"FEELIN' THE BLUES": A SURVEY OF DEPRESSION AMONG MEDICAL AND DENTAL STUDENTS AT OREGON HEALTH SCIENCES UNIVERSITY

by
Asha P. Subramanian

A MASTER'S THESIS

Presented to the Department of Public Health and Preventive Medicine

and the Oregon Health Sciences University

School of Medicine

in partial fulfillment of the

requirements for the degree of

Master of Public Health

June 2000

School of Medicine
Oregon Health Sciences University

CERTIFICATE OF APPROVAL

This is to certify that the M.P.H. thesis of

Asha P. Subramanian

has been approved

[redacted]
Professor in charge of thesis

[redacted]
Member

[redacted]
Member

[redacted]
Member

TABLE OF CONTENTS

Acknowledgements

I would like to extend my deepest regards to Dr. Tom Becker, without whose insight, energy and positive reinforcement this project (and my graduation from medical school) would not have been possible. Many thanks as well to the rest of my enthusiastic thesis committee: Dr. Cindy Morris, Dr. Mark Kaplan, and Dr. Jodi Lapidus, my omniscient statistical advisor. Through countless email messages and meetings, they challenged me to look beyond the data in order to truly understand the "big picture." I also would like to thank Dr. Nora Cromley of the Oregon Health Sciences University School of Dentistry and Vicki Fields of the Dean's Office, School of Medicine, for providing demographic data on their students. I appreciated the input of the Curriculum Committee of the School of Medicine and Dr. Mike Garland. Without Sarah Maitre, my kind and accurate data entry assistant, this project would never have been completed. Many thanks to the OHSU Tartar Trust Foundation for their financial support through the Tartar Trust Fellowship. Finally, to my greatest supporters throughout this process: my epidemiology "partner-in-crime" Beth Brown, my computer whiz/cheerleader/best man Rajan Gupta, Jaime and Jenny Delcampo, and my family and friends, who have waited for this day for too long.

Abstract

Context: Graduate health professional education is well-known for its academic and mental rigors. One of the most important personal health concerns in a stressful work environment is the ability to function at an intellectual and physical capacity necessary for that role. By the estimates of the National Institute of Mental Health (1999), 17.6 million Americans suffer from depression each year, or 1 in 10 adults, with the highest incidence in those between 25 and 44 years of age. The evidence suggests that graduate health professions students are at an increased risk of depression as compared to the general population.

Objective: To establish the prevalence of depressive symptoms (and probable clinical depression) among medical and dental students at the Oregon Health Sciences University (OHSU)

Materials and Methods:

Design: cross-sectional prevalence survey

Study Population: all medical and dental students at OHSU (n=687)

Survey Instruments: the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item structured self-report scale designed to measure depressive symptoms, and thereby probable clinical depression, in the general population. A demographic questionnaire was also designed.

Results: Three hundred sixteen (316) students at OHSU completed and returned the survey, for an overall response of 46%. Of this total response group, approximately 67% (213) were medical students, and 33% (103) were dental students. Three hundred five (305) students were included in the final analysis. One-way ANOVA analysis of the differences in respondent

characteristics by degree program and one-way ANOVA of the CES-D depression score by each respondent characteristic revealed no significant differences other than a difference in mean depression score by age ($p<0.03$). Students who were 30 years or older scored higher on the CES-D. With a CES-D cutoff score of 16 or greater, an elevated level of depression existed by all respondent characteristics, particularly in those 30 years of age or older, females, undecided students, 3rd year students, those without children and in those without confidantes. Overall, the percent of student respondents scoring 16 or greater on the CES-D scale was 30.2%. A binomial logistic regression model of the CES-D depression score was also constructed using gender, degree program, year in school and number of confidantes as independent variables. From this analysis, third-year medical and dental students were twice as likely to be depressed as compared to fourth-year medical and dental students (OR=2.18; 95% CI=1.07, 4.46). Women were twice as likely as men to be depressed (OR=1.90; 95% CI=1.13, 3.19). Students without a confidante were 3 times as likely to be depressed as those with 1 or more confidantes (OR=2.96, 95% CI=1.18-7.42). Degree program as well as first and second-year student status did not show a significant effect.

Conclusion: Probable clinical depression among medical and dental students at Oregon Health Sciences University is common and persistent. These results point to potential "vulnerable" periods during the course of training, particularly during the third year of training for medical and dental students and for women students. The presence of 1 or more confidantes was found to be strongly protective. Our research points to the need for increased awareness of mental health issues and initiation of preventive mechanisms, including social support networks, in a timely fashion during the graduate health professions curriculum.

Précis

I have always been interested in mental health issues. Perhaps this curiosity stems from growing up in an East Indian culture in which mental health was whispered about in corners. If people wanted to seek help in this milieu, they had to somatosize in order to gain entry: statements like "my head hurts all the time" were the proper and the only ticket to the physician's door. When I entered the medical profession, it felt in many ways like "deja vu." A sort of hypocrisy abounded, even from day one.

According to the medical establishment, the focus of the new American medicine was on holistic, patient-centered health care. "Listen to your patients' stories no matter what time of day or night," "never act as if you are tired" and "make the patient feel as if you are spending a lot of time with him or her even if you have three people lined up outside your door," were mantras chanted on a daily basis. But in this subculture of medicine, where the highest calling seemed to be to always give, who would replenish the health care provider's own spiritual and mental reservoirs? How could we truly practice "patient-centered health care" on a daily basis without burning out? Weren't we allowed to be human, too? As I progressed onto the clinical years, I saw what "being the ultimate physician" meant. Often, it meant being available at all hours, every day or night. In some specialties, valor equaled how many hours one could go without sleep, food, sitting down or a mental break. Even as students, statements such as "I only slept three hours last night," or "I haven't had a day off in two weeks" were already worn like badges of honor. In general, medical students were encouraged to go to faculty with questions about pulmonary physiology and renal diseases, but little was openly said about what to do if we had any personal difficulties. As in my youth, student mental health issues echoed behind closed doors, often as rumors.

From these years of observation and anecdotal experience, an idea for my MPH thesis project began to emerge. I was interested in how the students undergoing medical school

training, widely known to be one of the most rigorous courses of study in the United States, felt about their own experiences. Were they coping, and if so, how? Why did some individuals have an easier time in this course of study than others? Did medical school self-select for a certain "hardy" personality? And more importantly, what were some ways intervention could occur before problems spun out-of-control?

Thus, I began my exploration of the well-being of future health professionals. Obviously, for personal and professional reasons, I was very interested in the empirical examination of medical students' well-being and mental health. But who else might be an interesting group to study? Dental students at Oregon Health Sciences University, a group of students with similar training standards, seemed to be a perfect choice as a comparison group. Moreover, after perusal of the literature, dental students had been rarely studied, if at all, in this type of research. Thus, I was decided on my study population. Regarding study design, I would have loved to perform a longitudinal survey, as had been done in previous work with medical students. This type of method would best give a true picture of the changing attitudes of students over four years of study, and perhaps more insight into these changes. However, secondary to a lack of financial support and time (as I am concurrently in pursuit of the MD and MPH degrees from Oregon Health Sciences University), I decided to distribute a cross-sectional prevalence survey. The survey consisted of a well known depression scale, the CES-D, as well as a host of social and demographic variables that I thought might correlate with depression and coping with depression (social support, gender, course of study, and so on).

Overall, it has been a difficult road to complete a rigorous and thorough study of the entire medical and dental student populations at Oregon Health Sciences University while in pursuit of my own "rigorous" medical education. Research and clinical schedules are very hard to mix. However, through the support of faculty advisors, family and friends I have seen this project to a satisfying and fruitful completion. I only hope that in the end, some good may come

of this work, particularly to improve the resources available to Oregon health professions students.

I. Introduction

Graduate health professional education is well-known for its academic and mental rigors. This intense stress affects students in a spectrum of ways depending upon individual outlook, psychological makeup and environmental circumstances. One of the most important personal health concerns in a stressful work environment is the ability to function at an intellectual and physical capacity necessary for that role. Among graduate health professions students, this functioning has utmost importance as reduced leisure time, physical exhaustion, "life-and-death" decisions, and the subtleties of patient care begin with early training and continue throughout professional careers.

Unfortunately, both in the educational arena and in society, the stigma which surrounds mental illness persists. Despite increased acceptance of and publicity about mental health issues both by health care providers and the media, quality mental health services remain scarce. Furthermore, even when available, the cost of mental health services (due to lack of insurance coverage) preclude utilization of these services by those who need them most. According to the National Center for Health Statistics, 31.7 million office visits were made to physicians in 1995 for mental disorders, of which 5.1 million were for depression. By the estimates of the National Institute of Mental Health (1999), 17.6 million Americans suffer from depression each year, or 1 in 10 adults, with the highest incidence in those between 25 and 44 years of age. The cost of depression to the nation is staggering. Estimates from 1990 are between $30 and $44 billion; this figure includes 200 million estimated lost work days, decreased worker productivity, and more importantly, psychological distress to the individual. Considering the evidence, graduate health professions students are at an increased risk of depression as compared to the general population.

Overview of Depression:

Although the term "depression" is commonly used to denote a variety of psychological conditions, the clinical diagnosis of depression is more specific. Major depression is a syndrome characterized by mood disturbance plus a variety of psychological and somatic disturbances. The condition causes significant loss of a person's ability to function, but must not be due to bereavement, medical illness or substance abuse. The diagnosis includes depressed mood and feelings of anhedonia (loss of pleasure from activities) for 2 weeks plus five of the following: sleep disturbance; interest/pleasure reduction; guilt/worthlessness; energy decrease; concentration decrease; appetite change; psychomotor agitation/retardation; and suicidality. Although not overtly included in the clinical definition of depression, depending on individuals and their cultural and social milieu (such as the elderly or those from non-Western cultures), depression can also be primarily manifested through somatic complaints such as headaches, stomach pains, muscular weakness or fatigue. Dysthymic disorder is a related condition to major depression in which an individual experiences a chronically depressed mood during most of the day for at least 2 years. Brief periods of normal mood may be present, but for no longer than 2 months. Associated dysthymic symptoms include low self-esteem, feelings of inadequacy, hopelessness, pessimism, guilt, social withdrawal, decreased productivity, low energy and difficulty with concentration and memory (APA, 1994).

It is important to note that our study does not attempt to diagnose clinical depression. Rather, we examine the general prevalence as well as the psychological and social correlates of depression in the graduate health professions student population at Oregon Health Sciences University. Our primary survey instrument, the Center for Epidemiologic Studies Depression Scale (CES-D), is a well-known psychometric tool used to estimate probable clinical depression through the empirical measurement of general depressive symptoms. With this limitation in

mind, please note that we have used the word "depression" as shorthand for "probable clinical depression" in the text.

Background:

Many studies have examined depression during the medical education experience. Zoccolillo, Murphy, and Wetzel (1986), in a prospective study of 304 first- and second-year medical students, found a 12% cumulative incidence of depression during the first two years of medical school. Moreover, the lifetime depression prevalence history in these students up to the second year of medical school was 15%, far greater than the general population prevalence of 5-8% among college-educated 18-to-24 year olds in the same geographic area. Clark and Zeldow (1988) observed that among 121 medical students drawn from another first-year medical school class, at least 12% documented depressive symptoms sometime during the subsequent 3 years per the Beck Depression Inventory (BDI); the median BDI assessment score tripled during the first two years of medical school. In addition, the largest contingent of symptomatic students (25%) clustered near the conclusion of the second year, which is when medical students transition from preclinical to clinical studies. After statistical adjustment, the data showed family history of depression or substance abuse were not implicated as co-morbid factors. Notably, those with extremely high (>21) BDI scores were more likely to leave medical school than their less depressed counterparts. Furthermore, students with the lowest BDI scores performed the best on the NBME Part I exam, which tests material over the first two years of medical education. However, those with BDI scores 21 or higher did not perform significantly worse than those with median-level scores (Clark and Zeldow, 1988). From these results, the authors concluded that depression during medical training was chronic and persistent.

Subsequent studies have supported these initial conclusions. Vitaliano et al. (1988) and Vitaliano, Maiuro, Mitchell and Russo (1989) replicated previous findings on depression among

304 first-year medical students at one institution. These studies also showed that depression was enduring, chronic and specifically heightened in the second year of medical training. Researchers at another institution further explored the relationship of a major psychosocial correlate, sleep disturbance, to subsequent depression. A prospective study of insomnia and subsequent depression in 1,053 male medical students from Johns Hopkins University revealed a 2.0 relative risk of clinical depression, as compared to graduate students, over a 30-year period in those with self-reported sleep disturbances (Chang, Ford, Mead, Cooper-Patrick, and Klag, 1997); the analysis was adjusted for age at graduation, class year, parental history of clinical depression, coffee drinking, and measures of temperament. Rosal et al. (1997), in a four-year longitudinal study of freshmen medical students at the University of Massachusetts, observed that upon entering medical school, students' emotional profile resembled the general population. However, over the four-year course of medical school, depression ratings increased with a peak during Year 2. In that study, the authors also found that women experienced higher depression levels at year 2 although no gender differences were noted at baseline. In an examination of stress, coping, and well-being among 3rd year medical students (Mosley, Perrin, Neral, Dubbert, Grothues, and Pinto, 1994), researchers discovered that probable clinical depression, as measured by the Center for Epidemiological Studies Depression Scale (CES-D), were present in 15/69 (23%) of students. The Wahler Physical Symptoms Inventory also measured high levels of physical distress in 39, or 57% of these students.

Numerous cross-cultural analyses also document the relationship between medical students and depression. Sixty-one (61) of 172 (36%) first-year medical students exhibited psychological distress per the General Health Questionnaire in a study by Guthrie et al. (1995) in the United Kingdom. Other studies in Israel (Carmel and Bernstein, 1987) and Hong Kong (Stewart et al., 1995, 1997) have established the same patterns. Strayhorn (1980), in his

investigation of University of North Carolina Chapel Hill medical students, also reproduced increased depression prevalence among ethnic minority students.

Expanding their work to other graduate students, several researchers, including Clark and Rieker (1986) and Helmers et al.(1997), have examined law students and basic science Ph.D. students. These research findings are mixed. Clark and Rieker discovered that women in both law and medical school experienced increased stress and depression as compared to men. Women cited relationship and personal stress as endemic to their professional training, with the stress often leading to poor personal relationships, breakups and subsequent depression. On the other hand, Helmers et al. concluded that in comparison to law and graduate students, medical students are not particularly vulnerable to depression although they subjectively experience more stress. Williams et al.(1995) have also examined symptoms of depression among female nursing students, who did not exhibit increased stress over a comparison stress management client group.

Thus, among medical students and some other graduate student groups, a variety of well-validated and reliable psychometric measurement tools point to an increased prevalence of depression. From these findings, Zocolillo et al. suggest that widespread depression among medical students may "point to an inadvertent selection factor among admissions committee for depression." Others suggest that

> coping mechanisms that may enable some students to gain admittance to medical school and to succeed in basic science training may be less effective in dealing with the interpersonal issues inherent in clinical training. (Helmers, Danoff, Steinert, Leyton, and Young, 1997, pg. 714).

Surprisingly, although the increased prevalence of depression is well-documented in medical students, little research has been done to examine many of the psychological and social correlates of depression in this group. A large body of literature exists regarding the strong relationship between social support and depression in the general population. However, as far as we know, no work to date explores the relationship between depression in medical students and social factors such as probable career choice, living situation, presence of children in the

immediate family or number of confidantes. Furthermore, it is well-known that dentists have a higher prevalence of depression and incidence of suicide as compared to the general population. However, no study that we know of to date has examined depression and its psychological and social correlates among dental students. Dental students, like medical students, undergo rigorous, "total immersion" basic science and clinical training experiences which lasts for four years. Dental students have equivalent admissions standards to medical students as well.

Few interventions exist at this time to assist graduate health professions students experiencing depression. A survey of 115 hospital training programs indicated that only 39% had mental health program geared specifically towards medical students (Pasnau and Stoessel, 1994). One highly successful program is the University of California at Los Angeles' (UCLA) Mental Health Services for Physicians-in-Training, founded in 1981. A joint effort of the UCLA School of Medicine, the Department of Psychiatry, and the Center for Health Sciences, it provides confidential, easily available and low-cost therapy to both medical students and housestaff. Based on the principles of autonomy, confidentiality, promptness and referral, the Mental Health Services for Physicians-in-Training aims to provide early intervention for medical student mental health issues in order to prevent impairment. Per Pasnau and Stoessel (1994), this program has found a large student clientele and has been successful at evaluation and referral for numerous stress and mental disorders. Prior to the establishment of this program, a full-time member of the teaching staff screened and referred medical students to student health services, University psychiatric services, or to private care. At this time, no such specific medical or dental student mental health service exists at Oregon Health Sciences University, but may be needed.

Our study was designed to identify the prevalence of depressive symptoms among two graduate health professional student populations within the same institution: medical and dental students. Furthermore, it aimed to delineate the relationship, if any, between probable clinical

depression and a variety of psychological and social correlates of depression, many of which have remained unexamined. In this study, a well-validated and reliable instrument, the Center for Epidemiological Studies Depression (CES-D) scale, as well as a demographic questionnaire, was used. We hope that data from this study may increase awareness of depression among medical and dental students at OHSU and beyond, particularly about the characteristics of students who might be at-risk. Moreover, we hope that this study may provide valuable information towards the better utilization of existing mental health services, as well as insight towards development of additional mental health promotion activities, for all medical and dental students.

Objectives/Hypotheses:

Primary Objective:

To establish the prevalence of depressive symptoms among medical and dental students at Oregon Health Sciences University.

Primary Hypotheses:

a) Medical students and dental students will have a high prevalence of depression per the Center for Epidemiologic Studies - Depression (CES-D) scale (>20% prevalence as cited in the literature).

b) Second-year medical students will exhibit the highest prevalence of depression among all medical and all dental students at OHSU.

Secondary Hypotheses:

a) Dental students will have a higher prevalence of depression than medical students (all years).

b) Female students will have a higher prevalence of depression than male students.

c) Older students (those >30 years and above) will experience more depression than younger students (those <30 years).

d) Those who may enter primary care medicine or dentistry will experience more depression than those who may enter specialties.

e) Those who live alone will have a higher prevalence of depression than those who live with a partner or who are married.

f) One or more confidantes will decrease levels of depression.

II. Methods

Study Population

Between March and April 1999, all medical and dental students at the Oregon Health Sciences University were recruited for the study. Medical students were defined as those studying towards the M.D. degree, while dental students pursued a D.M.D. degree; students pursuing a combined medical or dental degree program such as the M.D./Ph.D. or M.D./D.M.D. course were also included in the study population as "combined degree students." Thus, 409 medical students and 278 dental students were available for the study. The two particular groups were chosen as they participate in similarly-structured educational programs at OHSU. Both sets of students must meet rigorous undergraduate/preprofessional training standards and pass comprehensive national science examinations (MCAT or DAT) to gain admission to their respective OHSU graduate programs. Each program offers basic science training in Years 1 and 2 with an opportunity for patient contact from the fall of Year 1. Medical and dental students also experience a similar and significant transition to full-time clinical care during Years 3 and 4.

Survey Instruments

The Center for Epidemiologic Studies Depression Scale (CES-D) is a 20 item, structured self-report scale designed to measure depressive symptoms in the general population (Appendix). It can be completed in 3-5 minutes. The 20 items of the scale are symptoms associated with depression which have been used in previously validated longer scales such as the Beck Depression Inventory. The CES-D is **not** designed for clinical diagnosis, although it is based upon symptoms seen in clinical cases. A clinical diagnosis of major depression would need to be made by a licensed psychiatrist or psychologist. However, a high score (16 or greater) on the CES-D is widely used as a marker for probable clinical depression. The CES-D has been designed for use in studies of the relationship between depression and other variables across population subgroups. The scale has been extensively tested among psychiatric patients, household interview settings, and in medical student populations. The CES-D has also been found to be generalizable among population subgroups, including race, gender, socioeconomic status and age.

The scale has high internal consistency (Cronbach's alpha of 0.85 in the general population; Radloff et al., 1977), test-retest reliability, concurrent validity by clinical and self-report criteria, and construct validity. Major items of depression tested through this instrument include feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. Of note, the questions do not ask about suicidality. Nor do they extensively inquire about the somatic manifestations of depression such as headaches, stomachaches, back pain or fatigue. The possible range of scoring is from 0 to 60, with higher scores indicating more symptoms, weighted by the frequency of occurrence during the past week. For example, the CES-D asks: "How many times in the past week could you not 'get going'?" with response categories "rarely or none of the time," "one time," "occasionally or some of the time" or "most of the time." Thus, the CES-D cutoff score of

16 represents an individual's experience of 75% of the 20 items at least once during the study time period (Radloff, 1977).

The principal investigator also designed a demographic questionnaire to obtain basic information regarding age, gender, degree program, living situation, children, career choice, number of confidantes, and hours of study per day, hours of sleep per day, hours of physical activity per week in order to characterize daily stress levels. Please refer to the Appendix.

The total completion time of the CES-D scale and the demographic questionnaire was approximately 5 minutes. As an incentive, students were also provided a beverage discount coupon ($1 off) at the Oregon Health Sciences University coffee stands. Return of the survey was not necessary to redeem this coupon.

Data Collection

All OHSU medical and dental students were initially alerted to the study in March 1999 through email contact. Study materials were placed in student mailboxes on the same day by the principal investigator with assistance from School of Medicine and Dentistry staff. The simultaneous study start date helped to avoid seasonal depression biases (winter versus summer) and was chosen to fall during a time when students were not approaching or recovering from course examinations. Two weeks after initial survey distribution, students were sent a reminder message through email. A second copy of the packet, minus the coffee incentive coupon, was again placed in mailboxes 6 weeks after the initial distribution. In total, the study time from start to completion was 10 weeks. Per the Oregon Health Sciences Institutional Review Board, the completion and return of the survey served as "implied consent."

Data Management and Analysis

Names and other identifying information were not used in the study. To ensure complete anonymity, we asked students to mail back the survey questionnaire in a pre-stamped security envelope marked as "Mood and Well-Being Survey, OHSU Department of Public Health/Preventive Medicine, CSB 669" through campus mail. As all students are based on campus, campus mail return was a free and easy way for students to return the necessary documents. Upon receipt, all envelopes were opened by the principal investigator and her data entry assistant. All surveys were securely and separately kept in a locked cabinet until completion of the study.

Data were coded and entered into the computer using Microsoft Excel 7.0 software and analyzed using the SPSS 9.0 for Windows statistical package. "Age," "gender," "degree program," "year in school," "career choice," "living situation," "children," and "number of confidantes" were categorically coded; for example, "male" was assigned a "0" while "female" was assigned a "1." Due to small cell sizes, number of confidantes and age categories were collapsed into "6 or more" and "36 or over." Living situation was collapsed into "single" or "living with partner/married." Descriptive analyses, including absolute number and percent total crosstabulations, were performed for each respondent characteristic to characterize the respondent population. Examined respondent characteristics included age, gender, degree program, career choice, living situation, children, and number of confidantes. These descriptive analyses were also performed by degree program. One-way ANOVA analysis was used in two specific ways: 1) to analyze the within-group and between group-differences between students from the two degree programs based on each respondent characteristic; and 2) to study the differences in mean CES-D depression score by each respondent characteristic. A histogram of the CES-D score distribution was constructed, and a descriptive analysis of the absolute number and percent total respondents scoring above the CES-D cutoff of 16 was done. Due to the

skewed distribution of the CES-D scores and lack of meaningful interpretation of a one-unit change in the CES-D score, a binomial logistic regression model was created using 16 or greater on the CES-D as the cutoff score. Gender, degree program, year in school and number of confidantes served as independent variables. The referent categories for each variable were as follows: male students, medical students, fourth-year students, and 1 or more confidantes. The level of significance for all analyses in this study was set at 0.03 to be more stringent in our criteria for rejecting the null hypothesis as many data in this study were not normally distributed.

Sample Size

Power analyses were performed with a maximum 100% response proportion of 409 among medical students and 278 among dental students, as well as fractional percentages of the medical and dental student pools (75%, 50% and 25%). With greater than a 25% student response proportion from each study population, power of the study is 0.99.

Student Body Characteristics

In the 1998-1999 school year, 409 medical students attended OHSU. Of this group, 97 were first-year students, 99 were second-year students, 130 were third-year students, and 83 were fourth-year students. Females comprised 41.2% of first-year medical students (40/97). During the same academic period, 278 dental students attended OHSU (70 students in the 1st, 3rd and 4th years and 68 in the 2nd year dental student class). When compared to the 1998-1999 entering medical student class, females comprised a far lower percentage of the incoming dental student class at 22.9% (16/70). The mean age for both medical and dental students was 25 years.

III. Results

Three hundred sixteen (316) students at the Oregon Health Sciences University completed and returned our survey, for an overall response of 46%. Of this total response group, approximately 67% (213) were medical students, and 33% (103) were dental students. Due to the extremely small number of "combined degree students" (11), this subgroup was eliminated for the purpose of data analysis, thus leaving a total of 305 students for the final analysis. Characteristics of the respondent population are given below (TABLE 1). Medical and dental student respondents were similar to the student body as a whole by age and class year. By gender, more female students responded to our survey as would have been expected by the student body gender distribution.

Table 1. Characterization of OHSU Medical and Dental Student Respondents

Respondent Characteristic	Response Category	Proportion of respondents in each response category
Age	21-25 years: 26-30 years: 31-35 years: 36 years or over:	37.4% 42.3% 13.8% 6.6%
Gender	Male: Female:	51.8% 48.2%
Career Choice	Primary Care: Specialty: Undecided:	62.6% 25.2% 12.1%
Living Situation	Lives alone: Married/with partner:	47.5% 52.5%
Children	Yes: No:	20.7% 79.3%
***Number of Confidantes**	None: One person: 2-3 persons: 4-5 persons 6 or more:	6.9% 18.4% 47.5% 18.5% 7.9%

*data unavailable for 1% of respondents

Considered as a group, student respondents were gender-balanced. One hundred fifty-eight (158/51.8%) of the 305 total respondents were male, while 48.2% (147) were female. When examined by degree program, however, respondent data for both medical and dental students equally overrepresented females. One-hundred ten (110), or 54.5% of medical student respondents were female versus ninety-two (92), or 45.5% male. In other words, 13.3% more females responded to our survey than would have been expected by the distribution of the study population. In contrast, 64.1% (66) dental student respondents were male, and 35.9% (37) of dental student respondents were female (TABLE 2). Among dental students, 13.0% more females responded to our survey than would have been expected.

When the total response pool (66.8% medical students versus 33.2% dental students) was examined by year in school and degree program, fourth-year medical students comprised the largest percent of respondents within the medical school at 28.7% (58). Third-year medical students were next highest at 23.3% (47). First-year medical students were third highest at 27.2% (55). Second-year medical students had the lowest response proportion of all medical students at 20.8% (42), much lower than any other medical student group by year. Among dental students, first-year students had the highest response percent at 31.1% (32), with fourth-year students next at 27.2% (28), second-year students at 22.3% (23), and the lowest response percent among third-year dental students at 19.4% (20) (TABLE 2).

Overall, 62.6% (191) of students showed an interest in a primary care career and 25.2% (77) revealed interest in a specialty-oriented career. Thirty-seven (37) students overall (12.1%) were undecided on career choice. The correlation between career choice and degree program was very high ($p<0.001$) as dental students primarily chose primary care careers (82.5%, 85 total) over a specialty career (12.6%, 13 total) [TABLE 4]. In contrast, while 52.5% (106) of medical students indicated an interest in a primary care career, 31.7% (64) indicated an interest in a

specialty career. Undecided students comprised 15.8% (32) of medical students and only 4.9% (5) of dental students (TABLE 2).

Table 2. Characteristics of Medical and Dental Student Respondents by Degree Program (number and % within degree program)

Respondent Characteristics	Degree Program			One-way ANOVA p-value (by degree program)
Age	**Medicine**	**Dentistry**	**Total**	0.126
21-25 years	72 (35.6)	42 (40.8)	114 (37.4)	
26-30 years	84 (41.6)	45 (43.7)	129 (42.3)	
31-35 years	32 (15.8)	10 (9.7)	42 (13.8)	
36 years and over	14 (6.9)	6 (5.8)	20 (6.6)	
Gender				0.492
Male	92 (45.5)	66 (64.1)	158 (51.8)	
Female	110 (54.5)	37 (35.9)	147 (48.2)	
Year in School				0.305
1st year	55 (27.2)	32 (31.1)	87 (28.5)	
2nd year	42 (20.8)	23 (22.3)	65 (21.3)	
3rd year	47 (23.3)	20 (19.4)	67 (22.0)	
4th year	58 (28.7)	28 (27.2)	86 (28.2)	
Career Choice				0.845
Primary Care	106 (52.5)	85 (82.5)	191 (62.6)	
Specialty Care	64 (31.7)	13 (12.6)	77 (25.2)	
Undecided	32 (15.8)	5 (4.9)	37 (12.1)	

One-hundred forty-five (145) or 47.5% of all respondents were single, while one-hundred sixty (160), or 52.5% were married or lived with a partner. By degree program, medical students were evenly split between the "single" and "married/living with partner" categories. On the other hand, dental students were more likely to be married: fifty-nine (59), or 57.3% married or living with a partner as compared to forty-four (44) or 42.7% single dental students (TABLE 3). Dental students also predominated as the group more likely to have children (TABLE 3) at

33.0% (34). Medical students were less likely to have children at 14.4% (29). The total number of respondents with children was 20.7%. A strong association also existed between the presence of children and degree program ($p<0.001$) [TABLE 4].

The mean and median number of confidantes among both medical and dental students was 2-3 persons, with 48.3% of medical and 48.7% of dental students falling in this category (TABLE 3). Overall, medical students reported more confidantes as compared to dental students. For example, only 12, or 6.0% of medical students respondents reported having "no confidantes" while 9, or 8.9% of dental students indicated themselves as belonging in this category. Similarly, 33 (16.4%) medical students reported having one confidante, while a larger number, 23 (22.8%) dental students indicated the same. Similar percentages of medical and dental student responders said that they had a large network of confidantes at six or more (8.0%/16 and 7.9%/8, respectively).

Table 3. Characteristics of Medical and Dental Student Respondents by Degree Program (number/% within degree program)

Respondent Characteristic	Degree Program			one-way ANOVA p-value (by degree program)
Living Situation	**Medicine**	**Dentistry**	**Total**	0.573
Single	101 (50.0)	44 (14.4)	145 (47.5)	
Married/Lives with Partner	101 (50.0)	59 (19.3)	160 (52.5)	
Children				0.256
Yes	29 (14.4)	34(33.0)	63 (20.7)	
No	173 (85.6)	69 (67.0)	242 (79.3)	
Number of Confidantes				0.409
None	12 (6.0)	9 (8.9)	21 (7.0)	
1 person	33 (16.4)	23 (22.8)	56 (18.5)	
2-3 persons	97 (48.3)	48 (47.5)	145 (48.0)	
4-5 persons	43 (21.4)	13 (12.9)	56 (18.5)	
6 or more	16 (8.0)	8 (7.9)	24 (7.9)	

Comparison analyses of respondent characteristics by degree program indicated an increased association between degree program and three variables: gender, children and career choice (TABLE 4). One way ANOVA analysis indicated no significant difference between groups on the array of respondent characteristics examined (TABLES 2,3).

Table 4. Association of Respondent Characteristics by Degree Program

Respondent Characteristic	$\chi 2$ analysis by degree program
	p-value
Age	0.468
Gender	0.002
# confidantes	0.294
Living situation	0.228
Children	0.001
Career choice	0.001

Distribution of the CES-D depression score of our two respondent populations by age, gender, year in school, career choice, living situation, children, and number of confidantes is given in Tables 5 and 6. A one-way ANOVA of the depression score by respondent characteristics reveals a significant difference only by age ($p<0.03$), but not by any other variable. Students who are 30 years of age or older scored higher on the CES-D scale than did those under 30 (TABLE 5).

Table 5. Mean CES-D Score of Medical and Dental Student Respondents by Respondent Characteristic

Respondent Characteristic	Mean Depression Score (min/max)	95% CI for mean depression score	Std Dev	One-way ANOVA p-value
Age				0.03
21-25 years	13.2 (1/46)	11.5/14.9	8.9	
26-30 years	12.4 (0/38)	10.8/13.9	8.7	
31-35 years	14.4 (0/36)	11.2/17.4	9.9	
36 years and over	14.3 (0/36)	9.6/18.8	9.9	
Gender				0.05
Male	11.7 (1/38)	10.4/12.9	8.3	
Female	14.6 (0/46)	13.0/16.2	9.6	
Year in School				0.71
1st year	13.1 (1/41)	11.2/14.9	8.7	
2nd year	13.5 (1/36)	11.4/15.6	8.6	
3rd year	15.7 (0/46)	13.1/18.3	10.5	
4th year	10.8 (0/35)	9.1/12.6	8.2	
Career Choice				0.49
Primary care	13.1 (0/46)	11.8/14.4	9.0	
Specialty	12.1 (0/36)	10.1/14.2	9.0	
Undecided	15.1 (2/41)	12.0/18.1	9.1	
Degree Program				0.17
Medicine	12.90 (0/41)	11.7/14.1	8.88	
Dentistry	13.55 (0/46)	11.7/15.4	9.46	

Table 6. Mean CES-D Depression Score of Student Respondents by Respondent Characteristic

Respondent Characteristic	Mean Depression Score (min/max)	95% CI for mean depression score	Std Dev	One-way ANOVA p-value
Living Situation				0.17
Lives alone	13.7 (1/46)	12.2/15.3	9.5	
Married/with partner	12.5 (0/37)	11.2/13.9	8.6	
Children				0.37
Yes	11.8 (0/37)	9.6/13.9	8.5	
No	13.4 (0/46)	12.3/14.6	9.2	
Number of Confidantes				0.41
None	19.0 (4/38)	14.4/23.7	10.25	
One person	13.5 (1/46)	10.9/16	9.45	
2-3 persons	13.2 (0/38)	11.7/14.6	8.8	
4-5 persons	10.6 (0/41)	8.4/12.8	8.2	
6 or more	12.3 (2/37)	8.7/15.9	8.6	

In the original CES-D research by Radloff et al. (1977), a cutoff score of 16 or above was used to indicate probable clinical depression. This score was chosen as representative of a person's experience of at least ¾ of the outlined symptoms on the CES-D at least once during the test period. Overall, the percent of student respondents scoring 16 or greater on the CES-D scale was 30.2 percent. In our respondent population, the highest proportion of CES-D scores equal to or greater than 16 is in those over 30 years of age, women, 3rd year students, 3rd year dental students, undecided students, those without children, and those without confidantes (TABLES 7, 8, 9). A total of ninety-two (92) students scored 16 or above on the CES-D scale.

Graph 1. CES-D Score Distribution among all Student Respondents

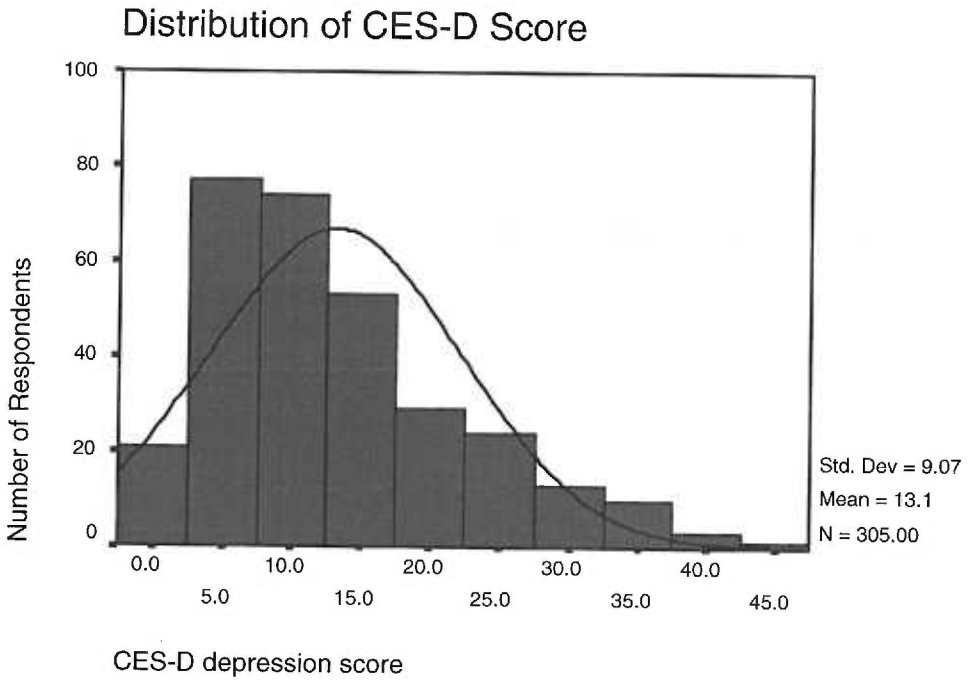

Table 7. Medical and Dental Student Respondents Scoring 16 or greater on CES-D by Respondent Characteristic (total number/percent>16)

Respondent Characteristic	Number scoring≥16	Percent score≥16
Age		
21-25 years	34/114	29.8
26-30 years	35/129	27.1
31-35 years	15/42	35.7
36 and over	8/20	40.0
Gender		
Male	39/158	24.7
Female	53/147	36.1
Degree program		
Medicine	61/202	30.2
Dentistry	31/103	30.1
Year in school		
1st year	24/87	27.6
2nd year	22/65	33.8
3rd year	26/67	38.8
4th year	20/86	23.3

Table 8. Medical and Dental Student Respondents Scoring 16 or greater on CES-D Scale (number/percent>16)

Year in School	Degree Program	
	Medicine	**Dentistry**
1st year	17/55 (0.31)	7/32 (0.22)
2nd year	15/42 (0.36)	7/23 (0.30)
3rd year	16/47 (0.34)	10/20 (0.50)
4th year	13/58 (0.22)	7/28 (0.25)
Total	61/202 (0.30)	31/103 (0.30)

Table 9. Medical and Dental Student Respondents Scoring 16 or greater on CES-D by Respondent Characteristic (number/percent>16)

Respondent Characteristic	Number scoring≥16	Percent score≥16
Career Choice		
Primary care	56/191	29.3
Specialty	20/77	26.0
Undecided	16/37	43.2
Living Situation		
Lives alone	42/145	29.0
With partner or married	50/160	31.3
Children		
Yes	14/63	22.2
No	78/242	32.2
Number of Confidantes		
None	11/21	52.4
1 person	14/56	25.0
2-3 persons	48/145	33.1
4-5 persons	13/56	23.2
6 or more	5/24	20.8

Logistic Regression Analysis

A binomial logistic regression model of the CES-D depression score (with a cutoff score of 16 or higher) was constructed using gender, degree program, year in school and number of

confidantes as independent variables. All variables were entered simultaneously into the model, From our analysis, third-year medical and dental students were twice as likely to be depressed as compared to fourth-year medical and dental students (OR=2.06; 95% CI=1.01, 4.21). Women were also twice as likely as men to be depressed (OR=1.86; 95% CI=1.11, 3.10). Moreover, students with no confidante were three times as likely to be depressed as those with 1 or more confidante (OR=2.96, 95%CI=1.18, 7.42). However, degree program, first-year student status and second-year student status did not show a significant effect (TABLE 10).

Table 10. Logistic Regression Model of CES-D Depression Score

Independent Variable	Beta	Standard Error	Odds Ratio	95% CI lower	95% CI upper
Gender	0.6418	0.2650	*1.90	1.13	3.19
Degree program	0.0674	0.2768	1.07	0.63	1.84
1st year students	0.2416	0.3546	1.27	0.64	2.55
2nd year students	0.5517	0.3752	1.74	0.83	3.62
3rd year students	0.7809	0.3648	*2.18	1.07	4.46
No confidantes	1.08	0.4689	*2.96	1.18	7.42
Constant	-1.3441	0.3780			

*OR significantly different than 1
*Referent categories:
gender: male students
degree program: medical students
school year: 4th year students
number of confidantes: 1 or more confidantes

IV. Discussion

The most important finding from this study is that depression among medical and dental students at Oregon Health Sciences University is common and occurs throughout training. Our first primary hypothesis—that medical students and dental students will have a high prevalence

of depression per the Center for Epidemiologic Studies - Depression (CES-D) scale (>20% prevalence as cited in the literature)—was strongly supported by the data. During the study period, approximately thirty percent (30.2%) of student respondents across four years of training indicated that they experienced probable clinical depression. It is once more important to note that using the CES-D scale, we cannot diagnose clinical depression among these respondents, but can only infer that this group experienced "probable clinical depression" during this time through the assessment of depressive symptoms. Our second primary hypothesis—that 2nd year medical students would be the most depressed of all medical and all dental students—was not supported by the data. However, of great concern, third-year students across programs were twice as likely to be depressed as were fourth-year students. Of our secondary hypotheses, an increased finding of depression among women, and the protective effect of social support (measured through number of confidantes), were both strongly confirmed by our data. In our study, women were twice as likely as men to report depression. In addition, those students without confidantes were three times as likely to report depression than those with 1 or more confidantes. The direction of the association between students 30 years of age or older and those who lived alone, although not significant, were also consistent with our secondary hypotheses. Thus, these findings point to 3rd year students, and women students in particular, as being the most important student groups to target with specific preventive activities, namely the increase of social support.

The results of this study on depression among medical and dental students at OHSU support the findings of previous work in this area and extend it to a new study population, dental students. In addition, our findings strongly reaffirm the role of social support as protective against depression and extend it to medical and dental students in-training. We should note that in this study, the estimated prevalence of depression in medical students does reveal a higher prevalence than some prior research. In dental students, as far as we know, these data do not exist. For example, Mosley et al. (1994) determined that clinical levels of depression, as

measured by the CES-D scale, were present in 15/69 (23%) of 3rd year medical students. Zoccolillo et al. (1986), in a prospective study of 304 first and second year medical students, found a lifetime depression prevalence through the second year of medical school of 15%. Our general depression prevalence of 30.2% and prevalence in third-year students of 39% are thus higher than in previous work. Rosal et al. (1997), in a four-year longitudinal study of freshmen medical students at the University of Massachusetts, observed that upon entering medical school, students' emotional profile resembled the general population. However, over the four-year course of medical school, depression ratings increased with a peak during Year 2. In this study, the authors also found that women were more depressed at year 2 although no gender differences were noted at baseline. Vitaliano et al. (1988) and Vitaliano, Maiuro, Mitchell and Russo (1989) replicated previous findings on depression among 304 first-year medical students at one institution. In both of these reports, depression was enduring, chronic and specifically heightened in the second year of medical training. Contrary to these authors, we found a peak of depression in the third rather than second year but did strongly confirm the role of gender in depression. Although no studies in the literature to date have examined dental students, Clark and Rieker (1986) and Helmers et al. (1997), broadened their study population to include law students and graduate students and also found elevated levels in these groups. In this study, we have expanded the respondent pool to dental students and have documented equivalent findings as in medical students. In addition to the discovery of a high prevalence of probable clinical depression in our respondent population, we have evidence to indicate that important psychosocial correlates include gender and the presence or absence of social support.

Limitations of this study are numerous and should be discussed. Of foremost concern is our low student response group. Altogether, only 46% percent of the total student respondent population returned our survey, and of this response pool, two-thirds were medical students. Thus, dental students had a much smaller representation in our study. Reasons for this poor

dental student response may include: 1) the principal investigator's affiliation as a medical student at OHSU, which might have encouraged medical students to return the survey through positive association and somehow discouraged dental students through a lack of association; 2) medical students' closer daily contact with the principal investigator by proximity, which may have served as a subtle reminder to return the survey; and 3) a possible higher level of comfort with survey completion among medical students at OHSU (who have completed surveys since day 1 of medical school). As far as we know, dental students were not discouraged by their faculty and staff to complete the survey, survey methods were meticulously followed per protocol in both populations, and the availability of campus mail to return surveys was equivalent in both groups.

A potentially large source of response bias in this study is that of the 46% of respondents, only the most depressed individuals may have completed the survey (for example, of the 20 third-year dental student respondents, half met the criteria for probable clinical depression). Moreover, women respondents were overrepresented in this study. This pattern is likely a reflection of the propensity of women, due to childhood socialization practices and prevailing social stereotypes, to be more comfortable with emotional and mental self-expression. In addition, among the student respondents, third-year dental students and second-year medical students had the smallest response proportion. In the case of dental students, if only the most depressed individuals responded, even this small response might have falsely exaggerated depression levels among third-year students as a whole. With regard to medical students, previous literature has shown that second-year medical students have a peak in depression, a finding which could not be adequately determined with our 20% response proportion in that particular subgroup. It is important to also note that although lack of social support was significant in our regression analysis, only 21 students out of 305 students (6.9%) indicated that they had no confidantes.

Due to factors beyond our control, this study was distributed at an inopportune time: for 4th year medical students, it was in March a few weeks before the residency match. At this time of year, these students were likely more intent on residency selection and graduation rather than clinical performance, as this performance was no longer a determinant of career success. At that time, we were aware of this limitation, but felt if we were to complete the study in a timely manner and include the data of graduating 4th year medical and dental students, we should distribute the survey in March. In addition, both 1st and 2nd year dental and medical students had also just returned from their "spring break" one-week vacation. This "time bias" is important in that this study may have revealed a falsely low prevalence of depression; conversely, we might contemplate what a 30.2% prevalence of depression in students returning from vacation truly indicates! It is interesting to speculate on whether depression levels would have been further elevated if the survey was distributed during a more typical period of the year, after many weeks of study and any vacations, and well before exams (examples would be in October or in February). In addition, because we conducted a "snapshot prevalence" survey without tracking, we must trust that survey participants honestly completed their own surveys, and moreover, did not complete more than one survey. In our study, this occurrence is difficult to quantify as we could not track responders secondary to confidentiality issues at OHSU. The students' interpretation of "a typical week, or in the last week" is also difficult to determine. As student respondents knew this was a survey on mood and well-being (although unaware of the hypotheses), those in support of mental health awareness at OHSU may have arbitrarily chosen a week in which they felt they were the most depressed, thereby filling out the survey with a negative skew. Those who did not support the aims of the study may have done the opposite and completed the study with a positive skew. We might postulate, though, that this "misclassification" would strengthen our argument. Finally, experimenter bias is a strong possibility as the principal investigator designed and executed the entire study, including data

analysis. However, despite these limitations, we may assume that our results are generalizable to all medical and dental students in the United States who attend clinically-oriented training programs similar to the one at OHSU.

Our survey of the prevalence and psychosocial correlates of depression at Oregon Health Sciences University suggests that "the blues" thrive among medical and dental students to a far greater extent than we may have previously thought. It is unclear why this situation may exist: is it the demands of the curriculum, the expectations of staff, the lack of social support or role models, the Oregon rain, the nature and personality of students attracted to OHSU, the general susceptibility of a personality type attracted to medicine or dentistry, a combination of these factors, or something else? We cannot determine from this study exactly why our students may be depressed, but can use this study and others like it as a springboard through which to initiate open and honest discussions regarding mental health. From the results of this study, depression during health professions training is obviously a salient issue. It is far past the time to ignore so-called "personal problems" during this time. We must overcome the social stigma surrounding discussion of mental health if we are to most effectively assist future health professions students during their intensive educational period. As evidenced by Clark and Zeldow (1988), national licensing exam scores can be affected by a depressed state. Therefore, we might extend their findings to speculate that clinical performance, knowledge base, and ultimately, patient outcomes and quality of patient care would likely be affected by depression.

Mental health promotion activities through which medical and dental students may obtain timely and confidential mental health assistance need to be in place at all academic health centers. Due to our third-year and women students being twice as likely to report depression, and those without confidantes indicating a three times higher prevalence of depression, a natural and low-cost intervention at OHSU might be a student pairing or "buddy system." Senior students in both the medical and dental program might serve as "buddies" or peer mentors for 3rd

year students in both programs. This type of intervention would assist 3rd year students to adjust to the stresses of full-time clinical training; learn more about rotation, scheduling, and post-graduate options; and have someone that if desired, they could regularly confer with regarding a variety of work and personal-related issues. On the other hand, to derive the most psychological benefit, this pairing could start when both mentor and mentee students were 1st and 2nd years. We realize such a system does exist currently, in informal form through friendship between students, at OHSU. However, creating a formal peer advising system, and stressing the availability of this system to those students who desire to participate, would help further emphasize the importance of social support and mental health issues to all students. Similarly, an informal pairing system currently exists for women students through women's groups at the medical and dental schools; this system could also be more formalized and advertised for those who were interested. However, it is important to note that any type of pairing system that would help students protect against depression could utilize not only student peers, but also faculty advisors, family, clergy or other persons (again for those students who desire it). In other words, it is not as important who provides the support, but that this support is readily available. In addition, at OHSU, all students may receive referral to psychiatrists through their student health physician and partake of mental health counseling through self-referral to psychologists. To ensure that all students in need are being adequately reached, the availability, confidentiality and quality of these services should be further publicized during the Transition to Clerkship week for medical students in the 3rd year, and even during Principles of Clinical Medicine forums in years 1 and 2. For dental students, appropriate forums would be during parallel transition periods between years 2 and 3, and during Orientation in Year 1. In addition, during non-urgent OHSU student health appointments, health center staff could mention the availability of counseling services at OHSU to further increase awareness of existing services.

Regarding future directions in this research, we suggest that a prospective, longitudinal study of depression among medical and dental students be carried out over four years. In this manner, we could establish a baseline prevalence of depression and observe how these levels evolve throughout the four years of health care training. This longitudinal study would also help us further determine the psychosocial correlates of depression and assist in the design and evaluation of strategies to assist those with depression. In this type of study, it would be extremely important to inquire about whether students have utilized existing mental health services in order to determine practical steps, if any, towards quality improvement. A case-control study of those who sought mental health care at OHSU—demographics, when they sought care and why—would also prove quite interesting, particularly since few studies to date characterize those who are more likely to seek this type of assistance. An important adjunct of a longitudinal study might also be performing it after an advising system was instituted to quantify any change in depression levels. It would also be crucial to determine who these confidantes were (faculty, family, peers, clergy, or others). Race and ethnicity, although it could not be studied here secondary to confidentiality issues, is closely intertwined with mental health. The examination of depression prevalence as it correlates with race and ethnicity would be very insightful. Including more health professional students, such as nursing students, physician assistant students, and pharmacy students to the population mix would also be valuable and perhaps point to common psychological and social correlates during training. Another natural extension of this study would be to resident physicians and/or newly-practicing physicians and dentists, as these populations remain little examined. Through these various means, perhaps we may shed more light on why medical and dental students are depressed and more importantly, how we may prevent this situation from impeding day-to-day learning and living as a graduate health professions student.

V. References

American Psychiatric Association. (1994). Diagnostic and Statistical Manual of Mental Disorders, 4th ed. Washington, D.C. American Psychiatric Association.

Carmel, S. and Berstein, J. (1987). Perceptions of medical school stressors: their relationship to age, year of study and trait anxiety. *Journal of Human Stress, Spring*: 39-44.

Chang, P., Ford, D.E., Mead, L.A., Cooper-Patrick, L., and Klag, M.J. (1997). Insomnia in young mean and subsequent depression: the Johns Hopkins precursors study. *American Journal of Epidemiology, 146*: 105-114.

Clark, E.J. and Rieker, P.P. (1986). Gender differences in relationships and stress of medical and law students. *Journal of Medical Education, 61*: 32-40.

Clark, R.C. and Zeldow, P.B. (1988). Vicissitudes of depressed mood during four years of medical school. *Journal of the American Medical Association, 260*: 2521-2528.

Fava, G.A., and Wise, T.N, eds. (1987). Research paradigms in psychosomatic medicine. Advances in Psychosomatic Medicine. New York: Karger.

Guthrie, E.A., Black, D., Shaw, C.M., Hamilton, J., Creed, F.H., and Tomenson, B. (1995). Embarking upon a medical career: psychological morbidity in first year medical students. *Medical Education, 29*: 337-341.

Helmers, K.F., Danoff, D., Steinert, Y., Leyton, M., and Young, S.N. (1997). Stress and depressed mood in medical students, law students and graduate students at McGill University. *Academic Medicine, 72*: 708-714.

Mosley, T.H., Perrin, S.G., Neral, S.M. Dubbert, P.M., Grothues, C.A. and Pinto, B.M. (1994). Stress, coping and well-being among third-year medical students. *Academic Medicine, 69*: 765-767.

Pasnau, R.O., and Stoessel, P. (1994). Mental health service for medical students. *Medical Education, 28*: 33-39.

Radloff, L.S. (1977). The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement, 1(3):* 385-401.

Rosal, M.C., Ockene, I.S., Ockene, J.K., Barrett, S.V., Ma, Y., and Hebert, J.R. (1997). A longitudinal study of students' depression at one medical school. *Academic Medicine, 72*: 542-546.

Stewart, S.M., Betson, C., Marshall, I., Wong, C.M., Lee, P.W.H., and Lam, T.H. (1995). Stress and vulnerability in medical students. *Medical Education, 29*: 119-127.

Stewart, S.M., Betson, C., Marshall, I., Lee., P.W.H., and Wong, C.M. (1997). Predicting stress in first year medical students: a longitudinal study. *Medical Education, 31*: 163-168.

Strayhorn, G. (1989). Expectations versus reality, social support, and the well-being of medical students. *Behavioral Medicine*, 133-139.

Vitaliano, P.P., Maiuro, R.D., Russo, J., Mitchell, E.S., Carr, J.E., and Van Citters, R.L. (1988). *Journal of Behavioral Medicine, 11(4):* 311-331.

Vitaliano, P.P., Maiuro, R.D., Mitchell, E.S., and Russo, J. (1989). *Social Science and Medicine, 28(12)*:1321-1329.

Williams, R.A., Hagerty, B.M., Murphy-Weinberg, V., Wan, J.Y. (1995). Symptoms of depression among female nursing students. *Archives of Psychiatric Nursing, 9(5)*: 269-278.

Zoccolillo, M., Murphy, G.E. and Wetzel, R.D. (1986). *Journal of Affective Disorders, 11*: 91-96.

www.cdc.gov/nchswww/fastats/mental.htm

www.nimh.nih.gov/dart/gen_fact.htm.

www.nimh.nih.gov/mhsgrpt/chapter2/sec2_1.html#epidemiology

www.nimh.nih.gov/publicat/depression.cfm

VI. Appendix

This survey asks for 2 types of information: 1) some basic information about yourself; and 2) some information about your mood and well-being in the past week. ***It should take 5-7 minutes to complete.*** **The survey is anonymous and all responses will be kept confidential.**

Please FILL IN the information below or CIRCLE THE ONE BEST ANSWER as indicated.

1. Age (years): **less than 20** **21-25** **26-30** **31-35** **36-40** **40 and over**

2. Gender: **male** **female**

3. Degree Program: **medicine** **dentistry**

4. Year in School (class affiliation): **1st** **2nd** **3rd** **4th** **combined degree (ex. MD/PhD)**

5. Probable Career Choice:
   a) primary care medicine/dentistry
   b) specialty medicine/dentistry
   c) undecided

6. Living Situation:
   a) single, live alone
   b) single, live with roommate(s)
   c) single, with children
   d) live with partner, no children
   e) live with partner, with children
   f) married, no children
   g) married, with children

7. On average, how many **hours per day** do you study? **0-1** **2-3** **4-5** **6-7** **8-9** **10+**

8. On average, how many **hours per day** do you sleep? **0-1** **2-3** **4-5** **6-7** **8-9** **10+**

9. **On how many of the past 7 days** did you exercise or participate in sports activities **for at least 20 minutes** that made you sweat and breathe hard, such as basketball, jogging, swimming, tennis, fast walking, dancing, bicycling, or similar aerobic activities? **0** **1** **2** **3** **4** **5** **6** **7**

10. Are there any people in your life that you can trust with your innermost feelings, people who completely understand and accept you? **YES** **NO**

***If YES**, with how many people do you feel this close? **No one** **1** **2-3** **4-5** **6 or more**

***Please turn page over for section 2. We're trying to save trees!**

MOOD AND WELL-BEING QUESTIONNAIRE

INSTRUCTIONS: Below is a list of the ways you might have felt or behaved **during the past week**. Next to each statement, *please indicate how often you have felt this way* **during the past week using the scoring system below:**

0 = rarely or none of the time (less than 1 day)
1 = some or a little of the time (1-2 days)
2 = occasionally or a moderate amount of time (3-4 days)
3 = most or all of the time (5-7 days)

	0	1	2	3
***EXAMPLE*: "I felt fearful " on 3 days (occasionally).**	____	____	__√__	____

During the past week:	**scoring:**	**0**	**1**	**2**	**3**
1. *I was bothered by things that usually don't bother me.*		____	____	____	____
2. *I did not feel like eating; my appetite was poor.*		____	____	____	____
3. *I could not shake off the blues even with help from my family or friends*		____	____	____	____
4. *I felt that I was just as good as other people.*		____	____	____	____
5. *I had trouble keeping my mind on what I was doing.*		____	____	____	____
6. *I felt depressed.*		____	____	____	____
7. *I felt that everything I did was an effort.*		____	____	____	____
8. *I felt hopeful about the future.*		____	____	____	____
9. *I thought my life had been a failure.*		____	____	____	____
10. *I felt fearful.*		____	____	____	____
11. *My sleep was restless.*		____	____	____	____
12. *I was happy.*		____	____	____	____
13. *I talked less than usual.*		____	____	____	____
14. *I felt lonely.*		____	____	____	____
15. *People were unfriendly.*		____	____	____	____
16. *I enjoyed life.*		____	____	____	____
17. *I had crying spells.*		____	____	____	____
18. *I felt sad.*		____	____	____	____
19. *I felt that people dislike me.*		____	____	____	____
20. *I could not "get going."*		____	____	____	____

THANK YOU for your participation! The results of the study will be made available on request.

Enjoy your coffee!