first semester (Holmbeck & Andrei, 1993; Palladin-Schultheiss & Blustein, 1994; Rice et al., 1995; Rice & Whaley, 1994), especially among women (Kenny & Donaldson, 1991). Studies have also shown that perceived security predicts social and emotional adjustment between the end of high school and the first year of college (Flaherty & Richman, 1986; Larose & Boivin, 1998), supporting the view that secure attachment facilitates school transition. Attachment security has also been related to social competence (Kenny, 1987), which in turn predicts emotional adjustment to college (Rice et al., 1997).

Parental control also appears to impact college student psychosocial adjustment. Behavioral control and psychological control are two factors that have been identified in the literature (Barber et al., 1994). Behavioral control involves

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parental guidance and supervision of child behavior as well as parental interest in their child's peer group, activities, and academics. Behavioral control teaches children that rules and structures govern society and that they must observe these rules to be perceived as socially competent (Barber et al., 1994). Psychological control involves parental interference in child emotional and psychological adjustment (Barber, 1996). Specifically, when parents exercise psychological control, they hinder child development by using guilt and emotional manipulation to control child behavior.

Parental control has been shown to decrease from childhood to adolescence, especially during late adolescence (Paulson & Sputa, 1996). However, in a 2-year longitudinal study, the benefits related to behavioral control and the detrimental effects of parental neglect were found to continue until late adolescence (Steinberg et al.,1994), suggesting that parental practices and rules internalized by adolescents have a continual impact even when they reach college age. Studies have shown that behavioral control fosters autonomy (Hill, 1995; Pardeck & Pardeck, 1990), academic success (Dornbusch et al., 1987; Melby & Conger, 1996), and academic motivation (Hein & Lewko, 1994), whereas psychological control has been related to dependence (Baumrind, 1978), deterioration of academic performance (Melby & Conger, 1996), and academic failure (Melby & Conger, 1996; Soucy & Larose, 2000). Moreover, psychological control has been related to internalized behavioral problems, while lack of behavioral control has been related to externalized behavioral problems (Barber et al., 1994).

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In a study involving college students, Soucy and Larose (2000) found that paternal behavior control was positively related to college student adjustment, whereas paternal psychological control was negatively related to adjustment. Specifically, although paternal behavioral control facilitated social adjustment and institutional attachment, paternal psychological control was the precursor of social and emotional adjustment difficulties as well as institutional attachment problems.

Mastery-Oriented Students. The last two decades of research on academic achievement motivation has produced a profile of the "mastery-oriented" student (e.g., Ames, 1987; Cain & Dweck, 1995; Chiu, Hong, & Dweck, 1994; Covington, 1984, 1998; Diener & Dweck, 1978; Dweck & Bempechat, 1983; Dweck & Elliot, 1983; Dweck & Leggett, 1988; Dweck & Wortman, 1982; Henderson & Dweck, 1990; Jagacinski, 1992; Nicholls, 1976, 1984). Mastery-oriented students tend to prefer challenging assignments and tasks in order to learn new material or to enhance their competence, have confidence that they will succeed academically, and maintain their focus on tasks even when experiencing failure and unexpected difficulty. Instructors are perceived as resources that can be consulted when assistance with academic work is required. Furthermore, critical feedback applied to academic work is less likely to deter mastery-oriented students even though their grades might not be as high as some of their "performance-goal-oriented" or "failure-avoiding" peers.

Mastery-Oriented Students and Parenting Styles. In a study examining mastery orientation and parenting styles, Strage and Brandt (1999) found that current parenting style predicted the level of a college student's mastery-orientation. Current as well as childhood higher perceived levels of parental support, demandingness, and

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autonomy granting predicted higher grades, persistence, task involvement, teacher rapport, and confidence levels in college students. Parenting style also had similar effects on student outcomes whether students lived with or away from parents, indicating the continuing effects of parenting style into young adulthood. Strage and Brandt suggested that a home environment characterized by high levels of autonomy granting, demandingness, and emotional support provides elements of mastery-orientation toward school work, which leads to handling college or university demands effectively, including persistence, autonomy, and self-regulation, all of which are required to be successful in the college environment. Moreover, research has indicated that children feel more equipped and have a better chance to succeed as home values and expectations parallel school standards and expectancies (Connor & De Vos, 1989; Cooper, Azmitia, Garcia, Ittel, Lopez et al., 1994; Duran, 1994; Goldenberg, & Gallimore, 1995; Mehan, 1992; Phelan, Davidson, & Coa, 1991). However, as school values and expectations differ from those at home, students although feeling grounded at home, may experience confusion about school goals and allegiances and may consequently be ineffective in the educational environment (Bronfenbrenner, 1979; Cooper et al., 1994; Cooper, Jackson, Azmitia, & Lopez, 1998).

Narcissistic Vulnerability/Injury and Perfectionism. Narcissistic vulnerability has been defined as caretakers' failure to mirror an infant's normal grandiose needs (Kohut, 1971, 1977; Miller, 1981). Caretakers do not empathetically confirm and admire the child's sense of specialness and greatness. Consequently, they fail to foster their child's self-esteem and self-cohesion. Moreover, narcissistic vulnerability is

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maintained when caretakers do not allow the infant to "merge" with themselves. Through encouraging the child to identify with their parents' strength and calmness, the child sees himself or herself as part of their power. Caretakers' failure to meet the child's innate mirroring and merging needs results in a fragmented self that profoundly affects personality growth and development.

Research suggests that injury to the developing self can result in shame, humiliation, withdrawal, aggrandizement, and attention-seeking behavior (Patton & Meara, 1992) as well as alcoholism, drug abuse, and delinquency (Patton, 1980). Narcissistic injury has also shown a negative correlation with two dimensions of college student adjustment, namely, social adjustment and institutional attachment (Mann, 2004).

Perfectionism has been defined as tending to set high performance standards along with tendencies to overly criticize ones behavior (Frost, Marten, Lahart, & Rosenblate, 1990). Perfectionism has been conceptualized as having three dimensions, namely self-oriented perfectionism, other-oriented perfectionism, and socially prescribed perfectionism (Hewitt & Flett, 1991). For perfectionistic individuals, the basis of self-worth is reaching high performance standards and goals, and when failing to meet these lofty expectations, perfectionistic individuals tend to unmercifully belittle themselves. Perfectionism has been associated with personality disorders, anxiety disorders including obsessive-compulsive and panic disorders, psychosomatic disorders, sexual dysfunction, migraine headaches, depression, and suicide (Blatt, 1995).

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In a study examining the impact of narcissistic vulnerability and perfectionism on college adjustment, Mann (2004) found that narcissistic injury and different forms of perfectionism predicted social adjustment and intuitional attachment in college students. Socially prescribed perfectionism was negatively correlated with college students' social adjustment and institutional attachment. Higher levels of narcissistic injury and socially prescribed as well as other-oriented perfectionism were related to lower levels of institutional attachment or goal commitment. Based on his findings, Mann suggested that because the student has an incoherent self due to narcissistic injury, he or she is less capable of meeting college life demands. Mann also suggested that a student's perception that significant others have unreasonable expectations that must be met to obtain approval (socially prescribed perfectionism) may create difficulties committing to an institution due to fear of being unable to meet expectations. Mann further suggested that perfectionist standards for others (other-oriented perfectionism) might interfere with institutional attachment because this form of perfectionism results in distrust of others, hostile feelings toward others, and a tendency to blame others. Whereas other-oriented and socially prescribed perfectionism appears detrimental to college adjustment, self-oriented perfectionism was found to be positively correlated with institutional attachment (Mann, 2004). Mann suggested that being motivated to attain perfection in one's endeavors might facilitate institutional attachment by being persistent in attempting to meet one's goals.

Coping Strategies. The transition from high school to college involves a significant amount of emotional, personal, and academic adjustment (Chickering &

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Reisser, 1993; Tinto, 2000). Roughly 60% of freshmen leave college within the first two years (Tinto, 2000). Typical personal and emotional stressors in the college environment include academic demands, change in living arrangements, and development of novel and different social networks. Studies have investigated a wide range of individual-level predictors of college adjustment, including problem solving skills (Heppner & Anderson, 1985; Nezu & Roman, 1988), assertiveness (Elliot & Gramling, 1990), coping styles (Clark & Hovanitz 1989; Kirsch, Mearns, & Catanzaro, 1990) including humorous coping skills (Burgoyne, Cole, & Hickman, 2003), personality characteristics such as self-esteem (Cantor, Norem, Niedenthal, Langston, & Brower, 1987), sense of mastery (Felsten & Wilcox, 1992), and optimism (Darvill & Johnson, 1991). The results of these studies suggest that regardless of their type, coping strategies appear to facilitate adaptation during the college transition (Brooks & DuBois, 1995).

Among college students, stress is detrimental to academic performance (Hocky, 1979; Silver, 1968) and may result in leaving college (Hirsch & Kenison, 1970; Katz, Korn, Ellis, Madison, Singer et al., 1968). Higher stress levels have been related to reduced grade point averages as well as an increase in psychological and somatic symptoms (Felsten & Wilcox, 1992). While several stress and coping models have been proposed, the person-environment model appears especially appropriate for college students (Whitman, Spendlove, & Clark, 1984). This model examines variations among individuals responding to the same environment. Events are stressful depending on the extent they are perceived as threatening, challenging, or harmful (Lazarus, 1966). Perceiving events as challenging results in positive coping

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responses (e.g., studying harder), whereas viewing events as threatening results in negative coping responses (e.g., dropping out of school). In this model, perception of control over the environment or capacity to actively cope determines the effects of stress. Having a strong sense of control over the environment is related to effective coping (Bandura, 1977; Cohen & Edwards, 1989; Taylor, Helgeson, Reed, & Skokan, 1991), and positive coping responses involve active problem solving (Lazarus, Averill, & Opton, 1974). Studies have shown that seeking social support and using problem-focused coping results in better adjustment across diverse populations (Compas, Malcarne, & Fondacaro, 1988; Cronkite & Moos, 1984; Dunkel-Schetter, Feinstein, Taylor, & Falke, 1992; Duquette, Kerouac, Sandhu, & Beaudet, 1994; Holahan & Moos, 1986, 1987, 1990, 1991; Leiter & Harvie, 1996; Smith, 1996; Vitaliana, Maiuro, & Russo, 1987; Zea, Reisen, & Poppen, 1999).

Research has indicated that active coping results in better adjustment in college students. Aspinwall and Taylor (1992) found that positive mood, higher optimism, and an active coping orientation had direct positive effects on later college adjustment among freshman. Higher social support was also associated with better adjustment, whereas avoidant coping was predictive of lowest levels of college life adjustment. Acting coping has also been associated with lower psychological stress in both college women and men (Hobfoll, Dunahoo, Ben-Porath, & Monnier, 1994). Moreover, active coping has been found to be predictive of personal/emotional adjustment as well as academic success among college freshman (Leong, Bonz, & Zachar, 1997). Other studies have shown that active coping strategies such as seeking social support and problem-focused coping are related to higher levels of adjustment

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to stressful events (Cronkite, & Moos, 1984; Dunkel-Schetter et al., 1992; Holahan & Moss, 1986, 1987). More recently, Shields (2001) found that active coping in the form of obtaining social support was related to greater retention in college students.

Peer, Teacher, and Mentor Relationships. Relationships with adults in the academic milieu appear to impact adjustment in students ranging from preschool to college-age. For example, secure preschool teacher attachments appear to partially compensate for insecure maternal relationships in predicting social competence and prosocial behavior in children (Copeland-Mitchell, Denham, & DeMulder, 1997). Children classified as having high levels of security in their teacher relationship were rated as more positive and gregarious in peer social situations than children rated as having low levels of security. Howes, Matheson, and Hamilton (1994) also found that children's social competence was not significantly associated with maternal attachment. Howes et al. suggested that teacher relationships might be related to peer outcomes, because teachers are a component of the setting in which development of peer interactions occur. Similarly, adolescent academic adjustment has been found to be more highly related to perceived secure high school teacher relationships than parental attachment (Cotterell, 1992). Additionally, adolescents have been shown to appreciate supervisors more when they display leadership during meetings and use stricter supervision (Kremer-Hayon & Wubbels, 1993). In studies involving college students, frequent and informal instructor and peer contact as well as participation in intellectual and social campus pursuits have also been associated with college student cognitive and personal advantages (Pascarella, 1980; 1985; Pascarella & Terezini, 1979, 1980; Terezini & Wright, 1987a, 1987b). These studies have also found that

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students' relationships with individuals and groups in the college environment become more influential as students advance through their college years.

The correlation between college student adjustment and parental attachment and parenting style is relatively low, averaging about .40 (Cotterell, 1992; Palladin-Schultheiss & Blustein; 1994), and at times even lower (Rice et al., 1997). These studies suggest that other relationships (e.g. professors, teachers, peers) may also predict college adjustment (Soucy & Larose, 2000). Several theorists have emphasized that perception of nonparental adult support increases in importance during adolescence and is a significant contributor to psychosocial adaptation (Darling, Hamilton, & Niego, 1994; Talmi, 1997). Several studies have investigated associations between college student adjustment and teacher as well as mentor relationships with students (Cotterell, 1992; Darling et al., 1994; Munch & Blyth, 1993; Talmi, 1997). These studies suggest that teacher and mentor relationships have a significant impact on college student adjustment, and in some situations may compensate for lack of family support and guidance (Pistole, 1989).

Control used by the mentor can also contribute to college student adjustment. Social interaction theory suggests that the development of autonomy occurs when individuals are given rules and supervision (Fagot, 1997). Studies have found a consistent relationship between adolescent adjustment outcomes and authoritative teacher and mentor characteristics. Specifically, authoritative teaching characteristics, including setting tasks, leading, assisting, determining procedure, and inspiring trust and confidence (Wubbels, Creton, Levy, & Hooymayers, 1993) have all been positively associated with higher levels of academic achievement and positive

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attitudes toward school (Brekelmans, Wubbels, Levy, 1993). Similar to studies involving children and younger adolescents, Soucy and Larose (2000) found that perceiving a secure mentor relationship predicted college student adjustment above and beyond perceived parental attachment and control. They also noted that the association between secure mentor relationship and college adjustment was stronger for students who perceived high secure relationships with their mothers. Specifically, these authors found that secure mentor attachment predicted academic adjustment and institutional attachment only among students who perceived secure attachments to their mothers. As noted by Soucy and Larose, their findings are similar to those of Fletcher, Darling, Steinberg, and Dornbusch (1995), who found that students from democratic family environments were more likely to benefit from other adults with democratic practices. Soucy and Larose noted that the moderating effects of secure student-mother relationships suggest that student attachment to mentors prevents development of college student adjustment problems but cannot completely compensate for insecure student-parent relationships. Talmi (1997) also found that nonparental adult support was beneficial if parental support from at least one parent exists. Moreover, parental attachment and teacher attachment have each shown unique predictive value in relation to adolescent academic motivation (Learner & Kruger, 1997).

Sleep

Mental health professionals in colleges and universities having basic knowledge of sleep will be better able to help students with sleep problems. Increased knowledge of the nature and processes of sleep has resulted from more research about

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sleep over the last several decades. While knowledge of sleep has increased, the overall function of sleep is still not fully understood (Kaplan & Sadock, 1998; Pressman & Orr, 1997). Studies indicate that the nervous system, a biological clock of sorts, often referred to as the circadian rhythm, and a drive for homeostatic balance coordinate wakefulness and sleep (Hirshkowitz, Moore, & Minhoto, 1997). Two basic states of sleep include non-rapid eye movement (NREM) and rapid eye movement (REM). NREM sleep is characterized by reduced levels of physical functions relative to wakefulness, while REM involves increased activity, particularly in the brain. An increase in blood pressure, respiration rate, and pulse rate also occurs during REM sleep that is similar to active wakefulness (Kaplan & Sadock, 1998).

Stages of Sleep. Research has shown that sleep is a complex behavior consisting of five stages (Hobson, 1995), identified by electrical activity of the brain. While several bodily functions and muscles might decrease activity, the brain remains active during sleep. Higher levels of brain activity or electrical discharge of numerous neurons are indicated by higher frequencies (less space between electroencephalogram [EEG] waves). Brain waves are largely composed of alpha and beta activities when an individual is awake (Carlson, 2004). The brain produces alpha waves, which are regular, medium frequency waves (8-12Hz), when an individual is resting quietly. Beta waves, which are irregular, mostly low amplitude waves (13-30Hz), occur during mental processing or physiological arousal.

Stage 1 of sleep usually starts when an individual gets drowsy and the eyes close, and theta waves (3.5-7.5Hz) begin to be visible on the EEG (Carlson, 2004). During Stage 1, which is a transition between wakefulness and sleep, individuals

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might deny being asleep if aroused (Hobson, 1995). Individuals with insomnia frequently spend more time in Stage 1 sleep compared to those without insomnia and often get more sleep than they report (Carskadon & Dement, 2000).

Generally after about 10 minutes in Stage 1 sleep, individuals enter Stage 2 sleep, which is characterized by the presence of K complexes and sleep spindles (Carlson, 2004). K complexes are sudden, sharp waves usually observed only in Stage 2 sleep, whereas sleep spindles are short EEG wave bursts occurring between two and five times per minute during the initial four stages of sleep. Researchers suggest that sleep spindles and K complexes help keep individuals asleep (Bowersox, Kaitin, & Dement, 1985; Steriade, 2001).

Healthy adults spend about 10-25 minutes in Stage 2 sleep before they enter Stage 3 (Carskadon & Dement, 2000). Delta waves, which are characterized by slow (less than 3.5Hz) high amplitude waves, emerge during Stage 3 sleep. Individuals generally remain in Stage 3 for several minutes and they then enter Stage 4, indicated by more than 50% delta waves. Stages 3 and 4 are commonly recognized as slow wave sleep, which involve the deepest levels of sleep. Sleepers awakened during Stage 4 are generally confused and easily fall back asleep without remembering being awakened (Bonnet, 2000).

The final sleep stage is marked by rapid eye movement (REM). Individuals generally cycle back through Stage 3 and then 2 before entering REM sleep (Carskadon & Dement, 2000). During REM, which is also called paradoxical sleep, the brain paralyzes muscles by inhibiting brain stem neural activity but beta activity is present, which is generally only observed during Stage 1 sleep or wakefulness

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(Carlson, 2004). Most dreams occur during REM, and individuals awakened during REM usually report that they were dreaming. Muscle paralyzation appears to occur to prevent individuals from acting out dreams that could cause injury (Carskadon & Dement, 2000). Fast, irregular, low voltage brain waves, which indicate considerable brain activity, also characterize REM sleep. Although individuals are totally asleep, brain activity pattern resembles wakefulness. Adults usually alternate between periods of non-REM and REM sleep throughout the night, and the complete cycle occurs in about 90 minutes (Carlson, 2004). Twenty to thirty minutes of REM sleep occupies each cycle, and REM periods progressively increase with each cycle. As individuals sleep through the night, Stages 1 and 2 become less frequent. Consequently, individuals will have four to five REM sleep periods during a typical eight-hour night of sleep.

Circadian Rhythms. Humans and other animals have several biological rhythms serving as internal clocks which vary in length, such as monthly rhythms (e.g., menstrual cycle in women) and annual rhythms (e.g., testosterone secretion in males) (Strubbe & Woods, 2004). Several human biological rhythms are circadian rhythms following approximately 24-hour cycles. The human sleep/wake cycle, which is closer to a 25-hour cycle, must be reset daily. The normal inactivity period begins several hours after dark and continues into the daylight portion of the day (Boivin, Duffy, Kronauer, & Czeisler, 1994). External cues, such as light, re-synchronize the human internal clock to a 24-hour cycle. Studies have shown that after maintained periods of constant darkness, circadian rhythms in humans and other animals can be reset with a brief period of bright light (Aschoff, 1979).

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The suprachiasmatic nucleus (SN) located in the hypothalamus of the brain appears to be largely responsible for regulating circadian rhythms (Refinetti & Menaker, 1992). The SN controls sleep-wake patterns by regulating melatonin (a hormone) secretion from the pineal gland. A few hours before an individual's regular bedtime, the SN is less active, and the pineal gland starts melatonin release into the blood stream, causing the individual to get sleepy within about an hour (Cajochen, Kraeuchi, & Wirz-Justice, 1997). Melatonin production decreases when an individual's normal waking time approaches, and the individual becomes more alert. To account for longer darkness periods, the SN secretes larger amounts of melatonin during the winter (Ralph & Lehman, 1991). Melatonin secretion is largely unregulated when the SN is damaged, and consequently, staying alert during the day becomes problematic (Cohen & Albers, 1991).

The retinohypothalamic tract, which extends from non-visual photoreceptors in the retina, sends messages to the SN. When the retinohypothalamic tract is damaged, circadian rhythms become resistant to external cues and are free running (Refinetti & Menaker, 1992). Nevertheless, the retinohypothalamic tract appears to have the capacity to receive input from non-visual photoreceptors in the skin as well as the retina. Circadian rhythms in human subjects, who were in dim light several days, have been reset by focusing a bright light behind their knees (without light contacting their eyes) (Campbell & Murphy, 1998).

Body temperature rhythm has also been associated with sleep. When body temperature rhythm is close to the bottom of its curve, individuals fall asleep easier (Campbell & Zulley, 1989). Muscular activity is nearly nonexistent during sleep, and

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consequently, a primary body heat source is basically eliminated, reducing production of body heat. Whereas the shivering response to cooler temperatures remains inactive during sleep, the sweating response continues and promotes cooling. During sleep, a general body temperature decline occurs due to these processes (Hobson, 1995). Central temperature control is basically lost during REM sleep and relies on arousal or the environment to sustain stable body temperature. Heat control neurons in the hypothalamus appear to be rested during REM sleep so they can control temperature more effectively during wakefulness (Parmeggiani, 1977). Sleep deprivation studies showing that prolonged sleep deprivation generally results in a significant body temperature reduction (Horne, 1988) have provided support for this theory. Extreme sleep deprivation studies with rats indicate that animals will die when deprived of sleep for prolonged periods resulting from complications due to their inability to conserve body heat (Rechtschaffen, Gilliland, Bergmann, & Winter, 1983). While the exact association among sleep and thermoregulation is undetermined, studies indicate that body temperature is associated with the sleep/wake cycle and that sleep appears essential for thermoregular maintenance.

When individuals change daily routines, circadian rhythms can become desynchronized with environmental rhythms, often resulting in sleep disturbances (Carlson, 2004). Human natural circadian rhythms often do not match modern societal demands, which can result in sleep problems along with accidents and physical health complications. For example, night shift workers generally drive home during daylight hours, and because daylight is an external cue for the human internal clock, sleep problems can occur in these workers. Moreover, during off days, night

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shift workers frequently try to go back to sleeping during the night and staying awake during the day, which often results in additional circadian rhythm disruptions and significant difficulties in adjusting to one sleep/wake schedule (Akerstedt, 1988). Hence, engineering and industrial disasters have been shown to occur most often between midnight and 6:00 a.m. (Mitler, Carskadon, Czeisler, Dement, Dinges et al., 1988). Significant relationships have also been found between shift work and health complications, including chronic cardiovascular problems, headaches, and gastric difficulties (Parkes, 1999; Smith, Robie, Folkard, Barton, Macdonald et al., 1999). Monk, Folkard, and Wedderburn (1996) found that health complications, inadequate job performance, and more traffic accidents were associated with circadian rhythm disruption and poor daytime sleep. Natural circadian rhythm disruptions (e.g., season change) appear to have negative effects on some individuals. For example, individuals who are especially light sensitive seem more vulnerable to Seasonal Affective Disorder (SAD), a mood disturbance characterized by a tendency to be depressed during shorter days of the year (Rosenthal & Wehr, 1992). During winter months, people frequently wake up before sunrise, which can result in delayed resetting of the sleep/wake circadian rhythm. SAD is significantly more prevalent in higher latitudes where daylight changes are more extreme (Avery, Dahl, Savage, & Brengelmann, 1997; Mesh, Middendorf, Bouhuys, Beers, & van den Hoofdakker, 1999).

The Functions of Sleep. For most healthy humans, about one third of their lives are spent sleeping (Hobson, 1995). Sleep appears to have restorative properties. Compared to quiet wakefulness, metabolic rate is about 9 percent lower (Reich,

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Geyer, & Karnovsky, 1972) and accumulated tissue restitution and neutralization of neurotoxins (Adam & Oswald, 1977; Hartman, 1973) appear to occur during sleep. However, the exact purpose of sleep remains unclear. Several theories, involving nervous system development (Hobson, 1995; Roffwarg, Muzio, & Dement, 1966), neurotransmitter replenishment (Hobson, 1995; Siegel & Rogawski, 1988), and memory reinforcement and consolidation (Antrobus, 1986; Hobson, 1995; Steriade & McCarley, 1990; Wood et al., 1992) have emerged during the last several decades.

Developmental theories suggest that REM sleep facilitates nervous system development (Hobson, 1995). Up to 80% of an infant's sleep is spent in REM during the first few weeks of life, which is more than three times the amount of adults. Roffwarg et al. (1966) found that breathing chest movements in fetal lambs were present only during REM sleep. Due to the prominence of REM in utero and during infancy, developmental theorists suggest that REM sleep allows the brain to rehearse future behaviors and increase the strength of neural pathways for future use. Additional support for developmental theories comes from consistent findings that REM sleep at birth is greater across species than any other time during the life-span, but decreases in adulthood (Roffwarg et al., 1966). In general, developmental theories suggest that brain stimulation during REM sleep facilitates brain development. However, developmental theories fail to explain the role of sleep during adulthood.

According to the neurotransmitter replenishment theory, certain nerve cells obtain a resting period during sleep that allows regeneration of neurotransmitters (Hobson, 1995). Most neurons show a slight decrease in activity during sleep with some completely ceasing to fire, particularly during REM sleep. Aminergic neurons

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stop firing during sleep and release norepinepherine and serotonin, which appear to have a significant function in attentive learning and memory (Siegel & Rogawski, 1988). Neurons continuously fire during waking hours and possibly have limited quantities of neurotransmitters that become depleted. Replenishment theories postulate that while inactive, aminergic neurons produce new neurotransmitters (Hobson, 1995). After sufficient REM sleep, aminergic neurons create enough reserve neurotransmitters that enable an individual to remain cognitively adept for another day.

Learning theories postulate that the main function of sleep is memory consolidation and reinforcement. Though research indicates that learning does not occur during sleep (Wood et al., 1992), sleep loss appears to hamper daytime learning (Hobson, 1995). While studies have not delineated exactly how memory is organized, learning theorists suggest that new memories result from the creation of new neural pathways in the brain. Neurons that are involved when new information or experience is obtained increase synaptic strength, and as a result fewer impulses are required for the post-synaptic neuron to fire (Hobson, 1995). A new protein structure is created as neural pathways strengthen, permitting permanent storing of new information in the brain (Steriade & McCarley, 1990). These proteins, however, are viewed as unstable and need to be rejuvenated to stay strong. Neural pathways modified by learning appear to be activated during REM sleep, which may explain why REM has been found to be important to memory and learning. The cortex and neo-cortex, which are brain memory and learning centers, have been shown to be active during REM sleep, and consequently might reinforce new as well as older memories. Antrobus (1986)

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has suggested that while the environment provides minimal or no stimuli to be processed during REM sleep, the brain is still aroused and ready for information processing. Consequently, the brain starts processing information stored in memory and handles the imagery and stream of thought as if the individual were awake.

Sleep and Health. Studies have shown associations between sleep difficulties and various physiological illnesses. For example, sleep loss appears to adversely affect normal growth and development and maintenance of a healthy immune system. Protein synthesis and growth hormones, which are at their highest levels during REM sleep, have a significant function in physical growth (Parker, Rosman, & Kripke, 1980; Sassin, Parker, & Johnson, 1969). Additionally, a reduction of up to 50% in natural killer T-cells, which are critical to the immune system in combating infection, has been found in individuals who get less than six hours of sleep (Irwin et al., 1996).

Sleep disordered breathing frequently is related to sleep difficulties and physical health problems. Problems breathing during sleep are usually associated with sleep apnea, which involves obstruction of the airway during sleep along with not getting adequate oxygen and consequently waking up several or many times during the night (Thorp & Yager, 2001). Five year old children with mild sleep-disordered-breathing (SDB) have reported significantly more bodily pain (Rosen, Palermo, Larkin, & Redline, 2002). Lower health-related quality of life scores in 5-17 year olds were related to mild SDB with lowest scores being associated with more severe SDB. Similar results were found in 30-60 year old adults, with even mild SDB being associated with decrements on a general health survey (Finn et al., 1998).

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Sleep difficulties in adults have also been associated with cardiovascular disease (Appels & Mulder, 1984) and gastrointestinal disorders (Elashoff et al., 1983). Junior high school students reporting poor sleep also reported more illnesses and had lower general health scores (Tanaka et al., 2003). Poor sleep has been associated with reduced physical health, including cardiovascular disease and limitations in activities of daily living in adults over 65 years of age (Asplund, 2000; Newman et al., 1997).

Insomnia is a common sleep disorder with prevalence estimates ranging from 15% to 20% for chronic insomnia and from 30% to 40% for occasional insomnia (Mellinger et al., 1985). Insomnia has been shown to have a detrimental impact on mood, relationships, physiological health, and general psychological well being (Lacks, 1987; Sloan & Shapiro, 1993).

Researchers have found associations between sleep habits and social as well as psychological health. For example, poor sleep quality in pre-adolescents has been related to poor mental health (Meijer, Habekothe, Van Den, & Wittenboer, 2001), and irregular sleep schedules in young adults have been associated with lower sociability, achievement potential, self-control, and intellectual efficiency (Taub & Hawkins, 1979). Moreover, college students rated as psychologically healthy reported more depressive and anxious symptoms, higher interpersonal reactivity, higher social discomfort, increased somatic complaints, and more obsessive-compulsive tendencies following only one night of poor sleep (Zammit, 1988). Fewer mental and social health difficulties have been reported by college students who reported falling asleep faster and having fewer sleep disturbances (Jenkins et al., 2002, June).

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Research also indicates that poor sleep in individuals with psychological disorders may exacerbate health problems. For example, in a group of urban police officers with post traumatic stress symptoms, somatic health problems were reported only by officers having poor sleep habits (Mohr, Vedantham, Neylan, Metzler, & Best, 2003).

Sleep Problems and Cognitive and Psychological Difficulties. Poor sleep has been associated with various cognitive and psychological difficulties. Children with sleep apnea and narcolepsy have shown significantly lower scores on auditory attention, visual attention, and general memory tests (Hansen & Vandenberg, 2001). Successful treatment of these disorders has resulted in significant improvement in overall cognitive performance. Similarly, reduced cognitive efficiency has been shown in children and adolescents who have sleep problems or have been deprived of sleep (Mitru, Millrood, & Mateika, 2002). Poor sleep in college students has been associated with decreased psychological well-being, depression, increased tension, and lower life satisfaction (Pilcher et al., 1997). Sleep loss also has been related to mood changes, cardiovascular disease, and personality changes (Blagrove, 2000; Boland, Shahar, Iber, Knopman, Kuo et al., 2003; Taylor & McFatter, 2003).

Sleep variation, deprivation, and reduction studies have revealed numerous detrimental effects of poor sleep quality and habits in college students (Lack, 1986; Kelly et al, 2001; Dinges, 1989; Pilcher & Huffcutt, 1996; Pilcher & Walters, 1997; Karni, Tanne, Rubenstien, Askenasy, & Sagi, 1994). Adult sleep deprivation studies suggest that loss of just one night of sleep significantly impacts cognitive functioning, affecting decision making and logical reasoning in adults (Blagrove & Akehurst, 2001; Harrison & Horne, 2000). Significant declines in cognitive performance have

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been associated with 24 or more hours of sleep deprivation (Dinges, 1989; Pilcher & Huffcutt, 1996; Pilcher & Walters, 1997). Sleep deprivation appears to increase suggestibility and negatively affect psychomotor reactivity as well as short-term memory (Blagrove, 2000; Kim, Lee, Kim, Park, Go et al., 2001; Sagaspe, Charles, Taillard, Bioulac, & Phillip, 2003). Sleep deprivation also appears to have a negative affect on student metacognition (Pilcher & Walters, 1997). For example, sleep deprived students reported significantly higher levels of self-rated concentration and performance on cognitive tasks compared to non-sleep deprived students even though sleep deprived students performed significantly worse than students not sleep deprived. While sleep deprived students might believe sleep deprivation is not detrimental to performance, results of this study suggest that it is. Similarly, sleep loss resulting from poor sleep quality has been associated with decreased visual motor skill, poor cognitive functioning, and false recall of recently learned words (Maquet, Schwartz, Passingham, & Frith, 2003; Roediger & McDermott, 1995). Sleep difficulties have been associated with significantly impaired academic performance (Jenkins & Buboltz, 2001, May; Lack, 1986).

Although a few studies (Siegel, 2001; Vertes & Eastman, 2000) have suggested REM sleep is not critical to learning and memory consolidation, several investigations have shown a clear relationship between poor sleep patterns and habits, especially those limiting or inhibiting REM sleep, and overall learning and memory. Students showing significant increases in REM sleep during and immediately after an intensive language course learned significantly more than students with lower or no increases in REM sleep (De Koninck et al., 1989). In a similar study involving a

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French language course for English speaking students, significant relationships were found between increases in REM sleep and language learning efficiency (De Koninck, Christ, Hebert, & Rinfret, 1990).

Theorists suggest that activation of information in long-term memory occurs during REM sleep (Atienza & Cantero, 2001). In support of this theory, studies have shown associations between sleep difficulties as well as poor sleep habits and patterns and impairment on memory tasks (Grosvenor & Lack, 1984; Karni et al., 1994; Taub, 1980; Webb & Agnew, 1974). Schredl, Weber, and Heuser (1998) found that after one night of no REM sleep, impairment was shown in retest performance of memory tasks. Several studies indicate that active neurophysiological processes occurring during REM sleep are important in sustaining and reinforcing memories (Davis, 1985; Hennevin, Hars, Maho, & Bloch, 1995; Schredl et al., 1998). Specific brain areas (occipital and pre-motor cortices) active during wakeful learning of a reaction time task have shown significantly increased activity during subsequent night sleep (Maquet et al., 2003), suggesting that production and reinforcement of memory traces occur during REM sleep.

REM sleep also appears to have a function in maintaining memory several days subsequent to learning new material. For example, Smith and Lapp (1991) found that after participants learned new material, REM sleep increased for 5 days, with the highest levels of increase being in the fourth and fifth REM periods. Smith and Lapp noted that as sleep progresses through the night, REM sleep takes up a larger portion of sleep time. Consequently, the most important portion of sleep in the learning process appears to be the last half of a full night's sleep (Smith & Lapp, 1991). This

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study suggests that consistent deprivation of the last two hours of sleep inhibits learning of new material as well as memory consolidation.

Some evidence indicates that slow wave sleep (SWS) also has an important function in memory consolidation. Overnight improvement of a visual discrimination task was found to be proportional to the amount of SWS in the first quarter of the night and the amount of REM sleep in the last quarter (Stickgold, Whidbee, Schirmer, Patel, & Hobson, 2000). Mechanisms active during normal sleep patterns appear to support perceptual skills consolidation. For example, visual discrimination task performance showed improvement in college age students following a normal night of sleep, but when REM sleep was disrupted, little or no improvement was noted (Karni et al., 1994).

Examining Sleep Problems in College Students. Numerous studies have examined college students' sleep patterns, habits, and difficulties. Research indicates that college students have more sleep problems than the general population (Buboltz, Brown, & Soper, 2001; Coren, 1994; Lack, 1986). Buboltz et al. (2001) found that over 70% of college students reported frequent sleep difficulty, with falling asleep being one of the most common problems. Coren (1994) found that over 30% of college students reported frequent sleep problems, while only 36% reported no sleep difficulties. Sleep problems have clear consequences for college students due to the large investment of time, effort, and money to adjust successfully to academic and personal demands.

Several contributing factors appear related to college student sleep difficulties. College years involve significant change and transition that included

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complex challenges in academic, social, and emotional adjustment (Chickering & Reisser, 1993). Entering college can be a major transition for many students as they experience leaving home and their parents for the first time. The college transition and accompanying separation from home can be especially difficult depending on the nature of the student-parent relationship and level of emotional preparedness (Hoffman & Weiss, 1987; Lopez et al., 1988; Rice et al., 1990).

Most students experience at least some level of stress due to demands inherent in the college setting (Darlaston-Jones et al., 2003). Studies have shown that college students experience significant academic and social demands (Kleeman & Richardson, 1985; Russell & Petire, 1992). Modern college students also experience significant pressures due to increased competition for jobs and the changing job market. These pressures create stress and anxiety (Stone & Archer, 1990), which can result in sleep problems and other disorders. The most salient academic stressors reported by students include too many demands along with too little time, anxiety about future success, grades, and professors (Murphy & Archer, 1996). Students reporting more concern about time have been more likely to report sleep problems (Vranesh, Madrid, Bautista, Ching, & Hicks, 1999). Similarly, the level of sleep satisfaction in students has been associated with time-pressure, which has been defined as the requirement to engage in outside activity immediately after ending sleep periods (Hawkins & Shaw, 1989). Students have reported experiencing a range of difficulties, including hallucinations when outside pressures limit the amount of sleep time (Soper, Kelly, & Von Bergen, 1997).

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College students frequently report staying up late at night due to academic demands with some reporting not sleeping during examination times for 24 to 48 hours (Hawkins & Shaw, 1992). Students have also reported depriving themselves of sleep during the week due to not having time to meet various demands and compensating for lost sleep by increasing sleep time or sleeping late during weekends (Hawkins & Shaw, 1992; Machado et al., 1998; Pilcher & Walters, 1997). However, variable sleep patterns can lead to delayed sleep phase syndrome (DSPS; Brown et al., 2001), which is a circadian rhythm disorder that results in problems falling asleep during weeknights and significant morning drowsiness. Lack (1986) found that 17% of college students reported symptoms meeting DSPS criteria, which is more than twice the occurrence reported by the general population (American Psychiatric Association, 1994). Students meeting DSPS criteria also had lower levels of academic performance (Lack, 1986). Daily sleep habits are one of the first things that change for first-year college students (Pilcher et al., 1997). Change in sleep habits has been identified as a common source of stress among college students (Ross, Neibling, & Hechert, 1999). Stress and worry have been related to poor sleep quality (McCann & Stewing, 1987).

Significant differences in sleep problems have been shown between younger, traditional-aged college students and older adults. Younger individuals have more difficulty going to sleep, whereas older adults have more problems staying asleep (Morin & Gramling, 1989; Morin, Kowatch, Barry, & Walton, 1993). Similar to young adults not attending school, falling asleep is the most often reported sleep problem by college students (Buboltz et al., 2001; Giesecke, 1987; Lack, 1986).

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Poorly sleeping college students have been found to be less well-adjusted psychologically on measures of tension and anxiety (Alapin, Fichten, Libman, Creti, Bailes et al., 2000), indicating that college students who are poor sleepers experience higher levels of situation-specific anxiety, such as that related to academic tests (Blankstein, Flett, Watson, & Koledin, 1990). Findings in this area of research also highlight the significant association that can exist between poor sleep and anxiety, cognitive arousal, and depression. Furthermore, a significant relationship has been found between sleep patterns and stress (Cartwright & Wood, 1991), and examining the elements of stress that impact sleep patterns has shown that emotional responses to stress are significantly associated with those sleep patterns (Verlander, Benedict, & Hanson, 1999).

Stimulant use including nicotine has also been associated with sleep problems in college students. A total of 28% of college smokers report starting to smoke after reaching college age (Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). Unexpectedly, light smoking has been associated with insomnia, whereas heavy smoking (>15 cigarettes/day) does not seem to affect sleep (Riedel, Durrence, Lichstein, Taylor, & Bush, 2004). Caffeine is also a common stimulant used among college students. Matheson, Farris, Stam, & Egger (1992) found that 42% of college students frequently drank coffee, and 29% regularly drank tea. Mild doses (100-150mg., about a cup of brewed coffee) of caffeine have been related to delayed sleep onset, increased light sleep, increased spontaneous awakenings, and reduced sleep time (Caldwell, 2003; Pressman & Orr, 1997). Roehrs and Roth (1997) also found that compared to non-users, frequent caffeine users tend to exhibit more sleep disruptions.

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Some individuals experience caffeine effects for up to 10 hours, so just one afternoon cup of coffee can disrupt sleep depending on an individual's caffeine sensitivity (Nehlig, Daval, & Debry, 1992). A relatively high proportion of college students have also reported amphetamine use. In a recent study, 35% of college students reported using prescription amphetamines without a prescription at least once during the past year, 34% reported using cocaine or methylenedioxymethamphetamine (MDMA) in the past year, and 8% reported using cocaine or MDMA at least once weekly (Low & Gendaszek, 2002). Illicit stimulants often have longer lasting effects than milder ones, such as caffeine, potentially causing even greater sleep problems.

Students may use alcohol to self-medicate when experiencing stress. Studies have indicated that 40% of college students engage in binge drinking (five or more drinks in a row) (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). While alcohol can facilitate sleep onset and increase slow wave sleep, it can also decrease REM sleep and has been related to insomnia (Roehrs & Roth, 1997), especially for male students (Pillitteri, Kozlowski, Person, & Spear, 1994). Students who reported higher amounts of alcohol intake fell asleep more often in class than students who reported drinking smaller amounts (Jean-Louis, von Gizycki, Zizi, & Nunes, 1998). However, sleep problems in college students might not simply result from alcohol abuse, even though alcohol use is common in the college population. College students having difficulty sleeping may also have more serious problems than moderate stress or pressure. For example, falling asleep in class and high levels of sleepiness during the day have been significantly related to negative mood states which are frequently associated with decreased academic performance, psychological difficulty, increased

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vulnerability to substance use, and mood disturbance (Jean-Louis et al., 1998). Finally, some students might use sleep medication to improve sleeping patterns. However, pharmacological agents have not been found to be effective in the treatment of long-term sleep difficulties (Morin & Wooten, 1996). Rebound insomnia, which involves sleep difficulties that are more severe after regular pharmacologic hypnotic use, has been reported by individuals when they stop taking sleep medication (Roehrs, Vogel, & Roth, 1990).

Sleep and Adjustment. A few studies have been conducted since the 1980s that examined the relationship between sleep and adjustment. Most of these studies have attempted to investigate the association between sleep and academic performance. While a few studies have been conducted with college students, most sleep research examining student adjustment has involved children and adolescents attending elementary, middle, or high school.

In a study conducted in Belgium that included 972 older children and preadolescents, parents completed a questionnaire assessing sleep quantity and quality, child daytime behavior, family background, and school achievements (Kahn, Van de Merckt, Rebuffat, Mozin, Sottiaux et al., 1989). Some 21% of poor sleepers (e.g., sleep latency greater than than 30 minutes plus 2 or more arousals per night at least 2 nights per week) were reported to be failing academically or to be below expected grade level one or more years. Poor sleepers were reported to have significantly more academic achievement difficulties compared to youngsters without sleep problems. A regression analysis using the same sample of children indicated that fatigue (hard to wake up in the morning and needing to nap at least once during

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the day) and parent educational level were the best predictors of school failure (Blum, Kahn, Mozin, Rebuffat, Sottiaux et al., 1990).

Link and Ancoli-Isreal (1995) investigated the relationship between sleep and academic performance in a survey study of 150 high school students. Students reported their Grade Point Averages (GPAs) and sleep-wake patterns. Higher GPAs were related to shorter sleep-onset, fewer night wakings, later school rise times, fewer school day naps, and earlier weekend rise times. Students with higher GPAs also reported longer night sleep (7.4 vs. 7.0 hr), while students with lower GPAs reported more symptoms of daytime sleepiness (fighting to not fall asleep in the bus/car or falling asleep).

In a survey study including approximately 3000 New England high school adolescents, students with higher grades reported significantly more total sleep and earlier school night bedtimes than students with lower grades (Wolfson & Carskadon, 1998). Sleep habit differences distinguished C students and worse from B or better students. B or better students reported 17-33 minutes more total sleep and 10-15 minute earlier bedtimes on average school nights than C and D/F students. Students with the lowest grades reported greater weekend sleep schedule delays than students with highest grades. That is, A and B students reported going to bed on average about 1.8 hours later on weekends than on school nights, while C and D/F students reported a difference of about 2.3 hours.

Hofman and Steenhof (1997) conducted a survey study involving 600 Dutch high school students and found that higher academic performance was associated with better sleep quality, shorter sleep lag (difference between weekday and weekend

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bed and rise times), and more time in bed. Higher academic performance was also associated with reduced substance use (e.g., alcohol, nicotine, caffeine).

A few studies have investigated the association between sleep/wake patterns and academic performance in college students. Kelly et al. (2001) surveyed nearly 150 introductory psychology college students concerning their average sleep length, overall GPA, and backgrounds. Long sleepers (9 hours/night) reported significantly higher GPAs than short sleepers (<6 hours/night). The average GPA for long sleepers was 3.2, while short sleepers had an average GPA of 2.7. Average sleepers' (7-8 hours/night) grades did not differ significantly from long or short sleepers' grades. Findings from this study support the hypothesis that more total sleep time is related to better grades.

In another study, 200 randomly selected first-year college students were either interviewed or surveyed concerning sleep/wake habits, level of perceived stress, exercise, social support, mood, time management, and eating and religious habits (Trockel et al., 2000). Students' GPAs were also obtained from the university registrar. Sleep habits, especially wake-up times, accounted for most of the variance in students' GPAs. Lower GPAs were associated with later weekday and weekend bedtimes, later weekday and weekend rise times, and greater number of work hours. The strongest correlation with low GPA was later weekday and weekend rise times followed by later weekday and weekend bedtimes. For each hour of delay in average weekday wake-up time, predicted GPA fell by 0.13, and for each hour of delay in average weekend rise time, predicted GPA decreased by 0.11 on a 0-4.0 standard grade scale.

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A few studies (e.g., Allen, 1992; Wahlstrom, 2001) have examined sleep and school performance from a school schedule or circadian rhythm perspective. Relationships between sleep/wake patterns and academic performance for early and late starting schools have been investigated. Researchers have also examined associations between sleep/wake patterns and academic performance for morning-type circadian phase preference (morning-types) versus evening-type circadian phase preference (evening-types). Students who are morning-types tend to wake up earlier and go to sleep earlier than students who are evening-types, whereas evening-types tend to wake up later and go to sleep later than morning-types.

Allen (1992) compared 72 high school seniors with a 7:40 a.m. school start time with 30 seniors with an 8:30 a.m. start time. Students completed a sleep/wake questionnaire regarding weekend sleep patterns, weekend social habits, work hours, alcohol use, and average grades. For all students, later weekend bedtimes were related to later work hours, lower grades, and later weekend parties. Students with a 7:40 a.m. school start time reported more sleep problems, shorter school-night total sleep time, and sleeping later on weekends than students starting school at 8:30 a.m. Fewer students with the highest grades (A - B+) reported weekend bedtimes after 2:30 a.m. Specifically, 15% of students with higher grades compared to 35% of students with average grades described going to bed on weekends after 2:30 a.m. Although this study indicated an association between sleep patterns and academic performance, no difference was found in average grades for students with early versus late school start times.

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Wahlstrom (2001) examined the sleep habits and daytime functioning of 7,168 high school students from three school districts in the Minneapolis-St. Paul, Minnesota area. School start time for districts A, B, and C were 8:30 a.m., 7:25 a.m., and 7:15 a.m., respectively. Students with better grades had a tendency to have earlier bedtimes and to get more school night total sleep. This finding was especially noteworthy when A and B grade average students were compared with D and F grade average students. While District A students reported similar bedtimes to District B and C students, District A students reported one hour later rise times and about one hour more total school night sleep. District A students also reported earning higher grades than students from the other districts. Moreover, District A students reported fewer sleep and behavior problems than District B and C students.

Epstein, Chillag, and Lavie (1995) conducted a large-scale study involving Israeli children and teenagers from 40 schools. The study included 2,764 elementary school students, 607 junior high school students, and 3,122 high school students. Significant positive correlations were found between less reported total sleep time and frequency of school tardiness, tendency to doze off in classes, and ability to concentrate during class. In a more recent study, the same investigators surveyed just over 800 Israeli fifth grade students (Epstein, Chillag, & Lavie, 1998). Students in this study had school start times ranging from 7:10-8:30 a.m. Students with 7:15 a.m. or earlier school start times were compared with students who regularly started school at 8:00 a.m. Sleep time for students with early school start times were significantly shorter than students with later school start times. Students with earlier start times also complained more often of sleepiness throughout the school day, complained

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more frequently of daytime fatigue, were more likely to doze off during class, and displayed attention/concentration difficulties in class. Average school night total sleep time for students with early start times was 8.7 hours, while students with later start times averaged 9.1 hours. Students with earlier school start times reported feeling more tired during first class period than students with later start times. The authors noted that while fatigue, sleepiness, tendency to doze off, and attention/concentration problems were not associated with total sleep time, early school start times appeared to have a negative impact on sleep, and consequently a detrimental effect on daytime school functioning.

Another study used a naturalistic design to examine the impact of school start time changes on school functioning and sleep patterns (Wahlstrom, 2001; Wahlstrom, 2002). Over 18,000 Minneapolis high school students were compared before and after the school start time change from 7:15 a.m. in the 1996-1997 school year to 8:40 a.m. beginning in the 1997-1998 school year. Students' grades, sleep patterns, school attendance, and enrollment were compared. The positive effects of later school start time were evidenced mostly in African American students, who comprised 40% of the student population. Minneapolis students and students from schools that did not change start times reported similar bedtimes. During the 1999-2000 school year, students with the later school start time reported obtaining an hour more of sleep compared to students with an hour earlier start time. After school start time changes, grades showed slight but no statistically significant improvement.

A few studies have examined the association between school functioning and circadian phase preference (morningness versus eveningness). In a study of 3000

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Italian teenagers, evening types reported longer sleep onset, later wake times, later school and weekend night bedtimes, less sleep time on school nights, but more weekend night sleep time (Cortesi, Giannotti, Mezzalira, Bruni, & Ottaviano, 1997). Evening types also reported falling asleep more often in class and lower academic achievement. Using the same sample of teenagers, Giannotti, Cortesi, and Ottaviano (1997) also examined school performance and sleep patterns for early (8:00 a.m.) versus late (8:30 a.m.) starting schools. Compared to students at the later starting school, students with the 8:00 a.m. start time reported increased daytime sleepiness, had significantly more irregular sleep schedules, reported lower academic performance, and used more stimulants.

In a study that included 211 college students in Australia, Lack (1986) investigated sleep loss, delayed sleep phase, and academic performance. Students were asked to report on frequency of sleep problems (e.g., early morning wakings, difficulty falling asleep), sleep habits (e.g., sleeping times), and various daytime symptoms (e.g., napping, substance use, depressed mood). An objective of this study was to pinpoint students with delayed sleep phase syndrome (DSPS), defined as long sleep-onset latency and/or late lights-out time, late weekend wake-up time, and little difficulty staying asleep. A comparison was made of 35 DSPS students with 19 students reporting frequent sleep problems but not daytime sleepiness and with 35 control group students reporting no sleep difficulties. The sleep difficulty group and the control group did not differ in academic performance. Students from both groups reported significantly higher grades than DSPS students. Lack concluded that lower

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school performance might result from chronic insufficient sleep and a sleep/wake pattern associated with DSPS.

A few studies have investigated the relationship between adolescents' sleep habits and academic performance along with other aspects of school functioning. Horn and Dollinger (1989) examined academic performance, test anxiety, and sleep in middle school students. Students' sleep behaviors, academic performance, and anxiety levels were compared on a high stress day (test day) versus a low stress day (no tests). Academic performance was assessed using test grades, vigilance was measured with a digit symbol substitution test, and sleep and anxiety were evaluated with self-report questionnaires. Using Testing Anxiety Scale (Sarason, 1984; Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960) responses, students were placed in three test anxiety groups (high, moderate, low). The three groups did not differ in reported sleep complaints, and no significant relationship was found between sleep behaviors and vigilance task scores on the high stress day. However, low stress day vigilance scores were significantly related to how rested students reported feeling. Horn and Dollinger suggested that sleepiness and/or sleep habits might be more significant on low stress school days than on high stress school days when tests are given, as test performance may be affected more by motivation and/or anxiety than sleepiness.

Meijer et al. (2001) conducted a study of 450 young Dutch adolescents that focused more on the association between sleep/wake patterns and students' perceptions of their school functioning than school performance. Students reported their sleep quality, sleep onset latency, and frequency of night wakings. Students'

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perception of how they were performing academically was assessed using a self-report questionnaire. They also completed a time-limited paper and pencil test to evaluate concentration or selective attention. Fifteen percent of students reported sleep problems, 43% reported having difficulty getting up in the morning, and 25% reported not feeling rested during school. Differences in concentration were not related to sleep quality or time in bed. However, students reporting problems waking up in the morning also reported less motivation to succeed academically. Students reporting better sleep quality and feeling more rested reported a more positive image of themselves as students, more receptivity to teacher influence, and greater motivation to succeed academically. Meijer et al. concluded that sleep quality significantly affects aspects of school functioning, including achievement motivation as well as students' perceptions of their academic capabilities.

In summary, studies examining the relationship between sleep and adjustment have mainly focused on the association between sleep and academic performance in elementary, middle, and high school students. A few studies have included college students. These investigations have examined sleep/wake patterns and academic performance, sleep patterns and classroom performance, the relationship between school start time and sleep habits/quality and academic performance, and the association between phase preference and sleep habits/quality and school performance. Findings indicate that inconsistent sleep/wake schedules, poor sleep quality, late bed and rise times, and shortened total sleep time are negatively related to academic performance.

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Assessment of Sleep Problems

Sleep researchers have suggested that mental health professionals in college and university settings might consider using a comprehensive approach that includes evaluating changes in sleep quality and quantity (Jensen, 2003). A comprehensive history of sleep problems, including age of onset, course, psychological state, and biological as well as environmental factors should be obtained. Students should also be instructed to keep a sleep log, which is the most often used procedure in diagnosis and is highly recommended by sleep experts (Spielman & Glovinsky, 1997). Sleep logs include sleep and wake periods covering a 24-hour period and can be used to record sleep times and duration. More detailed sleep logs assess napping, night wakings, sleep quality, tiredness, substance abuse, mood, and physical activity. Students' level of distress related to sleep problems should also be evaluated, because studies indicate that distress is a significant factor in sleep difficulty (Alapin et al., 2000). The sleep history should assess predisposing, precipitating, and perpetuating factors (Spielman & Glovinsky, 1997) in order to obtain a comprehensive picture of sleep problems. A comprehensive history facilitates accurate diagnosis and treatment plan formulation.

Treatments for Sleep Problems

Pharmacological treatments have shown minimal, if any, effectiveness in the treatment of long-term sleeping problems (Morin & Wooten, 1996). However, reliable and persistent improvements in sleep quality have been noted in 60% to 80% of individuals using psychological interventions (Morin et al., 1994; Morin & Wooten, 1996; Murtagh & Greenwood, 1995).

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Several non-clinical treatments have also improved sleep qualities in individuals with sleep problems. An essential component of non-clinical treatment of sleep disorders is sleep hygiene, which involves basic information about ways to promote good sleep as well as inhibit poor sleep (American Sleep Disorders Association, 1990). Sleep hygiene education usually consists of methods designed to maintain a consistent sleep/wake schedule, information related to the effects of poor sleep, foods to avoid at night (e.g., those containing caffeine), ways to maintain a good sleep environment (e.g., bed just for sleeping, minimal light and noise in the bedroom), and information about increased exercise (except for three hours before bedtime). Individuals with mild to moderate non-chronic sleep problems have shown improvement using sleep hygiene education (Buboltz, Soper, Brown, & Jenkins, 2001). Moreover, individuals reporting sleep problems have shown improvement in sleep after only one session of sleep hygiene instruction at one, three, and twelve-month follow-up (Hauri, 1993). Sleep hygiene education has been found to be as effective as stimulus control therapy or relaxation (Schoicket, Bertelson, & Lacks, 1988). People often overestimate knowledge of proper sleep habits and how they actually use the knowledge (Hicks, Lucer-Gorman, & Bautista, 1999), indicating that sleep hygiene education has the potential to improve sleep quality for many.

Bright light therapy has shown effectiveness in individuals with disturbed sleep schedules, particularly when sleep and wake times differ from the norm (Campbell & Murphy, 1998; Rosenthal, Joseph-Vanderpool & Levandosky, 1990). Bright light therapy has been effective in treating early morning and late night insomnia and is affordable and easily utilized. A broad spectrum light is positioned to

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allow full exposure to the light for 30-60 minutes during daily activities. Time of exposure depends on the specific problematic phase syndrome. Bright light exposure enables the circadian rhythm to shift to a more normal mode.

Regular exercise has been shown to improve sleep. Exercise has been related to decreased time to fall asleep and reported sleep problems as well as increased time spent in stages 3 and 4 sleep (Dement, 2001; Duncan, Bonar, Nicholson, & Wilson, 1995; Matsumoto, Saito, Abe, & Furumi, 1984; Youngstedt, Kripke, & Elloit, 1999). Exercises that consist of cardiovascular components improve sleep more than exercises lacking those methods (Tinder, Paxton, Montgomery, & Fraser, 1985), but exercise in any form appears to improve sleep to some extent.

Some individuals using proper sleep habits information, bright light therapy, or exercise continue to experience sleep problems. Nevertheless, sleep disturbances have been treated effectively with other interventions, including sleep restriction therapy, cognitive therapy, relaxation, stimulus control therapy, and paradoxical intent (Buboltz et al., 2001; Morin & Wooten, 1996; Bootzin & Perlis, 1992).

Stimulus control therapy includes instructional procedures involving the context of sleep and the bedroom (Morin & Wooten, 1996). Instructions typically include using the bedroom just for sleep and sex, waiting to go to bed only when sleepy, getting out of bed and going to another room after 15-20 minutes of not going to sleep, and going back to bed only when sleepy. Instructions also include avoiding napping during the day and maintaining a consistent rise time regardless of sleep onset time and duration. The objective of stimulus control therapy is to facilitate a

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more consistent circadian sleep/wake cycle and to associate the bedroom, bed, and bedtime with rapid sleep onset (Morin & Wooten, 1996).

Sleep restriction therapy centers on increasing time in bed as sleep time and limiting time in bed to actual sleep time. For example, individuals reporting only getting four hours of sleep, time in bed is restricted to four hours. Time in bed is increased 15-20 minutes when sleep efficiency, which is actual time sleeping while in bed, exceeds 85-90% of the amount of time in bed. Alternatively, time in bed is reduced 15-20 minutes when sleep efficiency falls below 80%. Sleep adjustments are made until sound sleep is maintained throughout the night. Individuals with insomnia may increase time in bed trying to get more sleep, which is the opposite of the approach when using sleep restriction therapy (Morin & Wooten, 1996). Many individuals with insomnia often complain of being unable to control their sleeping patterns. Consequently, a key component of sleep restriction therapy as well as stimulus control therapy is learning that sleep habits can be controlled.

Reduction of arousal level to facilitate sleep onset is the primary objective in relaxation therapies (Morin & Wooten, 1996). Behavioral relaxation therapy includes deep breathing, progressive muscle relaxation, and cognitive imagery. Cognitive imagery consists of imagining oneself in a pleasant place, such as lying on the beach or imagining feelings of warmth. Imagery has been effective with physical as well as mental restlessness such as ruminating about daily events, whereas behavioral approaches tend to work better with physical restlessness (Morin & Wooten, 1996). Individuals are encouraged to create their own relaxation tapes to facilitate the

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imagery and relaxation process. Relaxation techniques tend to be more effective with consistent application.

Paradoxical intent has been used to change individuals' perception of their sleep problems (Bootzin & Perlis, 1992). This approach involves instructing individuals to do the opposite of what they previously were doing. For example, rather than trying to fall asleep, individuals might be instructed to intentionally try to stay awake at bedtime. Many individuals with sleep difficulties attempt very hard to fall asleep, which results in anxiety about sleep. Consequently, sleep becomes more difficult and sleep quality worsens. A meta-analysis of over 100 sleep intervention studies indicated that paradoxical intent was slightly more effective compared to most psychological interventions in decreasing unwanted night time awakenings but less effective in decreasing sleep-onset latencies (Murtagh & Greenwood, 1995).

Cognitive therapy has been effective in reducing sleep problems by especially focusing on individuals' expectations (Bootzin & Perlis, 1992). Initial, small successes in experiencing control over sleep patterns facilitate further expectations of success. Two primary expectations are encouraged when therapists help individuals control bedtime and related circumstances. These therapists are perceived as a legitimate source of help, and after individuals experience small successes, they begin to anticipate larger ones.

Hypotheses

The literature suggests that there is a relationship between college students' sleep quality and their adjustment to college and mental/physical health. Because the few studies that have examined associations between sleep and college adjustment have

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focused mainly on academic performance, this study is exploratory by nature. Thus, many outcomes are possible. Nevertheless, specific hypotheses can be drawn since previous research indicated that poor sleep has adverse effects on cognition, mood, and other physiological and psychological aspects of human functioning. Studies (Berman & Sperling, 1991; Kenny & Donaldson, 1991; Lapsley et al., 1989; Lopez et al., 1986) indicate that female students are more closely tied to parents, which may accelerate higher levels of college adjustment among females (Kenny & Donaldson, 1991; Lopez et al., 1986). Consequently, hypotheses were presented separately for males and females since levels of adjustment to college were expected to vary between genders.

Hypothesis 1a for Males

Overall sleep quality will be related to selected scales of the College Adjustment Scales (CAS) for males. Specifically, poor sleep quality will be related to higher scores on the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), and Self-esteem Problems (SE) scales.

Hypothesis 1b for Females

Overall sleep quality will be related to selected scales of the CAS for females. Specifically, poor sleep quality will be related to higher scores on the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), and Self-esteem Problems (SE) scales.

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Hypothesis 2a for Males

Overall sleep quality will be related to selected scales of Version 2 of the SF-36 Health Survey (SF-36v2) for males. Specifically, poor sleep quality will be related to lower scores on the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scales.

Hypothesis 2b for Females

Overall sleep quality will be related to selected scales of the SF-36v2 for females. Specifically, poor sleep quality will be related to lower scores on the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scales.

Hypothesis 3a for Males

Sleep duration will not be related to any of the CAS scales for males. Specially, sleep duration will not be related to the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), or Self-esteem Problems (SE) scales.

Hypothesis 3b for Females

Sleep duration will not be related to any of the CAS scales for females. Specially, sleep duration will not be related to the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), or Self-esteem Problems (SE) scales.

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Hypothesis 4a for Males

Sleep duration will not be related to any of the SF-36v2 scales for males. Specifically, sleep duration will not be related to the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), or Mental Health (MH) scales.

Hypothesis 4b for Females

Sleep duration will not be related to any of the SF-36v2 scales for females. Specifically, sleep duration will not be related to the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), or Mental Health (MH) scales.

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CHAPTER 2

METHOD

The purpose of this study was to explore the relationships between college students' sleep quality and duration and their adjustment to college and mental/physical health. Statistical analyses were used to determine these relationships. This study used a demographic questionnaire, the Sleep Quality Index (Urponen, Partinen, Vuori, & Hasan, 1991) to measure general sleep difficulties, the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) to assess sleep quality, a sleep habits questionnaire based on an instrument designed by Lack (1986) to measure sleep habits and patterns, the College Adjustment Scales (Anton & Reed, 1991) to measure the experience and expression of adjustment problems, and Version 2.0 of the SF-36 Health Survey (Ware, Kosinski, & Dewey, 2000) to measure general health status.

Participants

Three hundred forty-eight undergraduate students were recruited from undergraduate courses at a mid-sized university in the southern United States. The University Human Use Committee approved this study and all participants were treated according to the *Ethical Principals of Psychologists and Code of Conduct*

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(American Psychological Association, 2002). Participation was voluntary and no compensation was given for participating in the study. A consent form detailing the nature of the study was signed by all participants prior to receiving a survey packet. All information was held strictly confidential. Data were used to gather group information. No individual data were analyzed or reported.

Instrumentation

Demographic Questionnaire

The demographic questionnaire (Appendix C) consists of eight items that inquire about participants' gender, age, current major, current year in school, ethnicity, and Grade Point Average (GPA).

The Sleep Quality Index

The Sleep Quality Index (SQI) is an eight item self-report inventory designed to assess general sleep difficulties (Appendix D). The SQI consists of a single scale labeled *Sleep Quality* (Urponen et al., 1991). For question #1, respondents choose one of three possible responses: "< 10 minutes", "11-30 minutes", or "> 30 minutes." For questions #2 - #5 and question #7, they choose one of three possible responses: "No", "< 3 days per week", or "3-7 days per week." For question # 6, participants choose one of three possible responses: "Very or Mostly Alert", "Don't Know", or "Very or Mostly Tired." For question #8, they choose one of three possible responses: "No", "Occasionally", or "At least once per week." Responses are weighted as 0, 1, or 2. The 2 response represents the most common or severe symptom. Sleep quality is determined by summing up items to obtain a total sleep quality score. Scores of 0 or 1 indicate good sleep quality, scores ranging from 2 to 8 indicate occasional sleep

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difficulties, and scores ranging from 9-16 indicate poor sleep quality. Construct validity of the SQI has been provided by a significant relationship between sleep quality and subjective health (Urponen et al., 1991). The SQI has been found to be a reliable indicator of general sleep difficulties. Test-retest reliability coefficients with undergraduate college students have ranged from .74 to .96 with a mean of .84 (Jenkins, 2005).

The Pittsburgh Sleep Quality Index

The Pittsburgh Sleep Quality Index (PSQI) was developed to provide a reliable and valid measure of sleep quality, differentiate "good" and "poor" sleepers, provide an easily interpreted sleep index, and provide a brief assessment of sleep disturbances that might impact sleep quality (Buysse et al., 1989). The PSQI is a 19-item, self-rated questionnaire that assesses sleep disturbances and quality over one month (Appendix E). It has five questions that are rated by the respondent's roommate or bed partner but are not used in scoring. The PSQI, which takes 5-10 minutes to complete, assesses various factors related to sleep quality, including sleep latency and duration and severity and frequency of specific sleep-related difficulties. The 19 self-rated items are grouped into seven component scores, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, medication use, and daytime dysfunction. Each component score is weighted equally on a 0-3 scale. Sleep Duration is obtained by examining question #4. Scores are assigned as follows: > 7 hours = 0, 6-7 hours = 1, 5-6 hours = 2, and < 5 hours = 3.

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The seven PSQI components consist of areas routinely assessed in patients with sleep/wake difficulties. A global PSQI score, which ranges from 0-21, is obtained by summing the seven component scores. Higher scores indicate worse sleep quality. The PSQI has been shown to be a reliable and valid indicator of sleep quality (Buysse et al., 1989). The seven PSQI component scores have demonstrated an overall reliability coefficient (Cronbach's alpha) of .83, indicating adequate internal consistency. Sleep Duration is obtained by examining question #4. Scores are assigned as follows: > 7 hours = 0, 6-7 hours = 1, 5-6 hours = 2, and < 5 hours = 3. Individual items have correlated highly with each other as indicated by a reliability coefficient (Cronbach's alpha) of .83. Global PSQI scores have shown a test-retest reliability coefficient of .85. Test-retest reliability coefficients for component scores have ranged from .65 to .84. In support of validity, a global PSQI score of greater than five has distinguished good and poor sleepers, demonstrating a diagnostic sensitivity of 89.6% and specificity of 86.5%.

The Sleep Habits Questionnaire

The sleep habits questionnaire is based on the instrument designed by Lack (1986). The habits section includes open ended items for reporting wake-up times, bedtimes, usual amount of sleep, and other sleep-wake habits for the week and weekend (Appendix F). The sleep habits questionnaire has been found to be a reliable indicator of usual amount of sleep, wake-up times, bedtimes, and other sleep-wake habits for the week and weekend. Two-week test-retest reliability coefficients using a sample of 18 male and 21 female undergraduate college students have ranged from .68 to .89 with a mean of .80 (Jenkins, 2005).

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College Adjustment Scales

The College Adjustment Scales (CAS) was developed to provide rapid screening of common developmental and psychological problems of college counseling clients and to assess the experience and expression of adjustment problems throughout their college years (Grayson & Crauley, 1989). Scales included in the CAS were chosen to address typical problems in college counseling centers. The CAS is a 108-item self-report inventory that provides measures of psychological distress, low self-esteem, relationship conflict, and career choice and academic difficulties (Anton & Reed, 1991).

The CAS consists of nine scales, including Anxiety (AN), Depression (DP), Suicidal Ideation (SI), Substance Abuse (SA), Self-esteem Problems (SE), Interpersonal Problems (IP), Family Problems (FP), Academic Problems (AP), and Career Problems (CP) (Anton & Reed, 1991). The AN scale measures clinical anxiety and focuses on common affective, physiological, and cognitive symptoms of anxiety. The DP scale assesses clinical depression and focuses on typical physiological, cognitive, and affective symptoms of depression. The SI scale measures the level of recent ideation reflecting suicide, including thoughts of resignation, hopelessness, and suicide. The SA scale assesses the level of disruption in vocational, academic, social, and interpersonal functioning resulting from substance use and abuse. The SE scale is a measure of global self-esteem that assesses dissatisfaction and negative self-evaluations related to personal achievement. The IP scale measures the extent of problems relating to other people in the college setting. The FP scale assesses relationship difficulties with family members. The AP scale measures the level of

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academic performance problems, and the CP scale assesses the level of career choice difficulties.

The CAS was standardized and validated with college and university students ranging in age from 17 to 65 years (Anton & Reed, 1991). Readability analyses indicate that respondents need at least a fifth-grade reading ability to validly complete the CAS. Studies indicate that the CAS is unbiased in terms of ethnic group membership and gender. The CAS can be administered individually or in a group testing situation. The CAS has been found to be a reliable indicator of college adjustment. Internal consistency reliability coefficients for CAS scales have ranged from .80 to .92 with a mean of .86 (Anton & Reed, 1991).

Studies have also provided evidence supporting the validity of the CAS (Anton & Reed, 1991). The CAS has been found to be a sensitive measure of adjustment in college students. For example, students receiving counseling services had significantly higher CAS scales (higher scales indicate adjustment problems) than students not receiving counseling.

The CAS has shown adequate convergent and discriminate validity (Anton & Reed, 1991). An initial study focused on the validity of the AN, DP, SI, SE, IP, and AP scales. All CAS scales, except the SA and CP scales, showed high positive correlations with scales on the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970), Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), and the Beck Hopelessness Scale (BHS; Beck, Weissman, Lester, & Trexler 1974). High positive correlations were also found between CAS AN, DP, SE, and IP scales and the NEO Personality Inventory (NEO-

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PI; Costa & McCrae, 1985) Neuroticism scale and six facet scales. The Extraversion scale of the NEO-PI was negatively correlated with the CAS DP scale. Warmth and Assertiveness facet scales of the NEO-PI were negatively correlated with CAS IP and FP scales, respectively. The Agreeableness scale of the NEO-PI correlated negatively with CAS AN, DP, and IP scales. The NEO-PI Conscientiousness scale correlated negatively with CAS DP, SE, CP, and AP scales. As predicted, the NEO-PI Openness scale did not correlate with any of the CAS scales, and the CAS AP scale showed a negative correlation with cumulative Grade Point Average (GPA).

Another study examined the validity of the CAS IP scale and replicated portions of the previous study (Anton & Reed, 1991). CAS and NEO-PI correlations were similar to those found in the previous study. High correlations were found between the NEO-PI Neuroticism scale and most of its facets and CAS AN, DP, SE, IP, FP, AP, and CP scales. NEO-PI depression scales were associated with the CAS SI scale. The CAS SE and IP scales were negatively correlated with most NEO-PI Extraversion facet scales. Negative correlations were found between CAS IP and AP scales and the NEO-PI Agreeableness and Conscientiousness scales, respectively. The NEO-PI Openness scale did not correlate with any of the CAS scales.

An additional study was conducted to replicate correlations between CAS scales and personality measures and to investigate the validity of CAS SA, SE, and FP scales (Anton & Reed, 1991). High correlations were found between CAS AN, DP, SI, SE, IP, and AP scales and the NEO-PI Neuroticism scale and most of its facet scales. A negative correlation was found between the NEO-PI Extraversion scale and CAS AN, DP, and SE scales. Negative correlations were found between the CAS IP

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and AP scales and NEO-PI Agreeableness and Conscientiousness scales, respectively. As expected, no correlations were found between CAS scales and the NEO-PI Openness scale. Positive correlations were found between the CAS SA scale and Michigan Alcoholism Screening Test (MAST, Selzer, 1971) and Drug Abuse Screening Test (DAST; Skinner, 1982a, 1982b) scores. Negative correlations were found between CAS AN, DP, SI, SE, IP, and AP scales and the Multidimensional Self-esteem Inventory (MSEI; O'Brien & Epstein, 1988) Global Self-esteem Scale. The largest negative correlation was found between the MSEI Global Self-esteem and CAS SE scales. A positive correlation was found between CAS FP scores and Family Adaptability and Cohesion Evaluation Scales III scores (FACES III; Olsen, McCubbin, Barnes, Larsen, Muxen et al., 1985).

Further research investigated the validity of the CAS AP and CP scales (Anton & Reed, 1991). The Career Decision Scale (CDS; Osipow, 1987) correlated positively with CAS AP and CP scales. The Self-expression Inventory (SEI; Robbins and Patton, 1985), which assesses an individual's capacity to set and pursue career goals, correlated positively with CAS AP and CP scores. Negative associations were found between CAS AN, AP, and CP scores and cumulative GPA. As noted by Anton and Reed (1991), several studies indicate that the CAS is not only a sensitive measure of adjustment problems in college students, but also has adequate convergent and discriminate validity. Moreover, correlations between CAS and NEO-PI scores across several samples demonstrate the stability of these relationships.

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Version 2.0 of the SF-36 Health Survey

The SF-36 is a generic, 36-item health survey that yields an 8-scale profile of scores pertaining to functional health and well-being, as well as physical and mental summary measures (Ware et al., 2000). The SF-36 can be self-administered, computer administered, or administered by a trained interviewer using a structured interview format. It has a standard form that consists of a 4-week recall and an acute form that consists of a one-week recall. The acute form is designed to assess health status weekly or biweekly and is intended to be more sensitive to recent health status changes.

The SF-36 has been given successfully in general population surveys (Ware, Keller, Grandek, Brazier, & Sullivan, 1995) and to young as well as older individuals with specific diseases (Ware, Snow, Kosinski, & Gandek, 1993; McHorney, Ware, Lu, & Sherbourne, 1994). The SF-36 can be completed within 5-10 minutes with high data quality, including high item completion rates (Ware et al., 1993). The SF-36 has been used in general and specific population surveys to compare the relative impact of diseases, to differentiate the health benefits of various treatments, and to compare disease-specific benchmarks with general population norms. Some of the most commonly investigated diseases and conditions using the SF-36 include back pain, arthritis, cardiovascular disease, cancer, depression, chronic obstructive pulmonary disease, diabetes, migraine headaches, gastro-intestinal disease, hypertension, HIV/AIDS, kidney disease, irritable bowel syndrome, multiple sclerosis, neuromuscular conditions, musculoskeletal conditions, psychiatric diagnoses, osteoarthritis, sleep disorders, rheumatoid arthritis, stroke, spinal injuries, surgical

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procedures, substance abuse, trauma, and organ transplants (Turner-Bowker, Bartley & Ware, 2002).

The eight health concepts measured by the SF-36 were selected from the medical outcomes study (MOS; Stewart & Ware, 1992) and represent the most often health survey measured concepts and those most impacted by disease and treatment (Ware et al., 1993; Ware, 1995). Items selected for the SF-36 also represent various operational indications of health, including objective reports and subjective ratings, favorable as well as unfavorable self-assessments of overall health status, distress and well-being, and behavioral function and dysfunction (Ware et al., 1993). The Functioning and Well-Being Profile (FWBP; Stewart & Ware, 1992) was the source for SF-36 instructions and items. A "development form" of the SF-36 was first available in 1988, and the "standard" form was available in 1990 (Ware, 1988; Ware & Sherbourne, 1992).

To correct deficiencies in Version 1.0 of the SF-36, Version 2.0 (SF-36v2) was introduced in 1996 (Ware et al., 2000). Improvements were made to instructions and items and to the layout for questions and answers, making questions easier to read and complete and helping to reduce missing responses. Five-level response choices replaced dichotomous response choices for seven role functioning scale items. To simplify items, five-level response categories replaced six-level response categories in the Vitality (VT) and Mental Health (MH) scales. The SF-36v2 has updated norms from the 1998 National Survey of Functional Health Status (NSFHS) along with norm-based scoring (NBS) algorithms for all eight scales (Ware et al. 2000). Scores for all eight scales, as well as the physical and mental summary

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measures, can be compared using NBS (mean = 50, standard deviation = 10). Cross-sectional and longitudinal norms were re-estimated for Version 1.0, making Version 1.0 easier to interpret and directly comparable to published results based on Version 2.0. Additionally, to evaluate the effect of Version 2.0 improvements and to ensure comparability of scores across Versions 1.0 and 2.0, national calibration studies were conducted in the United States in 1998 and 1999.

The taxonomy of the SF-36 consists of three levels: (1) items, (2) eight scales aggregating 2-10 items each, and (3) two summary measures that aggregate scales (Ware et al., 2000). A total of 35 items are used to score the eight SF-36 scales. One item is a self-report of health transition. Each item is used to score only one scale. SF-36 scales include the Physical Functioning (PF), Role-Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scales. The two summary measures include the Physical Component Summary (PCS) and Mental Component Summary (MCS) measures.

The PF scale measures the level of limitations in physical health due to physical problems. The lowest (floor) scores indicate the respondent is very limited in performing physical activities, such as bathing or dressing, while the highest (ceiling) scores indicate the respondent performs all types of physical activities, including the most vigorous without limitations due to physical health. The RP Scale assesses the degree of limitations in usual role activities due to physical health problems. The lowest scores indicate difficulties with work or other daily activities due to physical problems, while the highest scores indicate no problems with work or daily activities.

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The BP scale measures the presence of pain and level of limitations due to pain. The lowest scores indicate very severe and extremely limiting pain, while the highest scores indicate no pain or limitations due to pain. The GH scale assesses self-evaluation of personal health. The lowest scores indicate the respondent evaluates personal health as poor and believes it is likely to worsen. The highest scores indicate the respondent evaluates personal health as excellent.

The VT scale measures the level of energy and fatigue. The lowest scores indicate the individual feels tired all of the time, while the highest scores indicate the individual feels full of energy all of the time. The SF scale measures the degree of limitations in social activities due to physical or emotional problems. The lowest scores indicate extreme and frequent interference with normal social activities due to physical or emotional problems. The highest scores indicate that the respondent performs normal social activities with no interference due to physical or emotional problems.

The RE scale assesses the degree of limitations in usual role activities due to emotional problems. The lowest scores indicate problems with work or other daily activities due to emotional difficulties. The highest scores indicate no problems with work or other daily activities. The MH scale measures level of psychological distress or well-being. The lowest scores indicate feelings of nervousness and depression all of the time, while the highest scores indicate peaceful, happy, and calm feelings all of the time.

The lowest scores on the PCS measure indicate limitations in self-care, physical, social, and role activities; severe bodily pain; frequent tiredness; and health

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rated as "poor." The highest scores on the PCS measure indicate no physical limitations, disabilities or decrements in well-being, high energy level, and health rated as "excellent." The lowest scores on the MCS measure indicate frequent psychological distress and social/role disability due to emotional problems and health rated as "poor." The highest scores on the MCS measure indicate frequent positive affect, absence of psychological distress and limitations in usual social/role activities due to emotional problems, and health rated as "excellent."

The PCS measure is obtained using scores from the PF, RP, BP, and GH scales, while the MCS measure is obtained using scores from the VT, SF, RE, and MH scales (Ware et al., 2000). Factor analytic studies have confirmed that 80-85% of the reliable variance in the eight scales is accounted for by the physical and mental health factors (Ware & Gandek, 1994). The physical component correlates most highly with PF, RP, and BP scales and contributes most to the Physical Component Summary (PCS) score. Similarly, the MH, RE, and SF scales correlate most highly with the mental component and contribute most to the Mental Component Summary (MCS) score. Scales loading highest on the physical component are most responsive to treatments impacting physical morbidity, while scales loading highest on the mental component are most responsive to treatments influencing mental health.

Extensive investigations of SF-36 psychometric properties have been performed in the United States (Garratt, Ruta, Abdalla, Buckingham, & Russell, 1993; Jenkinson, Coulter, & Wright, 1993; McHorney et al., 1994; Wagner, Keller, Kosiniski, Baker, Jacoby et al., 1995). Studies have demonstrated that all SF-36 items correlate significantly with their respective scales (McHorney et al., 1994; Ware et

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al., 1993). Studies have also shown that the range of scale levels have increased substantially on the role functioning scales of the SF-36v2, resulting in a reduction of score concentrations at the "ceiling" and "floor" of the scales, as well as greater score precision (Ware et al., 2000). Internal consistency and test-retest methods have been used to estimate the reliability of SF-36 scales and summary measures. Reliability statistics have exceeded .70 in more than 25 studies (Tsai, Baylis, & Ware, 1997), and most have exceeded .80 (McHorney et al., 1994; Ware et al., 1993). Similarity, physical and mental summary score reliability estimates generally exceed .90 (Ware, Kosinski, & Keller, 1994). Several studies have demonstrated that median reliability coefficients equal or exceed .80 for all scales except SF, which has shown a median reliability of .76 (Ware et al., 1993). These reliability coefficients for SF-36 scales and summary measures have been replicated with patient groups that differ in diagnoses and socio-demographic characteristics (McHorney et al., 1994; Ware et al., 1993; Ware et al., 1994).

Validity studies have generally supported the intended meaning of SF-36 high and low scores (Ware et al., 1993; Ware et al., 1994). Research provided evidence for the content, concurrent, criterion, construct, and predictive validity of the SF-36. Regarding content validity, the SF-36 has been compared to other widely used generic health surveys (Ware et al., 1993; Ware, 1995). These comparisons indicate that eight of the most often assessed health concepts are included in the SF-36. Correlations between SF-36 scales and summary measures and 32 general concept measures as well as 19 specific symptoms have been performed to facilitate assessment of health concepts not included in the SF-36 (Ware et al., 1993; Ware et

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al., 1994). Substantial correlations have been found between SF-36 scales and most omitted general health concepts.

Factor analytic studies of construct validity have shown that each of the eight SF-36 scales and summary measures differ markedly from each other (McHorney et al., 1993; Ware, Kosinski, Baylis, McHorney, Rogers et al., 1995; Ware et al., 1994). Specifically, the most valid mental health measures include the MH, RE, and SF scales and the MCS summary measure, and the most valid physical health measures include the PF, RP, and BP scales and PCS summary measure. The MH scale (Berwick, 1991; Ware et al., 1994) and the MCS summary measure (Ware et al., 1994) has been useful in screenings for psychiatric disorders. For example, the MCS measure has shown a sensitivity of 74% and a specificity of 81% in detecting individuals with depressive disorder (Ware et al., 1994).

Predictive validity studies have linked SF-36 scales and summary measures to the clinical course of depression (Beusterien, Steinwald, & Ware, 1996; Wells, Burnam, Rogers, Hays, & Camp, 1992), health care services utilization (Ware et al., 1994), 180-day survival (Rumsfield, MaWhinney, McCarthy, Shroyer, VillaNueva et al., 1999), five-year survival (Ware et al., 1994), and job loss within one year (Ware et al., 1994). Hypotheses about SF-36 scale validity have been supported with clinical studies comparing patients' scores before and after treatment. For example, scales with the most physical factor content, including the PF, RP, and BP scales tend to be most responsive to the benefits of heart value surgery (Phillips & Lansky, 1992), hip replacement (Kantz, Harris, Levitsky, Ware, & Davies, 1992; Lansky, Butler, & Waller, 1992), and knee replacement (Kantz et al., 1992). The MH, RE, and SF

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scales, which have the most mental factor content, have been the most responsive in comparing change in the level of depression (Beusterien et al., 1996), patients before and after recovery from depression (Ware et al., 1995), and interpersonal therapy and drug treatment for depression (Coulehan, Schulberg, Block, Madonia, & Rodrigues, 1997). Finally, the SF-36v2 health transition item has been useful in estimating change in health status (Ware et al., 2000).

Procedure

Course instructors were contacted before surveys were conducted to gain permission for students to complete questionnaires during scheduled class time. All packets included the same demographics form and questionnaires. Before completing the surveys, participants read and signed a consent form in class that explained the purpose of the study. This form explained that participation was voluntary and that all information remained confidential. Prior to administering the questionnaires, participants were informed that survey results would be disseminated only as group data. After reading and signing the content form, students completed the demographics form and questionnaires in class. The survey packet took about 20 minutes to complete.

Data Analysis

Eight separate multivariate analysis of variance (MANOVA) tests were conducted for all eight hypotheses. Because the relationship between a categorical independent variable and multiple continuous dependent variables is being assessed in each case, a MANOVA is the appropriate statistical analysis for these hypotheses. Using a Bonferroni correction, alpha levels were adjusted to a family-wise level of

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.05. This correction was conducted to compensate for performing multiple statistical analyses on the same data, which controlled for Type I errors. Post hoc analyses were conducted on all MANOVAs.

Hypotheses 1a through 2b

In the first four hypotheses, sleep quality served as the independent variable. Scores on the SQI were separated into poor sleep quality, occasional sleep difficulties, and good sleep quality. In the first and second MANOVAs, scores on the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), and Self-esteem Problems (SE) scales of the CAS served as the dependent variables. In the third and fourth MANOVAs, scores on the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scales of the SF-36v2 served as the dependent variables.

Hypotheses 3a through 4b

In the fifth, sixth, seventh, and eighth hypotheses, sleep duration served as the independent variable. Scores on the PSQI were separated into less than five hours, five to six hours, six to seven hours, and more than seven hours. In the fifth and sixth MANOVAs, scores on the AN, DP, SA, IP, AP, and SE scales of the CAS served as the dependent variables. In the seventh and eighth MANOVAs, scores on the PF, RP, GH, VT, SF, RE, and MH scales of the SF-36v2 served as the dependent variables.

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CHAPTER 3

RESULTS

The results of the examination of the relationship between college students' sleep quality and duration and their adjustment to college and physical/mental health are presented in this chapter. Several components of college adjustment, including level of anxiety, depression, suicidal ideation, substance abuse, self-esteem, interpersonal problems, family problems, academic problems, and career problems were included in the study. The study also examined various aspects of physical health, including: limitations in physical health due to physical problems, limitations in usual role activities due to physical health problems, self-evaluation of person health, energy and fatigue, limitations in social activities due to physical or emotional problems, limitations in usual role activities due to emotional problems, and psychological distress or well-being. Gender differences were assessed and are presented in Table 1. Significant gender differences were found on five scales of the College Adjustment Scales (CAS). Because a number of significant gender differences were found, data were analyzed separately for males and females.

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Table 1

Gender Differences

	Mean				
Variables	Males	Females	*F*	*df*	*p*
College Adjustment Scales					
AP	24.89	22.41	12.71	340	.000
AN	20.44	22.28	5.66	342	.018
CP	18.96	16.46	10.60	343	.001
SI	14.65	13.54	5.44	339	.020
SA	16.93	15.14	9.48	340	.002

Note: AP = Academic Problems, AN = Anxiety, CP = Career Problems, SI = Suicidal Ideation, SA = Substance Abuse, *F* = F ratio of MANOVA, *df* = degrees freedom, *p* = probability

Participants

Participants consisted of student volunteers enrolled in undergraduate classes in a medium sized southeastern university. From an initial sample of 348 subjects, data from 347 participants were retained for analysis. One participant was excluded from the study for failure to complete the surveys. As there were significant gender differences, descriptive statistics will be presented separately for each gender.

Male Participants

A total of 152 males ranging in age from 18 to 39 participated in the study. The mean age was 20.8 years (*SD* = 3.3 years). Males accounted for 43.4% of the overall sample. The male sample consisted of 117 European Americans (77%), 25 African Americans (16.4%), 3 Native Americans (2%), 2 Asian Americans (1.3%), 2 Hispanic/Latino (1.3%), and 2 males (1.3%) who did not indicate ethnicity. Male participants consisted of 56 freshman (36.8%), 28 sophomores (18.4%), 34 juniors (22.4%), 32 seniors (21.1%), and 2 males (1.3%) who chose "other" as their year in college. The mean GPA for the last year of school completed was 3.0 with a standard deviation of .6.

Female Participants

A total of 195 females ranging in age from 18 to 54 participated in the current study. The mean age was 21.1 years (*SD* = 5.0 years). Females accounted for 55.7% of the overall sample. The female sample consisted of 160 European Americans (82.1%), 27 African Americans (13.8%), 4 Hispanic/Latino (2.1%), 3 females who did not indicate an ethnic background (1.5%), and 1 Asian American (.5%). Female participants consisted of 76 freshman (39%), 41 sophomores (21%), 41 juniors

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(21%), 29 seniors (14.9%), 7 graduate students (3.6%), and 1 female (.5%) who chose "other" as her year in college. The mean GPA for the last year of school completed was 3.2 with a standard deviation of .5.

Descriptive Statistics and Reliabilities

Significant Gender Differences

Scores of males and females differed significantly on five scales of the CAS. As shown in Table 1, males and females demonstrated significant differences on Academic Problems, $F(1, 339) = 12.71, p < .000$; Anxiety, $F(1, 341) = 5.66, p < .018$; Career Problems, $F(1, 342) = 10.60, p < .001$; Suicidal Ideation, $F(1, 338) = 5.44, p < .020$; and Substance Abuse, $F(1, 339) = 9.48, p < .002$. Males and females did not differ significantly on any scales of the SF-36v2.

Male Descriptive Statistics and Reliabilities

Table 2 presents the means, standard deviations, and reliability coefficients of the Sleep Quality Index, the Pittsburgh Sleep Quality Index, the CAS, and Version 2 of the SF-36 Health Survey (SF-36v2). The mean and standard deviation for the Sleep Quality Index was: $M = 5.10$, $SD = 3.50$. The means and standard deviations for the Pittsburgh Sleep Quality Index scales were as follows: Sleep Latency ($M = .89$, $SD = .90$), Total Sleep Latency ($M = 2.22$, $SD = 1.84$), Sleep Duration ($M = .77$; $SD = .94$), Sleep Disturbances ($M = 6.59$, $SD = 4.31$), and Daytime Dysfunction ($M = 3.00$, $SD = 1.51$). Internal consistency for the total score of the Pittsburgh Sleep Quality Index was .79 and is within acceptable limits and consistent with previously reported findings.

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Table 2

Means, Standard Deviations, and Internal Consistencies of the Variables

Variables	Males			Females		
	M	*SD*	α	*M*	*SD*	α
Sleep Quality Index	5.19	3.5	.79	5.35	3.52	.75
Pittsburg Sleep Quality Index						
PSL	.89	.90		.74	.86	
LAT	2.22	1.84		2.01	1.78	
SDUR	.77	.94		.74	.95	
DIS	6.59	4.31		8.19	4.95	
DTD	3.00	1.51		2.90	1.54	

Note: PSL = Pittsburgh Sleep Quality Index Latency, LAT = Pittsburgh Sleep Quality Index Total Sleep Latency, SDUR = Pittsburgh Sleep Quality Index Duration, DIS = Pittsburgh Sleep Quality Index Disturbances, DTD = Pittsburgh Sleep Quality Index Daytime Dysfunction, *M* = Mean, *SD* = Standard deviation, α = alpha

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Table 2 Continued

Means, Standard Deviation, and Internal Consistencies of the Variables

Variables	Males			Females		
	M	*SD*	α	*M*	*SD*	α
College Adjustment Scales						
AP	24.89	6.96	.85	22.41	5.89	.80
AN	20.44	6.95	.88	22.28	7.26	.88
IP	21.39	5.50	.75	20.74	5.36	.78
DP	18.44	5.86	.83	17.99	4.86	.76
CP	18.96	7.59	.92	16.46	6.62	.93
SI	14.65	5.59	.93	13.54	3.11	.79
SA	16.93	6.09	.88	15.14	4.69	.86
SE	26.52	3.62	.30	26.57	3.42	.33
FP	18.68	4.95	.77	19.25	4.62	.68

Note: AP = Academic Problems, AN = Anxiety, IP = Interpersonal Problems, DP = Depression, CP = Career Problems, SI = Suicidal Ideation, SA = Substance Abuse, SE = Self-esteem Problems, FP = Family Problems, *M* = mean, *SD* = standard deviation, α = alpha

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Table 2 Continued

Means, Standard Deviation, and Internal Consistencies of the Variables

Variables	Males			Females		
	M	SD	α	M	SD	α
SF-36v2 Health Survey						
PF	28.34	3.70	.94	27.84	3.96	.93
RP	17.28	3.78	.93	17.69	3.29	.89
GH	20.23	3.43	.75	19.66	4.05	.85
VT	13.95	3.34	.83	13.41	3.21	.79
SF	8.69	1.78	.79	8.73	1.63	.75
RE	12.76	3.19	.95	12.72	2.85	.92
MH	19.33	3.81	.82	19.26	3.65	.81

Note: PF = Physical Functioning, RP = Role-Physical, GH = General Health, VT = Vitality, SF = Social Functioning, RE = Role Emotional, MH = Mental Health, *M* = mean, *SD* = standard deviation, *α* = alpha

Means and standard deviations for the CAS were as follows: Academic Problems (M = 24.89, SD = 6.96), Anxiety (M = 20.44, SD = 6.95), Interpersonal Problems (M = 21.39, SD = 5.50), Depression (M = 18.44, SD = 5.86), Career Problems (M = 18.96, SD = 7.59), Suicidal Ideation (M = 14.65, SD = 5.59), Substance Abuse (M = 16.93, SD = 6.09), Self-esteem (M = 26.52, SD = 3.62), Family Problems (M = 18.68, SD = 4.95).

Means of the CAS for the present study are consistent with means for the standardization sample, which ranged from 14.20 to 23.70 (Anton & Reed, 1991). Internal consistencies in the current study ranged from .30 to .93 and are within acceptable ranges and consistent with previously reported findings.

Means and standard deviations for SF-36v2 were as follows: Physical Function (M = 28.34, SD = 3.70), Role-Physical (M = 17.28, SD = 3.78), General Health (M = 20.23, SD = 3.43), Vitality (M = 13.95, SD = 3.34), Social Functioning (M = 8.69, SD = 1.78), Role-Emotional (M = 12.76, SD = 3.19), and Mental Health (M = 19.33, SD = 3.81). Means of the SF-36v2 for the present study are consistent with means for the standardization sample, which ranged from 8.70 to 26.09 (Ware et al., 2000). Internal consistencies in the current study ranged from .75 to .95 and are within acceptable ranges and consistent with previous findings.

Females Descriptive Statistics and Reliabilities

Table 2 presents the means, standard deviations, and reliability coefficients of the Sleep Quality Index, Pittsburgh Sleep Quality Index, CAS, and SF-36v2 for female participants. The mean and standard deviation for the Sleep Quality Index was: M = 5.35, SD = 3.52. The means and standard deviations for the Pittsburgh Sleep Quality

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Index scales were as follows: Sleep Latency (M = .74, SD = .86), Total Sleep Latency (M = 2.01, SD = 1.78), Sleep Duration (M = .74; SD = .95), Sleep Disturbances (M = 8.19, SD = 4.95), and Daytime Dysfunction (M = 2.90, SD = 1.54). Internal consistency for the total score of the Pittsburgh Sleep Quality Index was .75 and is within acceptable limits and consistent with previously reported findings.

Means and standard deviations for the CAS were as follows: Academic Problems (M = 22.41, SD = 5.89), Anxiety (M = 22.28, SD = 7.26), Interpersonal Problems (M = 20.74, SD = 5.36), Depression (M = 17.99, SD = 4.86), Career Problems (M = 16.46, SD = 6.62), Suicidal Ideation (M = 13.54, SD = 3.11), Substance Abuse (M = 15.14, SD = 4.69), Self-esteem (M = 26.57, SD = 3.42), and Family Problems (M = 19.25, SD = 4.62). Means of the CAS for the present study are consistent with means for the standardization sample, which ranged from 14.20 to 23.70 (Anton & Reed, 1991). Internal consistencies in the current study ranged from .33 to .93 and are within acceptable ranges and consistent with previous findings.

Means and standard deviations for SF-36v2 were as follows: Physical Function (M = 27.84, SD = 3.96), Role-Physical (M = 17.69, SD = 3.29), General Health (M = 19.66, SD = 4.05), Vitality (M = 13.41, SD = 3.21), Social Functioning (M = 8.73, SD = 1.63), Role-Emotional (M = 12.72, SD = 2.85), and Mental Health (M = 19.26, SD = 3.65). Means of the SF-36v2 for the present study are consistent with means for the standardization sample, which ranged from 8.70 to 26.09 (Ware et al., 2000). Internal consistencies in the current study ranged from .75 to .93 and are within acceptable ranges and consistent with previous findings.

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Correlations Among Variables

Correlations for Male Participants

Intercorrelations of all variables in the study for males are presented in Table 3. Several significant correlations were found and are highlighted. The Academic Problems scale of the CAS was correlated significantly with the CAS's Anxiety ($r = .62, p < .000$), Interpersonal Problems ($r = .58, p < .000$), and Depression ($r = .57, p < .000$). The Academic Problems scale was significantly correlated with the Vitality scale of the SF-36v2 ($r = -.59, p < .000$).

The Anxiety scale of the CAS was correlated significantly with the CAS's Interpersonal Problems ($r = .79, p < .000$) and Depression ($r = .79, p < .000$). The Anxiety scale also was significantly correlated with the SF-36v2's General Health ($r = -.55, p < .000$), Vitality ($r = -.67, p < .000$), Social Functioning ($r = -.65, p < .000$), and Role-Emotional ($r = -.59, p < .000$).

The Interpersonal Problems scale of the CAS was correlated significantly with the CAS's Depression ($r = .77, p < .000$). The Interpersonal Problems scale also was significantly correlated with the SF-36v2's Vitality ($r = -.53, p < .000$), Social Functioning ($r = -.62, p < .000$), Role-Emotional ($r = -.59, p < .000$), and Mental Health ($r = -.61, p < .000$).

The Depression scale of the CAS was correlated significantly with the SF-36v2's General Health ($r = -.50, p < .000$), Vitality ($r = -.59, p < .000$), Social Functioning ($r = -.74, p < .000$), and Role-Emotional ($r = -.65, p < .000$).

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Table 3

Correlation Matrix for All Variables for Males

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	—	.51*	.09	-.17*	.02	-.03	.09	-.11	-.01	-.03	-.20*	-.05	-.10
2. School		—	-.12	-.07	.04	-.03	.02	-.09	-.00	-.07	-.11	-.07	-.06
3. GPA			—	-.25*	-.13	-.18	-.09	-.14	-.13	-.02	.09	-.00	.10
4. AP				—	.62*	.58*	.57*	.56*	.43*	.34*	.17*	.54*	-.23*
5. AN					—	.77*	.80*	.53*	.55*	.30*	.24*	.60*	-.35*
6. IP						—	.77*	.48*	.60*	.37*	.32*	.65*	-.31*
7. DP							—	.56*	.73*	.37*	.22*	.68*	-.37*
8. CP								—	.40*	.27*	.17*	.57*	-.19*
9. SI									—	.40*	.15	.59*	-.39*
10. SA										—	.10	.31*	-.29*
11. SE											—	.29*	-.11
12. FP												—	-.35*
13. PF													—

Note: GPA = Grade Point Average, AP = Academic Problems, AN = Anxiety, IP = Interpersonal Problems, DP = Depression, CP = Career Problems, SI = Suicidal Ideation, SA = Substance Abuse, SE = Self-esteem Problems, FP = Family Problems, PF = Physical Functioning

* p, .05 two-tailed

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Table 3 Continued

Correlation Matrix for All Variables for Male

Variable	RP 14	GH 15	VT 16	SF 17	RE 18	MH 19	SQIT 20	PSL 21	LAT 22	SDUR 23	DIS 24	DTD 25	SQIC 26
1. Age	-.15	-.05	-.11	-.14	-.02	-.17*	.06	.06	.06	.01	.11	-.01	-.03
2. School	-.09	.10	-.04	-.14	-.05	-.13	-.10	-.04	-.09	-.07	-.09	-.04	-.09
3. GPA	.05	.05	.04	.17*	.08	.15	.07	.02	.08	.11	-.05	.02	.02
4. AP	-.27*	-.50*	-.60*	-.45*	-.39*	-.40*	.31*	.10	.17	.23*	.24*	.48*	.43*
5. AN	-.47*	-.55*	-.66*	-.65*	-.60*	-.71*	.43*	.27*	.31*	.17*	.42*	.45*	.39*
6. IP	-.42*	-.44*	-.53*	-.62*	-.60*	-.61*	.34*	.27*	.29*	.21*	.37*	.30*	.32*
7. DP	-.50*	-.50*	-.60*	-.74*	-.65*	-.70*	.35*	.24*	.27*	.14	.35*	.30*	.33*
8. CP	-.37*	-.30*	-.38*	-.40*	-.50*	-.36*	.33*	.15	.20*	.23*	.28*	.30*	.29*
9. SI	-.41*	-.43*	-.40*	-.52*	-.53*	-.44*	.25*	.20*	.20*	.06	.31*	.14	.26*
10. SA	-.31*	-.27*	-.23*	-.37*	-.40*	-.28*	.19*	.07	.15	.12	.34*	.18*	.17*
11. SE	-.11	.11	-.17*	-.10	-.12	-.02	.07	.03	.03	.21	.24	.29*	.07
12. FP	-.44	-.44	-.48*	-.52*	-.59*	-.46*	.31*	.24*	.26*	.21*	.33*	.30*	.29*
13. PF	.51*	.31	.19*	.32*	.48*	.36*	-.21*	-.18*	-.20*	-.05	-.21	-.19*	-.17*

Note: GPA = Grade Point Average, AP = Academic Problems, AN = Anxiety, IP = Interpersonal Problems, DP = Depression, CP = Career Problems, SI = Suicidal Ideation, SA = Substance Abuse, SE = Self-esteem Problems, FP = Family Problems, PF = Physical Functioning, RP = Role-Physical, GH = General Health, VT = Vitality, SF = Social Functioning, RE = Role-Emotional, MH = Mental Health, SQIT = Pittsburgh Sleep Quality Index Total Score, PSL = Pittsburgh Sleep Quality Index Latency, LAT = Pittsburgh Sleep Quality Index Total Latency, SDUR = Pittsburgh Sleep Quality Index Disturbances, DIS = Pittsburgh Sleep Quality Index Disturbances, DTD =Pittsburgh Sleep Quality Index Daytime Dysfunction, SQIC = Sleep Quality Index Total Score

* *p*, .05 two-tailed

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Table 3 Continued

Correlation Matrix for All Variables for Males

Variable	14	15	16	17	18	19	20	21	22	23	24	25	26
14. RP	—	.34*	.35*	.47*	.65*	.37*	-.18	-.12*	-.11	-.18*	-.34*	-.32*	-.22*
15. GH		—	.48*	.51*	.39	.45*	-.34*	-.18*	-.22*	-.07	-.28*	-.21*	-.28*
16. VT			—	.52*	.41*	.64*	-.36*	-.21*	-.26*	-.16*	-.22*	-.53*	-.32*
17. SF				—	.71*	.67*	-.25*	-.24*	-.22*	-.08	-.29*	-.26*	-.23*
18. RE					—	.62*	-.29*	-.22*	-.19*	-.17*	-.28*	-.31*	-.30*
19. MH						—	-.31*	-.29*	-.32*	-.06	-.24*	-.28*	-.27*
20. SQIT							—	.63*	.70*	.23*	.62*	.40*	.82*
21. PSL								—	.87*	.16*	.41*	.14	.49*
22. LAT									—	.15	.55*	.22*	.51*
23. SDUR										—	.29*	.31*	.15
24. DIS											—	.36*	.54*
25. DTD												—	.30*
26. SQIC													—

Note: RP = Role-Physical, GH = General Health, VT = Vitality, SF = Social Functioning, RE = Role-Emotional, MH = Mental Health, SQIT = Pittsburgh Sleep Quality Index Total Score, PSL = Pittsburgh Sleep Quality Index Latency, LAT = Pittsburgh Sleep Quality Index Total Latency Score, SDUR = Pittsburgh Sleep Quality Index Duration, DIS = Pittsburgh Sleep Quality Index Disturbances, DTD = Pittsburgh Sleep Quality Index Daytime Dysfunction, SQIC = Sleep Quality Index Total Score

* p, .05 two-tailed

The General Health scale of the SF-36v2 was significantly correlated with the Social Functioning scale of the SF-36v2 ($r = .51, p < .000$). The Vitality scale of the SF-36v2 was correlated significantly with the SF-36v2's Social Functioning ($r = .52, p < .000$) and Mental Health ($r = .64, p < .000$). The Social Functioning scale of the SF-36v2 was significantly correlated with the SF-36v2's Role-Emotional ($r = .71, p < .000$) and Mental Health ($r = .67, p < .000$). The Role-Emotional scale of the SF-36v2 was correlated significantly with the Mental Health scale of the SF-36v2 ($r = .62, p < .000$).

Correlations for Female Participants

Table 4 presents the intercorrelations of all the variables for females in the study. Several significant correlations were found and will be highlighted below. The Academic Problems scale of the CAS was correlated significantly with the Anxiety scale of the CAS ($r = .50, p < .000$). The Anxiety scale of the CAS was significantly correlated with the CAS's Interpersonal Problems ($r = .69, p < .000$) and Depression ($r = .76, p < .000$). The Anxiety scale also was correlated significantly with the SF-36v2's General Health ($r = -.54, p < .000$), Vitality ($r = -.64, p < .000$), Social Functioning ($r = -.58, p < .000$), and Role-Emotional ($r = -.66, p < .000$).

The Interpersonal Problems scale of the CAS was significantly correlated with the CAS's Depression ($r = .71, p < .000$). The Interpersonal Problems scale also was correlated significantly with the SF-36v2's Vitality ($r = -.54, p < .000$), Role-Emotional ($r = -.54, p < .000$), and Mental Health ($r = -.57, p < .000$). The Depression

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Table 4

Correlation Matrix for All Variables for Females

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	—	.40*	-.02	-.13	.10	.07	.14	-.06	.03	-.06	-.07	-.03	.25*
2. School		—	.01	-.14	.03	.03	.05	-.09	.08	-.02	.04	.00	-.12
3. GPA			—	-.42*	-.11	.08	-.12	-.09	-.14	-.14	-.03	.00	.12
4. AP				—	.50*	.47*	.34*	.42*	.17*	.31*	.18*	.29*	-.09
5. AN					—	.69*	.76*	.39*	.47*	.30*	.29*	.56*	.31*
6. IP						—	.71*	.39*	.48*	.31*	.25*	.59*	-.19*
7. DP							—	.36*	.59*	.25*	.20*	.53*	-.31*
8. CP								—	.34*	.27*	.22*	.29*	-.11
9. SI									—	.30*	.11	.41*	-.28*
10. SA										—	.10	.23*	-.08
11. SE											—	.25*	-.16*
12. FP												—	.20*
13. PF													—

Note: GPA = Grade Point Average, AP = Academic Problems, AN = Anxiety, IP = Interpersonal Problems, DP = Depression, CP = Career Problems, SI = Suicidal Ideation, SA = Substance Abuse, SE = Self-esteem Problems, FP = Family Problems, PF = Physical Functioning

* p, .05 two-tailed

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Table 4 Continued

Correlation Matrix for All Variables for Females

Variables	RP 14	GH 15	VT 16	SF 17	RE 18	MH 19	SQIT 20	PSL 21	LAT 22	SDUR 23	DIS 24	DTD 25	SQIC 26
1. Age	-.16*	-.19*	-.20*	-.15	.04	-.14	.20*	.12	.10	.12	.23*	.26*	.16*
2. School	-.11	-.06	-.09	.07	.05	.03	.11	.06	.03	-.11	.07	.03	.03
3. GPA	.10	.02	.10	-.03	-.01	.04	-.02	.06	.06-	.10-	.13	-.07	-.07
4. AP	-.28*	-.27*	-.35*	-.24*	-.39*	-.28*	.11	-.17*	-.14	.06	.17	.27*	.15*
5. AN	-.43*	-.54*	-.64*	-.57*	-.66*	-.70*	.37*	.05	.12	.15*	.43*	.36*	.25*
6. IP	-.43*	-.43*	-.43*	-.54*	-.46*	-.57*	.27*	.03	.01	.15*	.31*	.41*	.19*
7. DP	-.43*	-.43*	-.59*	-.55*	-.61*	-.71*	.27*	.08	.12	.13	.32*	.29*	.15*
8. CP	-.33*	-.18*	-.20*	-.22*	-.32*	-.26*	-.04*	-.18*	-.12	.02	.16	.10	-.01
9. SI	-.31*	-.32*	-.31*	-.43*	-.51*	-.51*	.12	-.04	-.03	.09	.12	.09	.05
10. SA	-.17*	-.17*	-.16*	-.16*	-.25*	-.24*	.05	-.03	-.01	.10	.14	.06	.07
11. SE	-.17*	-.17*	-.16*	-.13	-.21*	-.02	-.01	.06	-.11	-.02	-.04	.06	-.03
12. FP	-.39*	-.31*	-.25*	-.44*	-.47*	-.42*	.09	-.04	-.01	.07	.21*	.18*	.02*
13. PF	.61*	.42*	.28	.44*	.37*	.28*	-.10	-.11	-.05	-.04	-.26*	-.07	-.04

Note: GPA = Grade Point Average, AP = Academic Problems, AN = Anxiety, IP = Interpersonal Problems, DP = Depression, CP = Career Problems, SI = Suicidal Ideation, SA = Substance Abuse, SE = Self-esteem Problems, FP = Family Problems, PF = Physical Functioning, RP = Role-Physical, GH = General Health, VT = Vitality,SF = Social Functioning, RE = Role-Emotional, MH = Mental Health, SQIT = Pittsburgh Sleep Quality Index Total Score, PSL = Pittsburgh Sleep Quality Index Latency, LAT = Pittsburgh Sleep Quality Index Total Latency Score, SDUR = Pittsburgh Sleep Quality Index Duration, DIS = Pittsburgh Sleep Quality Index Disturbances, DTD = Pittsburgh Sleep Quality Index Daytime Dysfunction, SQIC = Sleep Quality Index Total Score

* *p*, .05 two-tailed

Table 4 Continued

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Correlation Matrix for All Variables for Females

Variable	14	15	16	17	18	19	20	21	22	23	24	25	26
14. RP	—	.45*	.37*	.49*	.60*	.38*	-.11	.01	.03	.11	.23*	.26*	.16*
15. GH		—	.55*	.48*	.42*	.46*	-.39*	-.13	-.17*	-.17*	-.43*	-.28*	-.33*
16. VT			—	.50*	.52*	.69*	-.39*	-.08	-.12	-.07	-.41*	-.48*	-.36*
17. SF				—	.65*	.66*	-.27*	-.09	-.16*	-.17*	-.48*	-.20*	-.21*
18. RE					—	.65*	-.19*	-.01	-.03	-.06	-.32*	-.18*	-.15*
19. MH						—	-.34	-.08	-.17	-.12	-.42	-.33*	-.28*
20. SQIT							—	.57*	.67*	.27*	.56*	.37*	.81*
21. PSL								—	.88*	.14*	.19	.03	.43*
22. LAT									—	.18*	.32*	.13	.51*
23. SDUR										—	.22*	.25*	.27*
24. DIS											—	.32*	.50*
25. DTD												—	.34*
26. SQIC													—

Note: RP = Role-Physical, GH = General Health, VT = Vitality, SF = Social Functioning, RE = Role-Emotional, MH = Mental Health, SQIT = Pittsburgh Sleep Quality Index Total Score, PSL = Pittsburgh Sleep Quality Index Latency, LAT = Pittsburgh Sleep Quality Index Total Latency Score, SDUR = Pittsburgh Sleep Quality Index Duration, DIS = Pittsburgh Sleep Quality Index Disturbances, DTD = Pittsburgh Sleep Quality Index Daytime Dysfunction, SQIC = Sleep Quality Index Total Score

* *p*, .05 two-tailed

scale of the CAS was significantly correlated with the SF-36v2's Vitality (r = -.59, p < .000), Social Functioning (r = -.55, p < .000), and Role-Emotional (r = -.61, p < .000).

The Role-Physical scale of the SF-36v2 was correlated significantly with the SF-36v2's Role-Emotional (r = .60, p < .000). The General Health scale of the SF-36v2 was significantly correlated with the SF-36v2's Vitality (r = .55, p < .000). The Vitality scale of the SF-36v2 was correlated significantly with the SF-36v2's Role-Emotional (r = .52, p < .000) and Mental Health (r = .69, p < .000). The Social Functioning scale of the SF-36v2 was significantly correlated with the SF-36v2's Role-Emotional (r = .65, p < .000) and Mental Health (r = .66, p < .000). The Role-Emotional scale of the SF-36v2 was correlated significantly with the SF-36v2's Mental Health (r = .65, p < .000).

Results for Hypotheses

In this section the results of the eight hypotheses are presented. The first four hypotheses stated that overall sleep quality would be related to selected scales of the College Adjustment Scales (CAS) and Version 2 of the SF-36 Health Survey (SF-36v2) for males and females. The last four hypotheses indicated that sleep duration would not be related to any of the CAS or SF-36v2 scales for males and females. Because of the number of statistical tests employed, a Bonferroni correction was made. This correction sets the family-wise alpha level for all statistical tests at .05.

Hypothesis 1a for Males

Hypothesis 1a stated that overall sleep quality would be related to selected scales of the CAS for males. Specifically, it was hypothesized that poor sleep quality

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would be related to higher scores on the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), and Self-esteem (SE) scales of the CAS. A multivariate analysis of variance (MANOVA) was conducted to determine this relationship. The results of the overall F test of the MANOVA indicated a significant relationship between Overall Sleep Quality and the scales of the CAS [$F(12, 274) = p < .000$]. Examination of between subjects effects showed that there were significant effects for Anxiety, $F(2, 142) = 13.43, p < .000$; Depression, $F(2, 142) = 10.24, p < .000$; Interpersonal Problems, $F(2, 142) = 9.75, p < .000$; Academic Problems, $F(2, 142) = 10.27, p < .000$; and Self-esteem Problems, $F(2, 142) = 5.31, p < .000$. No significant relationship was found between Overall Sleep Quality and Substance Abuse, $F(2, 142) = 2.23, p < .111$).

Tukey's post hoc tests were performed on all significant findings. All alpha levels for the following were less than .05. Regarding anxiety, poor sleepers scored higher than those with occasional sleep difficulties and good sleepers, and those with occasional sleep difficulties scored higher than good sleepers. Poor sleepers scored higher on Depression than those with occasional sleep difficulties and good sleepers. On Interpersonal Problems, poor sleepers scored higher than those with occasional sleep difficulties and good sleepers, and those with occasional sleep difficulties scored higher than good sleepers. Poor sleepers scored higher on Academic Problems than those with occasional sleep difficulties and good sleepers. On Self-esteem, poor sleepers scored higher than those with occasional sleep difficulties. There were no other significant findings.

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Hypothesis 1b for Females

Hypothesis 1b stated that overall sleep quality would be related to selected scales of the CAS for females. Specifically, it was hypothesized that poor sleep quality would be related to higher scores on the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), and Self-esteem (SE) scales of the CAS. A multivariate analysis of variance (MANOVA) was conducted to determine this relationship. The results of the overall F test of the MANOVA indicated a significant relationship between Overall Sleep Quality and the scales of the CAS [$F(12, 354) = p < .004$]. Examination of between subjects effects showed that there were significant effects for Anxiety, $F(2, 182) = 6.65, p < .002$); Depression, $F(2, 182) = 3.06, p < .049$); Interpersonal Problems, $F(2, 182) = 3.72, p < .026$); and Academic Problems, $F(2, 182) = 3.32, p < .038$). No significant relationship was found between Overall Sleep Quality and Substance Abuse, $F(2, 182) = 2.08, p < .127$), or between Overall Sleep Quality and Self-esteem Problems, $F(2, 182) = .51, p < .600$.

Tukey's post hoc tests were performed on all significant findings. All alpha levels for the following were less than .05. As to Anxiety, both poor sleepers and those with occasional sleep difficulties scored higher than good sleepers. Poor sleepers scored higher on Depression than those with occasional sleep difficulties. On Interpersonal Problems, poor sleepers scored higher than those with occasional sleep difficulties and good sleepers. Those with occasional sleep difficulties scored higher on Academic Problems than good sleepers. There were no other significant findings.

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Hypothesis 2a for Males

Hypothesis 2a stated that overall sleep quality would be related to selected scales of the SF-36v2 for males. Specifically, it was hypothesized that poor sleep quality would be related to lower scores on the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scales of the SF-36v2. A MANOVA was conducted to determine this relationship. Results of the overall F test of the MANOVA indicated a significant relationship between Overall Sleep Quality and the scales of the SF-36v2 [$F(14, 272) = p < .010$]. Examination of between subjects effects showed that there were significant effects for Physical Functioning, $F(2, 142) = 3.23, p < .042$; Role-Physical, $F(2, 142) = 5.50, p < .005$; General Health, $F(2, 142) = 6.97, p < .001$; Vitality, $F(2, 142) = 7.96, p < .001$; Social Functioning, $F(2, 142), p < .021$); Role-Emotional, $F(2, 142) = 8.44, p < .000$; and Mental Health, $F(2, 142), p < .004$.

Tukey's post hoc tests were performed on all significant findings. All alpha levels for the following were less than .05. As to Physical Functioning, poor sleepers scored lower than good sleepers. Poor sleepers scored lower on Role-Physical than those with occasional sleep difficulties and good sleepers. On General Health, poor sleepers scored lower than those with occasional sleep difficulties and good sleepers, and those with occasional sleep difficulties scored lower than good sleepers. Both poor sleepers and those with occasional sleep difficulties scored lower on Vitality than good sleepers. On Social Functioning, poor sleepers scored lower than good sleepers. Poor sleepers scored lower on Role-Emotional than those with occasional

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sleep difficulties and good sleepers. On Mental-Health, both poor sleepers and those with occasional sleep difficulties scored lower than good sleepers. There were no other significant relationships.

Hypothesis 2b for Females

Hypothesis 2b stated that overall sleep quality would be related to selected scales of the SF-36v2 for females. Specifically, it was hypothesized that poor sleep quality would be related to lower scores on the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scales of the SF-36v2. A MANOVA was conducted to determine this relationship. Results of the overall F test of the MANOVA indicated a significant relationship between Overall Sleep Quality and the scales of the SF-36v2 [$F(14, 348) = p < .000$]. Examination of between subjects effects showed that there were significant effects for General Health, $F(2, 180) = 10.68, p < .000$; Vitality, $F(2, 180) = 11.47, p < .000$; Social Functioning, $F(2, 180) = 7.08, p < .001$; Role-Emotional, $F(2, 180) = 3.67, p < .028$; and Mental Health, $F(2, 180) = 7.27, p < .001$. No significant relationship was found between Overall Sleep Quality and Physical Functioning, $F(2, 180) = .29, p < .746$), or between Overall Sleep Quality and Role-Physical, $F(2, 180) = .74, p < .480$.

Tukey's post hoc tests were performed on all significant findings. All alpha levels for the following were less than .05. Regarding General Health, poor sleepers scored lower than those with occasional sleep difficulties and good sleepers, and those with occasional sleep difficulties scored lower than good sleepers. Poor sleepers scored lower on Vitality than those with occasional sleep difficulties and good

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sleepers, and those with occasional sleep difficulties scored lower than good sleepers. On Social Functioning, poor sleepers scored lower than those with occasional sleep difficulties and good sleepers. Poor sleepers scored lower on Role-Emotional than those with occasional sleep difficulties and good sleepers. On Mental-Health, poor sleepers also scored lower than those with occasional sleep difficulties and good sleepers.

Hypothesis 3a for Males

Hypothesis 3a stated that sleep duration would not be related to any CAS scales for males. A MANOVA was conducted to determine this relationship. As predicted, the overall F test [$F(27, 377) = 1.39, p < .095$] found no significant relationship between Sleep Duration and CAS scales. As the overall F test showed no significant difference between variables, no further analyses were warranted.

Hypothesis 3b for Females

Hypothesis 3b stated that sleep duration would not be related to any CAS scales for females. A MANOVA was conducted to determine this relationship. As predicted, the overall F test [$F(27, 488) = 1.11, p < .326$] found no significant relationship between Sleep Duration and CAS scales. Because the overall F test showed no significant difference between variables, no further analyses were warranted.

Hypothesis 4a for Males

Hypothesis 4b stated that sleep duration would not be related to any SF-36v2 scales for males. A MANOVA was conducted to determine this relationship. As predicted, the overall F test [$F(21, 388) = 1.11, p < .340$] found no significant

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relationship between Sleep Duration and SF-36v2 scales. No further analyses were warranted since the overall F test showed no significant difference between variables.

Hypothesis 4b for Females

Hypothesis 4b stated that sleep duration would not be related to any SF-36v2 scales for females. A MANOVA was conducted to determine this relationship. As predicted, the overall F test [$F(21, 497) = 1.12, p < .323$] found no significant relationship between Sleep Duration and SF-36v2 scales for females. As the overall F test showed no significant difference between variables, no further analyses were warranted.

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CHAPTER 4

DISCUSSION

The focus of the current study was to examine the relationship between college students' sleep quality and duration and their adjustment to college and physical/mental health. Hypotheses were narrowed to specify the relationships between sleep quality and duration and selected scales of the College Adjustment Scales (CAS) and between sleep quality and duration and selected scales of Version 2 of the SF-36 Health Survey (SF-36v2).

This chapter begins with a broad overview, which is followed by a discussion of the eight formal hypotheses. A general discussion that highlights significant findings and implications of the results of the hypotheses is presented next. Limitations of the study are then discussed, which are followed by suggestions for future research.

General Overview

Overall, the results indicate that for male students, there is a significant relationship between sleep quality and all of the predicted scales of the CAS except Substance Abuse. A relationship also was found for males between sleep quality and all of the predicted scales of the SF-36v2. For females, the results indicate that there

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is a significant relationship between sleep quality and all of the predicted scales of the CAS except for Substance Abuse and Self-esteem Problems. A significant relationship also was found between all the predicted scales of the SF-36v2 except for Physical Functioning and Role-Physical.

In general, it was found that male students who have poor sleep quality have higher levels of anxiety, depression, interpersonal problems, academic problems, and self-esteem problems. Male students who have poor sleep quality rate themselves as having lower levels of personal health and have more limitations in physical health due to physical problems. They also have more limitations in usual role activities due to physical health problems, higher levels of fatigue, more limitations in social activities due to physical or emotional problems, more limitations in usual role activities due to emotional problems, and higher levels of psychological distress. Female students who have poor sleep quality have higher levels of anxiety, depression, interpersonal problems, and academic problems. Additionally, female students who have poor sleep quality rate themselves as having lower levels of personal health and have higher levels of fatigue. They also have more limitations in social activities due to physical or emotional problems, more limitations in usual role activities due to emotional problems, and higher levels of psychological distress.

The relationship between college students' sleep duration and their adjustment to college and physical/mental health was not significant. These results are consistent with previous findings that indicate sleep quality is more important than sleep length in many areas of human functioning (Pilcher et al., 1997).

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Discussion of Specific Results

Interpretation of Hypothesis 1a for Males

Hypothesis 1a stated that overall sleep quality would be related to selected scales of the CAS for males. Specifically, poor sleep quality will be related to higher scores on the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), and Self-esteem Problem (SE) scales.

The results show that the more sleep difficulties male students experience the more anxiety they report. This relationship was true for each sleep category, as poor sleepers reported higher levels of anxiety than those with occasional sleep difficulties (OSD), and those with OSD reported higher levels of anxiety than good sleepers. Students having high scores on Anxiety indicate that they may be experiencing muscle tension; increased vigilance of their environment; autonomic hyperactivity, such as rapid and shallow respiration; and excessive concerns about real or expected life events that might be experienced as intrusive and unwanted thoughts (Anton & Reed, 1991). These findings are consistent with previous research indicating that sleep problems are associated with anxiety (e.g., Alapin et al., 2000; McCann & Stewing, 1987). The relationship between poor sleep and anxiety is probably related to excessive worry that interferes with sleep-onset as well as maintaining sleep throughout the night. Because both anxiety (e.g., Jean-Louis et al., 1998) and poor sleep (e.g., Lack, 1986) have been linked to lower academic performance, most poor sleeping, anxious students may have significant difficulties meeting academic and other demands of the university environment. These students may have difficulties focusing on academic work due to problems concentrating from the combined

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negative impact of poor sleep and anxiety. They also may have problems adjusting socially due to anxiety in interpersonal situations.

Results indicate that poor sleeping male students have higher levels of depression than those with OSD as well as good sleepers. Students scoring high on Depression suggest that they are easily or chronically fatigued, have loss of interest or pleasure in normally enjoyable activities, have feelings of sadness and hopelessness, and withdraw or isolate from others (Anton & Reed, 1991). These findings corroborate previous ones that depression is related to poor sleep (e.g., Jean-Louis et al., 1998). Results indicate that male students having sleep problems also may be experiencing high levels of depression.

The results show that increased incidences of sleep difficulties are directly related to level of interpersonal problems. For each sleep category, as sleep quality decreased, interpersonal problems increased. Poor sleepers reported more interpersonal problems than those with OSD, and those with OSD reported more interpersonal problems than good sleepers. Students scoring high on Interpersonal Problems may have excessive dependence on others and increased vulnerability to the vicissitudes of these relationships and/or a distrustful, argumentative style of relating to others (Anton & Reed, 1991). These results are consistent with prior studies showing that sleep difficulties are associated with interpersonal problems (e.g., Taub & Hawkins, 1979). Such findings indicate that male students with poor sleep quality may be having social adjustment problems. These students may have difficulties relating to others, including peers and professors, which could lead to poor academic

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adjustment. Interpersonal and academic problems may then lead to more sleep difficulties, setting up a cycle that becomes a downward spiral.

Results indicate that poor sleeping male students have higher levels of academic problems than those with OSD and good sleepers. Students scoring high on Academic Problems indicate that they have poor study skills, inefficient use of time, poor concentration, and possibly test anxiety (Anton & Reed, 1991). These results corroborate previous findings indicating that poor sleep quality is related to lower academic performance (e.g., Wolfson & Carskadon, 2003). Such findings suggest that male students with sleep problems may not have developed their study skills, might not make good use of their time, and may have difficulties focusing on class work, all of which could have detrimental effects on academic adjustment. Poor sleep quality could lead to difficulties concentrating and this also might result in academic problems. Moreover, poor sleeping males might experience loss of REM sleep, which also has been associated with learning problems (e.g., Davis, 1985; Hennevin et al., 1995; Schredl et al., 1998).

The relationship between sleep quality and Self-esteem Problems was limited to a difference between students with OSD and poor sleepers, with poor sleepers having more self-esteem problems (Anton & Reed, 1991). Students scoring high on Self-esteem Problems suggest that they have a tendency to be self-critical and dissatisfied with their skills, abilities, or achievement and view themselves as unassertive, excessively sensitive to criticism, or physically or sexually unattractive (Anton & Reed, 1991). However, these findings should be looked at with caution due to low internal consistency of the Self-esteem scale. Results suggest that poor

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sleeping male students might view themselves as being unable to achieve academically and have difficulties acquiring a support system, including peers and instructors.

In summary, findings indicate that poor sleep quality in male college students is related to several components of college adjustment. Poor sleep quality appears to have a negative impact on academic, social, emotional/personal, and institutional adjustment.

Interpretation of Hypothesis 1b for Females

Hypothesis 1b stated that overall sleep quality would be related to selected scales of the CAS for females. Specifically, poor sleep quality will be related to higher scores on the Anxiety (AN), Depression (DP), Substance Abuse (SA), Interpersonal Problems (IP), Academic Problems (AP), and Self-esteem Problem (SE) scales.

Results indicate that both poor sleeping female students and those with OSD have higher levels of anxiety than good sleepers. Compared to good sleeping female students, poor sleepers and those with OSD experience more muscle tension, increased vigilance, higher levels of autonomic hyperactivity, and excessive concerns about life events. Like male students, these findings indicate that most poor sleeping female students experience more anxiety, and this anxiety may lead to difficulties adjusting to the various demands of the university setting. Due to the combined negative effects of poor sleep and anxiety, they may have problems concentrating on academic work, dealing with social relations, and meeting other demands of the college environment.

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The relationship between poor sleep quality and the Depression scale was limited to a difference between female students with OSD and poor sleepers, with poor sleepers having higher levels of depression. These findings indicate that poor sleeping female students may be easily or chronically fatigued, may have lost interest or pleasure in enjoyable activities, might have feelings of sadness and hopelessness, and may withdraw or isolate from others. Results indicate that female students with poor sleep and high levels of depression may have significant difficulty meeting academic demands due to chronic fatigue, loss of interest in academic work and other activities, and feelings of hopelessness.

Results indicate that poor sleeping female students have more interpersonal problems than those with OSD as well as good sleepers. Findings indicate that female students with poor sleep may be having social adjustment problems. Results indicate that they might have excessive dependence on others and/or a distrustful, argumentative style in social situations. They may have poor academic adjustment because of difficulties relating to peers and professors. Interpersonal and academic problems may then result in more sleep difficulties, which sets up a cycle that becomes a downward spiral.

The relationship between poor sleep quality and Academic Problems was limited to a difference between female students with OSD and good sleepers, with females having OSD experiencing more academic problems. Female students with OSD appear to use their time less efficiently, more often experience test anxiety, and have poorer study skills and more difficulties concentrating. These findings suggest that female students with sleep problems have inadequate study skills, do not make

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good use of time, and have difficulties concentrating on school work, thus creating problems with academic adjustment. Poor sleep quality could result in problems with concentration that also might lead to academic difficulties. Moreover, poor sleeping females may experience loss of REM sleep, which also has been related to problems learning (e.g., Davis, 1985).

In summary, findings indicate that poor sleep quality in female college students is associated with several components of college adjustment. Poor sleep quality appears to have negative effects on academic, social, emotional/personal, and institutional adjustment.

Interpretation of Hypothesis 2a for Males

Hypothesis 2a stated that overall sleep quality would be related to selected scales of the SF-36v2 for males. Specifically, it was hypothesized that poor sleep quality would be related to lower scores on the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scales of the SF-36v2.

The relationship between sleep quality and Physical Functioning was limited to a difference between good sleepers and poor sleepers, with poor sleeping males being more limited in physical health due to physical problems. Low scores on Physical Functioning indicate students are limited in performing physical activities, such as bathing or dressing, while high scores indicate students can perform all types of physical activities, including the most vigorous without limitations due to physical health (Ware et al., 2000). These findings are consistent with previous research indicating that sleep difficulties are associated with physical problems

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(e.g., Finn et al., 1998; Irwin et al., 1996). Results indicate that poor sleep quality may limit male students' capacity to perform essential daily activities, ranging from performing personal hygiene to more strenuous activities such as completing class assignments and studying for examinations. Limitations in physical activities have the potential to negatively impact various components of adjustment, including academic, social, and personal adjustment.

Results show that males with poor sleep quality have more limitations in usual role activities due to physical health problems than those with OSD and good sleepers. Low scores on Role-Physical indicate difficulties with work or other daily activities due to physical problems, while high scores indicate no problems with work or daily activities (Ware et al., 2000). These results corroborate previous ones that limitations in usual role activities are related to poor sleep (e.g., Asplund, 2000; Newman et al., 1997). Findings indicate that male students with poor sleep quality may be having difficulties completing class assignments and other academic requirements, while students with good sleep quality are able to adjust to the academic workload required in a college environment. Poor sleeping males may have problems with activities of daily living, including performing household chores and personal hygiene. Limitations in activities of daily living could then lead to poor academic, social, and personal adjustment.

The results indicate that the more sleep difficulties male students experience, the lower they tend to rate their personal health. This relationship was true for each sleep category, as poor sleepers rated their personal health lower than those with OSD, and those with OSD rated their personal health lower than good sleepers. Low

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scores on General Health indicate that students evaluate their personal health as poor and believe it is most likely to worsen, whereas high scores indicate that students evaluate their personal health as excellent (Ware et al., 2000). These results indicate that good sleeping male students have good personal health, while poor sleepers have health problems that they perceive worsening overtime. This may indicate that physical problems are less likely to hamper good sleepers' adjustment to college, as they should be able to attend classes, complete assignments, and study for examinations without the negative impact of physical health problems. On the contrary, poor sleeping male students appear to have physical problems that have the potential to impair various components of college adjustment. They also appear to view their health getting worse overtime, which has the potential to create stress about completing a college degree. This added stress could lead to more sleep problems that result in more difficulties adjusting to university demands.

Results indicate that both poor sleeping male students and those with OSD have lower levels of energy than good sleepers. Low scores on Vitality indicate that students feel tired all of the time, while high scores indicate students feel full of energy a majority of the time (Ware et al., 2000). The relationship between poor sleep quality and lower levels of energy most likely results from the fact that these male students are not getting adequate sleep. Feeling tired most of the time has the potential to have wide ranging negative effects on college adjustment, including academic, social, personal, and institutional adjustment. Students who feel tired throughout the day are probably less productive academically and most likely have a tendency to avoid interactions with others. They probably lack motivation to meet

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academic demands and to participate in social relations. Because of fatigue, they may have difficulties completing academic tasks, getting up in time for class, going to classes, interacting with peers and instructors, and meeting other demands of university life.

The relationship between sleep quality and Social Functioning was limited to a difference between good sleepers and poor sleepers, with poor sleepers being more limited in social activities due to physical or emotional problems than good sleepers. Low scores on Social Functioning indicate extreme and frequent interference with normal social activities due to physical or emotional problems, while high scores indicate that students perform normal social activities with no interference due to physical or emotional problems (Ware et al., 2000). These findings indicate that poor sleeping male students may have difficulties with social adjustment due to physical and/or emotional problems, while good sleepers are more likely to have a support system that will facilitate their adjustment to college. Males with sleep difficulties appear to have physical and/or emotional problems that interfere with peer and instructor relations, which may lead to social isolation. Social isolation might then result in more sleep problems.

Results indicate that poor sleeping male students have more limitations in usual role activities due to emotional problems than students with OSD and good sleepers. Low score on Role-Emotional indicate problems with work or other daily activities due to emotional difficulties, while high scores indicate no problems with work or other daily activities (Ware et al., 2000). These findings suggest that poor sleep quality is associated with emotional problems and that poor sleeping males with

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emotional problems may be having difficulties completing school assignments, going to classes, waking up in time for classes, and performing other academic requirements. They also may have difficulties performing activities of daily living, including performing household chores and personal hygiene, which could then lead to poor academic, social, and personal adjustment.

The results indicate that both poor sleeping male students and those with OSD have higher levels of psychological distress than good sleepers. Low scores on Mental-Health indicate feelings of nervousness and depression all of the time, while high scores indicate peaceful, happy, and calm feelings all of the time (Ware et al., 2000). These findings indicate that good sleeping male students are adjusting to college without feeling anxious and depressed, while poor sleepers may be experiencing high levels of anxiety and depression. Poor sleep along with anxiety and depression could negatively impact academic, social, and personal adjustment.

In summation, findings suggest that poor sleep quality has negative effects on several dimensions of physical/mental health in college males. Poor sleeping male students appear to be more limited in performing physical activities and usual role activities. They seem to evaluate their health as poor and feel that it will worsen overtime. Results also indicate that they generally feel tired, are more limited in social activities due to physical or emotional problems, and have more limitations in usual role activities due to emotional problems. They also seem to feel anxious or depressed most of the time.

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Interpretation of Hypothesis 2b for Females

Hypothesis 2b stated that overall sleep quality would be related to selected scales of the SF-36v2 for females. Specifically, it was hypothesized that poor sleep quality would be related to lower scores on the Physical Functioning (PF), Role-Physical (RP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scales of the SF-36v2.

Results indicate that the more sleep difficulties female students experience, the lower they tend to rate their personal health. This relationship was true for each sleep category, as poor sleepers rated their personal health lower than those with OSD, and those with OSD rated their personal health lower than good sleepers. Poor sleeping female students appear to evaluate their personal health as poor and believe it is most likely to worsen. Findings indicate that physical problems are less likely to hamper good sleeping female students' adjustment to college, as they should be able to attend classes, complete assignments, and study for examinations without the negative impact of physical health problems. On the other hand, poor sleeping female students may be having physical problems that could impair their academic adjustment. They may have difficulty attending classes, completing assignments, and studying for examinations due to physical limitations. Physical problems also may negatively impact concentration when completing assignments as well as decrease motivation when attempting to perform academic tasks.

The results indicate that increased incidences of sleep difficulties are related to level of energy in females. For each sleep category, as sleep quality decreased, the level of energy decreased. Poor sleeping females rated their level of energy lower

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than those with OSD, and those with OSD rated their level of energy lower than good sleepers. Findings indicate that poor sleeping female students feel tired most of the time. Feeling tired most of the time has the potential to have negative effects on several dimensions of college adjustment, including academic, social, personal, and institutional adjustment. Female students who feel tired throughout the day are probably less productive academically and most likely have a tendency to avoid interactions with others. Due to a lack of energy, they may have difficulties performing academic assignments, getting up in time for class, attending classes, interacting with peers and instructors, and meeting other demands of university life.

Results show that female students with poor sleep are more limited in social activities due to physical or emotional problems than those with OSD as well as good sleepers. Findings suggest that poor sleeping female students may experience extreme and frequent interference with normal social activities due to physical or emotional problems. Poor sleepers appear to have difficulties with social adjustment because of physical and/or emotional problems, while good sleepers are more likely to have a support system that facilitates their adjustment to college. Physical and/or emotional problems may interfere with peer and instructor relations, which might result in social isolation. Social isolation might then lead to more sleep problems.

The results indicate that poor sleeping female students have more limitations in usual role activities due to emotional problems than those with OSD and good sleepers. Poor sleeping female students may have problems with work or other daily activities due to emotional difficulties. They may be having difficulties completing academic assignments, attending classes, waking up in time for classes, and

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performing other academic requirements. They also might have problems accomplishing activities of daily living, including performing household chores and personal hygiene, which could then lead to poor academic, social, and personal adjustment.

Results show that poor sleeping female students have higher levels of psychological distress than those with OSD and good sleepers. Female students with poor sleep appear to experience nervousness and depression most of the time. These findings may indicate that good sleeping female students are not feeling overly anxious and depressed, while poor sleepers may be experiencing high levels of anxiety and depression. Poor sleep together with anxiety and depression could have a detrimental impact on academic, social, and personal adjustment.

In summary, poor sleep quality in female students appears to have a negative impact on several components of mental/physical health. Findings indicate that female students with poor sleep quality rate their personal health as poor, feel tired most of the time, and experience frequent interference with normal social activities due to physical or emotional problems. They also appear to have problems with academic work and other daily activities due to emotional problems and experience anxiety and depression a majority of the time.

Interpretation of Hypothesis 3a for Males

Hypothesis 3a stated that sleep duration would not be related to any CAS scales for males. Results indicate that there is not a significant relationship between any of the CAS scales and sleep duration. These findings indicate that sleep duration is not associated with college males' level of anxiety, depression, or substance abuse.

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Sleep length also does not appear to contribute to interpersonal, academic, or self-esteem problems. Given these findings, no component of college adjustment appears related to sleep duration in college males. This is consistent with some prior research that indicates sleep quality is more important to various areas of human functioning than sleep length (Pilcher et al., 1997). Contrary to popular beliefs, sleep duration does not appear to be important for male student college adjustment.

Interpretation of Hypothesis 3b for Females

Hypothesis 3b stated that sleep duration would not be related to any CAS scales for females. Findings indicate that there is no significant relationship between any of the CAS scales and sleep duration. Results indicate that sleep duration is not related to college females' level of anxiety, depression, or substance abuse. Sleep length also does not appear to contribute to interpersonal, academic, or self-esteem problems. Based on these findings, no dimension of college adjustment appears related to sleep duration in college females. Similar to males, sleep quality in females appears more important than sleep length to various areas of human functioning including adjustment to college demands.

Interpretation of Hypothesis 4a for Males

Hypothesis 4a stated that sleep duration would not be related to any SF-36v2 scales for males. The results indicate that there is not a significant relationship between any of the SF-36v2 scales and sleep duration. These findings indicate that sleep duration is not associated with limitations in performing physical activities and usual role activities in college males. Sleep duration also does not appear to

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contribute to negative self-evaluations of physical health or level of energy. Additionally, sleep duration does not appear to be associated with limitations in social activities due to physical or emotional problems, limitations in usual role activities due to emotional problems, or elevated levels of anxiety or depression. Given these findings, no component of physical/mental health appears related to sleep duration in college males. This is consistent with previous research that indicates sleep quality is more important to various areas of human functioning than sleep length (Pilcher et al., 1997). Findings of this study indicate that sleep duration does not impact areas of health as measured by the SF-36v2. However, the results of this study do not indicate for certain that sleep duration does not impact other domains of health.

Interpretation of Hypothesis 4b for Females

Hypothesis 4b stated that sleep duration would be not related to any SF-36v2 scales for females. Results indicate that there is no significant relationship between any of the SF-36v2 scales and sleep duration. These findings indicate that sleep duration is not associated with limitations in performing physical activities and usual role activities in college females. Sleep duration also does not appear to contribute to negative self-evaluations of physical health or level of energy. Additionally, sleep duration does not appear to be related to limitations in social activities due to physical or emotional problems, limitations in usual role activities due to emotional problems, or elevated levels of anxiety or depression. Based on these findings, no component of physical/mental health appears to be related to sleep duration in college females. Results of this study indicate that sleep duration is not negatively related to

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components of health assessed by the SF-36v2. Nevertheless, these findings do not indicate for sure that sleep duration is not associated with other dimensions of health.

In summation, findings from this study indicate that sleep duration is not related to college adjustment or physical/mental health. These results were found for both male and female college students. Sleep length does not appear to be associated with limitations in performing physical or usual role activities, self-evaluations of personal health, level of energy, limitations in social activities due to physical or emotional problems, limitations in usual role activities due to emotional problems, or level of anxiety or depression. Given these findings, sleep duration does not appear to contribute to academic, social, personal/emotional, or institutional adjustment.

Implications

Poor sleep quality appears to be associated with several components of college adjustment. While a few studies have shown that poor sleep quality and inconsistent sleep/wake habits are related to lower academic performance, research examining the relationship between sleep problems and various components of college adjustment is lacking. Additional studies that investigate impact of sleep difficulties on college adjustment will increase this limited knowledge base. The present study corroborated previous research on sleep and academic performance and explored other dimensions of college adjustment.

Examination of the overall results of this study shows that poor sleep quality was related to several components of college adjustment and physical/mental health. These findings support the results of previous studies (Wolfson & Carskadon, 2003) that indicate poor sleep quality is related to lower academic performance. The current

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study brings new information about other dimensions of adjustment that can be used to help college students with adjustment difficulties and sleep problems.

Current findings have a number of practical implications for sleep and adjustment problems in college students. First, mental health professionals working with college students that present with academic, social, or personal/emotional adjustment problems and/or physical health problems should assess for sleep disorders, such as insomnia and/or poor sleep quality. Adjustment or physical/mental health problems might be related to poor sleep quality and/or a sleep disorder. Students with sleep disorders should be offered empirically supported sleep interventions. Second, college students should be informed that poor sleep quality might be related to academic, social, and/or emotional/personal adjustment problems as well as physical health problems. Third, attempts should be made to identify students who are at risk for poor sleep quality in order to prevent possible development of adjustment and/or physical health problems. Students could be given sleep questionnaires, adjustment scales, and general health surveys during orientation or seminar classes. This information can be collected in less than 30 minutes, and interpretation of the results requires minimal training. Thus, assessment of college adjustment as well as sleep quality and habits is inexpensive and very practical. Fourth, sleep problems, including poor sleep quality, might be related to psychopathologies, including mood and/or anxiety disorders. Students with psychopathology should be offered empirically supported interventions designed to treat those disorders. Fifth, students with sleep problems and adjustment difficulties without psychopathologies should be offered non-clinical interventions, such as

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regular exercise or sleep hygiene education in order to develop consistent sleep/wake schedules and improve sleep quality. Due to the high prevalence of sleep problems in the college population, sleep hygiene education could be offered to all students during orientation. Sleep hygiene education might be presented at seminars that are scheduled between regular classes.

Limitations

Several limitations may have influenced the results of this study. The sample may limit generalizing the results to different populations. Students in this study included predominately undergraduates attending a midsize university in the southeastern part of the United States. Because ethnic diversity is restricted in the geographical area, the sample largely consisted of European Americans. Over 90% of the participants ranged in age from 18 to 24 years. Given the nature of the sample, findings from this study should not be generalized to individuals of other age groups, ethnic backgrounds, or educational levels.

Limitations also related to the instruments used. First, data used in this study were collected with self-report measures. Consequently, information collected from students was retrospective and subjective. Additionally, all participants may not have answered truthfully, and random or dishonest responses are difficult to pinpoint in every case. Nevertheless, surveys were reviewed and efforts were made to eliminate those that were clearly unsuitable for analyses (e.g., failing to complete items, responding identically to all items). Second, studies examining the reliability and validity of the Sleep Quality Index (SQI) and the Sleep Habits Questionnaire (SHQ) are limited. However, lack of extensive examination of the psychometric properties of

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these instruments may not be entirely problematic. SQI questions are directly related to elements of sleep quality. SHQ items consist of direct questions about sleep habits and patterns, and no composite score is obtained because items are examined separately.

Another limitation might be the time frame it was conducted, 2 weeks before the end of the term. College students may show variations in sleep quality, duration, and habits throughout the quarter or semester. For example, sleep quality and duration may decrease toward the end of the quarter due to final examination preparation. While final examinations are usually given during the last week of a quarter, some students prepare for these examinations two or three weeks in advance. Therefore, results of this study may not generalize to the beginning, middle, or last week of a quarter or semester. Additionally, the study was conducted in the month of May when days and nights are similar in length. Studies performed during other times of the year, such as winter months when days are shorter than nights, might have different outcomes.

Finally, because this study is correlational in nature, causation cannot be implied. While poor sleep quality was related to various components of college adjustment and physical/mental health, it cannot be said that poor sleep quality causes adjustment and/or mental/physical health problems or that adjustment and/or mental/physical health problems cause poor sleep quality. The relationship may be in the opposite direction or bidirectional or may be caused by another variable.

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Suggestions for Future Research

Although this study has limitations, findings indicate that poor sleep quality is negatively related to several components of college adjustment and physical/mental health. Like this investigation, results of previous research examining sleep and adjustment have been based almost entirely on self-report measures. Future studies should include not only self-report questionnaires but also additional methods of measurement, such as college records, professor ratings, standardized tests, and sleep laboratory recordings. A multi-dimensional approach may provide a comprehensive database that has the potential to be more reliable and valid than information based only on subjective and retrospective self-report data.

Sleep quality has been found to be more important than sleep length in many areas of human functioning (Pilcher et al., 1997). Findings from this study corroborate previous research, as sleep quality rather than sleep duration was significantly related to college students' adjustment and their physical/mental health. Results of this investigation indicate that future studies examining sleep and its impact on other areas of human functioning may be more informative if measures of sleep quality rather than sleep length are used.

Studies have indicated that insomnia (Roberts, Roberts, & Chen, 2002) and delayed sleep phase syndrome (DSPS, Lack, 1986) are associated with daytime sleepiness, morning drowsiness, and problems falling asleep on weeknights. Researchers have suggested that insomnia and DSPS produce poor academic performance. This study found a relationship between poor sleep quality and

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academic problems. However, more research in this area is needed, as there is a lack of well-designed studies to establish these relationships.

Causation cannot be implied with this study because of its correlational nature. Consequently, it remains unclear if poor sleep quality results in adjustment and/or physical/mental problems or if adjustment and/or physical/mental health problems lead to poor sleep quality. A directional relationship might become more evident with process outcome research. Prior to sleep intervention, participants with poor sleep quality could be administered adjustment scales and general health surveys. After sleep quality improves, post treatment adjustment scales and health survey scores could be compared with pretreatment scores.

A major contribution of this study is that it is the first known to demonstrate a relationship between poor sleep quality and components of college adjustment. Thus, it should be replicated to establish a reliable association between the two constructs. It may be that it will prove beneficial, both in terms of research and education/intervention, to focus more on sleep quality than quantity, which has been the case to date.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL

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LOUISIANA TECH
UNIVERSITY

OFFICE OF UNIVERSITY RESEARCH

MEMORANDUM

TO: Dr. Walter Buboltz, Dr. Lamar Wilkinson, Robert Krenek

FROM: Nancy Fuller, University Research

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: 5/03/05

In order to facilitate your project, an EXPEDITED REVIEW has been done for your proposed study entitled:

"The Impact of Sleep on College Student Adjustment"
Proposal # HUC-165

The proposed study's revised procedures were found to provide reasonable and adequate safeguards against possible risks involving human subjects. The information to be collected may be personal in nature or implication. Therefore, diligent care needs to be taken to protect the privacy of the participants and to assure that the data are kept confidential. Informed consent is a critical part of the research process. The subjects must be informed that their participation is voluntary. It is important that consent materials be presented in a language understandable to every participant. If you have participants in your study whose first language is not English, be sure that informed consent materials are adequately explained or translated. Since your reviewed project appears to do no damage to the participants, the Human Use Committee grants approval of the involvement of human subjects as outlined.

Projects should be renewed annually. This approval was finalized on May 2, 2005 and this project will need to receive a continuation review by the IRB if the project, including data analysis, continues beyond May 2, 2006. Any discrepancies in procedure or changes that have been made including approved changes should be noted in the review application. Projects involving NIH funds require annual education training to be documented. For more information regarding this, contact the Office of University Research.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of

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the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Research or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

If you have any questions, please contact Dr. Mary Livingston at 257-4315.

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APPENDIX B

HUMAN SUBJECTS CONSENT FORM

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HUMAN SUBJECTS CONSENT FORM

Group Format

The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.

TITLE: The Impact of Sleep on College Student Adjustment

PURPOSE: To gather information about the impact of sleep on college student adjustment.

PROCEDURES: Completion of the survey packet

RISKS/ALTERNATIVE TREATMENTS: None

BENEFITS/COMPENSATION: There will be no benefits or compensation for participants.

I attest with my signature on the attached page that I have read and understood the above description of the study, "The Impact of Sleep on College Student Adjustment," and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon my request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participation in this study.

CONTACT INFORMATION: The principal experimenters listed below may be reached to answer questions about the research, participants' rights, or related matters:

Dr. Walter C. Buboltz	257- 4039
Dr. Lamar Wilkinson	257- 2449

The Human Subjects Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:

Dr. Mary Livingston	257- 2292
Dr. Les Guice	257- 3056

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APPENDIX C

DEMOGRAPHIC QUESTIONNAIRE

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Demographic Questionnaire

Please provide the following information by filling in the blank or circling the appropriate answer.

A. Age in years: _____

B. Gender: M F

C. Current year/status in school? Freshman Sophomore Junior Senior Graduate Student Other

D. With which ethnic group do you most identify?
1. African American
2. Asian American
3. Caucasian American
4. Hispanic/Latino
5. Native American
6. Other

E. Current Major (if any) or Undecided:

_____

F. Grade Point Average (G.P.A.) for the last year of school you completed:

_____

G. Is your vision corrected with glasses or contact lenses? Y N

H. Which hand do you write with? Right Left

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APPENDIX D

SLEEP QUALITY INDEX

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Sleep Quality Index

Please answer the following questions to the best of your ability by circling the response that best fits you. If unsure, please give your best guess.

1. Time to fall asleep

   <10 min 11-30 min >30 min

2. Suffered from insomnia during the past 3 months

   No <3 days/week 3-7 days/week

3. Difficulties falling asleep during the past 3 months

   No <3 days/week 3-7 days/week

4. Disturbed night sleep during the past 3 months

   No <3 days/week 3-7 days/week

5. Nocturnal awakenings during the past 3 months

   No <3days/week 3-7 days/week

6. Tiredness in the morning

   Very or Mostly Alert Don't Know Very or Mostly Tired

7. Wake up too early in the morning during the past 3 months

   No <3days/week 3-7 days/week

8. Use of sleeping medication during the past 3 months

   No Occasionally At least once per week

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APPENDIX E

PITTSBURGH SLEEP QUALITY INDEX

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Pittsburgh Sleep Quality Index

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? _____
2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night? _____
3. During the past month, when do you usually awake in the morning? _____
4. During the past month, how many hours of actual sleep do you get at night? _____

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

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

(a) Cannot get to sleep within 30 minutes
Not during the past month _____
Less than once a week _____
Once or twice a week _____
Three or more times a week _____

(b) Wake up in the middle of the night or early morning
Not during the past month _____
Less than once a week _____
Once or twice a week _____
Three or more times a week _____

(c) Have to get up to use the bathroom.
Not during the past month _____
Less than once a week _____
Once or twice a week _____
Three or more times a week _____

(d) Cannot breathe comfortably._____
Not during the past month _____
Less than once a week _____
Once or twice a week _____
Three or more times a week _____

(f) Feel too cold.
Not during the past month _____
Less than once a week _____
Once or twice a week _____
Three or more times a week ___

(g) Feel too hot.
Not during the past month _____
Less than once a week _____
Once or twice a week _____
Three or more times a week ___

(h) Had bad dreams.
Not during the past month _____
Less than once a week _____
Once or twice a week _____
Three or more times a week____

(i) Have pain.
Not during the past month _____
Less than once a week _____
Once or twice a week _____
Three or more times a week____

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(e) Cough or snore loudly.
Not during the past month_____
Less than once a week_____
Once or twice a week _____
Three or more times a week _____

(j) Other reasons for sleep difficulties, please describe___
_____
Not during the past month _____
Less than once a week _____
Once or twice a week_____
Three or more times a week____

6. During the past month, how would you rate your sleep quality overall?
Very Good _____
Fairly Good ____
Fairly Bad _____
Very Bad _____

8. During the past month, how often have you had trouble staying awake? while driving, eating meals, or engaging in social activities?
Not during the past month _____
Less than once a week _____
Once or twice a week_____
Three or more times a week____

7. During the last month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?
Not during the past week_____
Less than once a week _____
Once or twice a week_____
Three or more times a week____

9. During the past month, how much of a problem has it been for you to keep up? enthusiasm to get things done?
Not during the past month ____
Less than once a week _____
Once or twice a week _____
Three or more times a week ___

Please answer the three following questions for your sleep last night.
1. What time did you go to sleep last night? _____
2. What time did you wake up today? _____
3. How many hours of sleep did you get last night? _____

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APPENDIX F

SLEEP HABITS QUESTIONNAIRE

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Sleep Habits Questionnaire

Please answer the following questions by filling in the blank.

1. During the week, what time do you usually fall asleep? _____
2. During the week, what time do you usually wake up? _____
3. On the weekend, what time do you usually fall asleep? _____
4. On the weekend, what time do you usually wake up? _____
5. During the week, what is your average amount of sleep each night? _____
6. During the weekend, what is your average amount of sleep each night? _____
7. Ideally, I would like to get ____hours of sleep each night during the week.
8. Ideally, I would like to get ____hours of sleep each night during the weekend.
9. It usually takes me about ____minutes to fall asleep on a weeknight.
10. It usually takes me about ____minutes to fall asleep on a weekend night.

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