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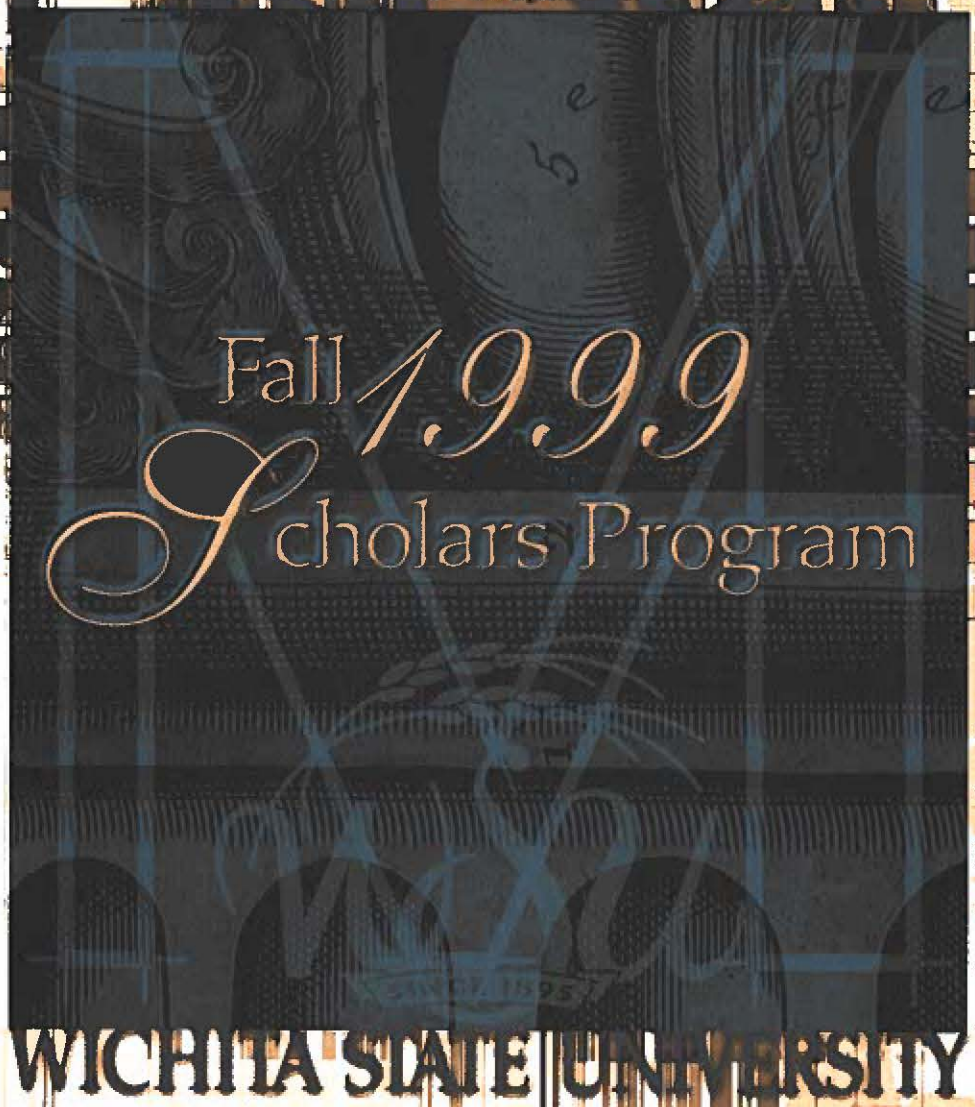


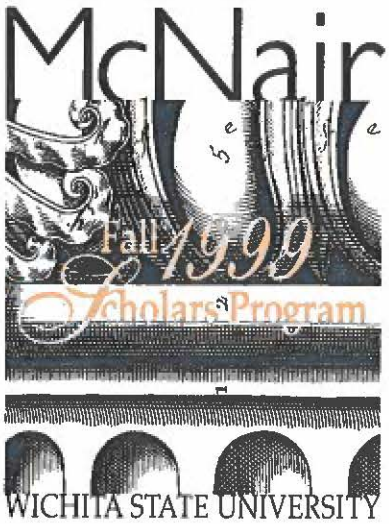
Fall 1999 Scholars Program

Journal of Research Reports

"True courage comes in enduring . . . persevering and believing in oneself."

-Ronald McNair

WICHITA STATE UNIVERSITY



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The *Journal of Research Reports* is produced and published annually by the Wichita State University McNair Scholars Program to further the objectives of the program. The goal of the McNair Scholars Program is to provide quality services which encourage students who are underrepresented in higher education to graduate with bachelor's degrees from WSU and to pursue post-baccalaureate degrees.

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Table of Contents

Director

National efforts to move students from traditional, passive learning to active learning is being met with enthusiasm by faculty and students alike. Probably the best active learning environment that exists for students is the research site. Over the past four years, the McNair program has been instrumental in providing numerous and unique research opportunities for undergraduate students.

This journal represents the diverse and practical research experiences of our undergraduate students during the 1998-99 academic year. It is obvious that these students learned a great deal through their involvement in research projects under the supervision of leading faculty research scholars. Not only was their learning enhanced as undergraduates but it will also provide them with significant advantages when they enter graduate school. Most importantly, they have begun to contribute to the knowledge about our world in ways that hold much promise for the future.

Larry A. Ramos

Larry Ramos

Director

Research Assistant

Congratulations to the McNair Scholars of 1998-99! The students exhibited high aspirations and dedication as they completed their research endeavors. Their commitment to learn, grow, and pursue knowledge is to be commended.

The McNair Scholars Program provides tremendous opportunities for students to learn from faculty mentors, experience scholarly research, and prepare appropriately for doctoral study. May the 1998-99 McNair Scholars draw from these experiences and find great success in achieving their goals.

Jan L. Petersen

Jan Petersen

Research Assistant

Dolomitization of Modern Marine Sediments in Northern Belize

Kimberly D. Dimmick, *WSU McNair Scholar*
S.J. Mazzullo, PhD, *Professor of Geology, WSU Faculty Research Scholar*

Abstract

Dolomite is a magnesium-calcium carbonate mineral that forms in modern tropical to subtropical environments. Seawater of normal salinity is supersaturated with respect to dolomite, and thermodynamically has the capability of precipitating dolomite. However, occurrences are rare due to kinetic inhibitors that must be overcome (low alkalinity, pH, and Mg^{+}, Ca^{+} hydration) before dolomite can form. The goal of this study is to determine the mechanism and relative timing of the dolomite formation in subtidal sediments of the Cangrejo Shoals mudbank in the high energy, outer shelf environment in northern Belize. This will be accomplished by examining the carbon and oxygen isotopic compositions of the dolomite samples from the study area. Oxygen isotopic analysis will reflect the temperature and salinity of seawater at the time of dolomite formation. Carbon isotopic compositions will give data supporting mechanisms of dolomitization here. For example, enriched $d^{13}C$ compositions indicate methanogenesis, whereas depleted $d^{13}C$ compositions indicate sulfate reduction, which are two possible mechanisms of overcoming kinetic inhibitors of dolomite formation. The range of geochemical environments in which dolomite can form will be identified, and this study will contribute to the interpretation of the origin of some massive ancient dolomites.

Deodat De Dolomieu (1791) published the first paper on the mineral we now call dolomite (Zenger , Bourrouilh, & Carozzi, 1994). The 'dolomite problem' in 1957 (Fairbridge) was that although there were large deposits in ancient rocks, very little was found in Holocene sediments. They were restricted to deep marine sediments, with none found in peritidal, or shallow marine, subtropical to tropical environments. Dolomite is now known to form in Holocene sediments in tropical to subtropical environments (Persian Gulf, Illing & Taylor, 1965; Bahamas, Shinn, Ginsburg & Lloyd, 1965; Belize, Mazzullo, Bischoff, & Teal, 1995; Teal, 1998) and has been studied extensively. The recent expression of the 'dolomite problem' concerns the mechanisms through which dolomitization is possible. Evidence has been given that kinetic barriers such as low pH, low alkalinity, and strong hydration of HCO_3^-, Mg^{+}, and Ca^{+} ions must be overcome for dolomite to precipitate (Bathurst 1975). The mechanisms believed to aid in dolomite formation are the bacterial processes of methanogenesis and sulfate reduction.

Methanogenesis and Sulfate Reduction

With the presence of organic matter and relatively fast sedimentation rates, anoxic pore water environments can be generated wherein anaerobic bacteria begin to degrade the organic matter. Sulfate reducing bacteria utilize oxygen from sulfate in seawater. CO_2 is released in this process, and alkalinity is raised. The rise in alkalinity and pH weaken the strongly hydrated Mg^{+}, Ca^{+}, and HCO_3^- ions. The concentration of $CO_3^{=}$ rises along with free Mg^{+}, Ca^{+} ions and dolomite can then precipitate. The by-products of this reaction are the release of hydrogen sulfide and pyrite. When the sulfate ions are depleted, methanogenic bacteria then take over by utilizing oxygen directly from organic matter. Alkalinity and pH rise further, and hydrated ions become free to precipitate dolomite. In the case of sulfate reduction, ^{12}C is released, which will give a negative $d^{13}C$ signature to the dolomite relative to normal seawater. Methanogenesis, on the other hand, will give a positive $d^{13}C$ isotopic signature to the dolomites that is enriched relative to normal seawater.

Research Methodology

Three cores were taken from sediments at Cangrejo Shoal mudbank in northern Belize. These cores were from the southeastern tip (core 27), southwestern edge (core 25) and northwestern edge (core 24) of Cayo Cangrejo. X-ray diffraction analysis shows that cores 24 and 25 contained dolomite, whereas core 27 did not contain dolomite. These X-rays were also used to calculate percentages of HMC, LMC, aragonite, and dolomite to help support data from chemical analysis of pore waters, which inferred the source of Mg^{+} and Ca^{+} ions (seawater or dissolution of preexisting carbonates). Six-inch segments of the cores containing dolomite were sieved and separated into component size fractions. The mud sized fractions of cores 24 and 25 were then treated with 5.25% sodium hypochlorite (commercial Clorox bleach) to remove soluble organic matter. Samples were then treated with 10% acetic acid to isolate the dolomite to greater than 95% by dissolving all other carbonate phases in the enclosing sediment. Isolated samples were sent for analysis to determine the stable carbon-oxygen isotopic compositions. This provided data pertaining to salinity and temperature of the water from which these modern dolomites formed. Evidence of possible sulfate reduction or methanogenesis was also determined from the stable carbon-oxygen analysis.

Results

A quartz standard was used when performing X-ray diffraction analysis so that peak shifts could be calculated. When interpreting X-rays for the percentages of HMC, LMC, and aragonite in the presence of dolomite, results showed no loss of HMC and/ or aragonite or gain of LMC in the presence of dolomite, which infers seawater as being the principal source of Mg^+ and Ca^+ ions. This supports previous pore water analysis done in the study area (Teal, 1998), where in the presence of dolomite there was a decrease in Mg^+ and Ca^+ ions in the pore water. This suggests that the needed Mg^+ and Ca^+ was supplied by seawater. $d^{13}C$ isotopic composition of the dolomite averages -2.03 0/00 (range -1.1 to -2.8 0/00), which suggests sulfate reduction as the bacterial process acting within the sediments. Pyrite is also present in these cores, and the smell of hydrogen sulfide is evident. Average $d^{18}O$ of the dolomite is 2.230/00 (range 2.0-2.40/00), which suggests that the dolomite precipitated from near normal seawater.

Conclusions

Dolomitization of the unconsolidated sediments in core 24 and 25 is taking place in the high energy subtidal zone of Cangrejo Shoals at depths (below mean sea level) ranging from 2.4 - 4.1m (core 24) and from 4.3 - 5.7m (core25). The dolomite averages 4% (range 1-10%). According to $d^{18}O$ isotopic signature, dolomite is forming penecontemporaneously in the unconsolidated sediments from seawater of near normal salinity. Sulfate reduction, inferred by $d^{13}C$ stable isotopic composition, is the bacterial process responsible for breaking the kinetic barriers that would normally block the precipitation of dolomite. Relatively constant percentages of HMC, LMC, and aragonite in the presence of dolomite, and previous pore water analysis, support seawater as being the ion contributor in the formation of dolomite. This information adds to present knowledge of the processes involved in dolomitization and supports a subtidal dolomitization model that might be used for the interpretation of massive, ancient dolomites that are important as oil and gas reservoirs.

Acknowledgments

This research project was funded by the McNair Scholars Program and a research grant to Dimmick from the Geological Society of America (SW Section). Isotopic analysis was done by the Stable Isotope Lab, University of Michigan-Ann Arbor. I thank Dr. S.J. Mazzullo for his guidance and support in this project.

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Advance Directives: Knowledge and Attitudes

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Alicia Huckstadt, *PhD, Associate Professor of Nursing, WSU Faculty Research Scholar*

Abstract

This study explores nursing students' knowledge and attitudes regarding advance directives. Advance directives are executed as living wills and durable power of attorney for health care. Hospitals, nursing homes, and health plans are required by the Patient Self-Determination Act of 1991 to ask whether patients have advance directives and to incorporate them into their medical record. Nurses and other health care workers are expected to be knowledgeable about advance directives in order to inform patients of their right to participate in their own medical decision-making. In this study, 86 nursing students attending a midwestern university completed a survey that included items from two scales: (a) Crego's "Nurses' Knowledge of Advance Directives Scale" and (b) Doukas' "Quality of Life Values Scale." In addition, items regarding students' experiences with death, illness, and advance directives were included. Results of the study indicated that students had accurate information about advance directives and understood their importance, yet 95% of the participants had not completed their own advance directives.

Congress passed the Patient Self-Determination Act (PSDA) which went into effect December of 1991. The act requires hospitals, nursing homes, and hospices to advise patients of their right to accept or refuse treatment as well as to execute advance directives. Other requirements of the PSDA include implementing advance directive policies, educating staff about advance directives, and documenting whether a patient has advance directives (Berrio & Levesque, 1996).

Advance directives are legal documents comprised of two main forms: the living will and the durable power of attorney for health care (DPAHC). Within these two forms of advance directives, individuals are able to make their end-of-life wishes known. Living wills are written documents which allow an individual to describe what type of health care he or she does or does not wish to receive in certain situations such as terminal illness or persistent vegetative state. DPAHC allows the individual to select a proxy or an agent who is responsible for carrying out the person's wishes, or to make health care decisions in the event that he or she becomes incapacitated (Calfee & Parkman, 1997; Gross, 1998).

This study focuses on nursing students' knowledge about advance directives, as well as their values in regard to quality of life. Focusing on this area is of great importance, since nursing students may soon be in the position of informing patients about advance directives. Assessing the subjects' values regarding quality of life is important, since it may affect their attitude towards advance directives and how they present information to patients in the future.

Although the PSDA has been in effect for almost eight years, the number of Americans who actually execute advance directives is low. It is estimated that only 4% to 24% of the population has advance directives, and in other studies patients were found to have them at rates of 11% to 15%, (Carney & Morrison, 1997; Gross, 1998; Hammes & Rooney, 1998). These disappointingly low rates should be of great concern considering that 27% of the total Medicare budget is spent on end-of-life medical costs, which are ever-increasing with the aging population (Danis, 1994; Gross, 1998).

It has been found that the majority of those with advance directives are elderly. One study indicated that individuals who are more likely to execute advance directives are older, Caucasian, well educated and those who tend to plan for the future (Gross, 1998; Sachs, 1994). Another study suggested that ethnic minorities are less likely to self-express their own health care choices than whites (Hornung, Eleazer, Strothers, Wieland, Eng, McCann, & Sapir, 1998).

In a study conducted by Pearlman (1994), common reasons for not filling out advance directives were lack of time and lack of perceived need. He found that elderly individuals believed they could rely on others to make medical decisions for them rather than make their own medical choices. In addition, Pearlman (1996) and High (1994) found other factors contributing to the low completion rates: family attitudes, clinicians with limited training in advance directives, culture, and religion.

Patients often wait for health care professionals to introduce the topic of advance directives, yet it has been found repeatedly that physicians are rarely involved in counseling patients about advance directives (Freid, Rosenberg, & Lipsitz, 1995; Pearlman, 1996; Schonwetter, Walker, Solomon, Indurkhya, & Robinson, 1996; Wetle, 1994). In the review of literature, it was indicated that many

patients do express interest in advance directives, though few complete them. In one study it was found that 48% of patients did not receive written information about advance directives upon hospital admission (Berrio & Levesque, 1996). This is a disturbing fact considering 80% of deaths occur in health care organizations, 60% of those in hospitals (Hammes & Rooney, 1998).

Several researchers have found that health care providers do not always follow advance directives and this may be another reason for the low completion rates. There may be the belief that advance directives are not honored, so they may not take the time to execute them. Often, health care providers do not realize that patients have advance directives, thus the lack of communication also plays a role in not following through with the patient's end-of-life choices. There are also situations where the family may oppose the contents of the living will and clinicians will go with the family preference rather than the advance directive (Danis, 1994; Gross, 1998; Teno et al., 1997). In one large study of seriously ill hospitalized patients (N=9,105), researchers found only about one in three advance directives are documented in the permanent medical record by health care providers (Teno et al., 1997). On the other hand, Hammes and Rooney (1998) found the opposite outcome. Their study indicated that patient preferences were honored, and there was no blatant disregard of patient wishes.

With so much information about the lack of physician involvement in the patient's end-of-life planning, the idea of non-physician staff taking over this duty is a valid point. Sachs (1994) found that when non-physician staff discussed advance directives with patients, there was a 71% completion rate. One complexity Ackerman (1997) discussed is that in nursing homes, social workers deal with advance directives, yet they have no medical background. It is necessary for people to have an understanding of the nature and the implications of medical conditions and interventions in order to make informed choices about their health care (Emanuel & Pearlman, 1994). Consequently, nurses are in an ideal position to inform and educate patients about advance directives because they possess medical knowledge. No prior studies were found on how nurses perceive and value advance directives, other than the work of Crego and Lipp (1998). Crego and Lipp (1998) found that of the 339 registered nurses who participated in their study, 55% did not have a good understanding of advance directives.

Nurses and other health care workers are expected to be knowledgeable about advance directives in order to inform patients of their right to participate in their own medical decision-making. This study explores nursing students' knowledge and attitudes regarding advance directives. The following sections describe the methods, results, and implications of this research.

Methods

Participants

A purposive sample of 86 nursing students from two undergraduate nursing courses at a midwestern university participated in this study. Females composed 81.4% of the sample and 17.4% were male. Their ages ranged from 19 to 50 years with a mean age of 27.05 (SD=7.32). The sample was 84.9% Caucasian, 5.8% Asian, 3.5% Native American, and 1.2% each for Hispanic and African-American.

Instruments

In this study, three instruments were used: a knowledge scale, values scale, and demographics questionnaire. The study also included items about experiences with death, critical illness, and advance directives. The knowledge scale used items from "Nurses' Knowledge of Advance Directives" (Crego & Lipp, 1998), as well as items constructed and modified by the researchers. There were 23 true or false questions on the knowledge scale. These were used to determine the participants' knowledge about advance directives. Higher scores indicated higher knowledge levels. Content validity for the knowledge questionnaire was supported by Crego and Lipp (1998).

The values scale included items from the "Quality of Life Values" scale (Doukas & McCullough, 1988) and other value statements constructed and modified by the researchers. This section of the survey included 17 statements about end-of-life wishes and beliefs. The items were scored from 1 to 7, ranging from not important (1) to very important (7). The purpose of the values scale was to determine nursing students' beliefs about end-of-life wishes. Portions of this scale have been used in multiple studies, although no reliability and validity indices could be found at this time.

Nineteen items were included in the demographics section with additional questions about the subjects' experiences with advance directives, illness, and death issues. These items were included after a review of the literature, and minimal information was found about nursing students' experiences with advance directives.

Procedure

A written proposal of the study was submitted and approved by the Wichita State University Institutional Review Board. Instructors for two undergraduate nursing courses were informed about the study, and their permission was requested for their classes to participate. During two regularly scheduled class sessions, students were asked to participate by answering a 59-item questionnaire, which took approximately 15 to 20 minutes to complete. Students were assured that participation was voluntary and confidential, and they were informed they could end participation at any time. Returned questionnaires were coded with a number and entered into a SPSS data file.

Results

Descriptive Findings

Demographic results are detailed in Appendix A. The majority of the sample was comprised of Caucasian females with the mean age of 27.05 years.

Knowledge

The participants demonstrated above average knowledge in the area of advance directives, as described in Appendix B. Ethnic background, marital status, gender, or religious affiliation did not significantly affect the knowledge level. There were several questions on the knowledge scale in which the scores were low. In the sample, 39.5% of the participants thought that advance directives could only be processed through an attorney, as well as 69.8% believed that advance directives must be notarized (both are incorrect—an individual can draw up advance directives; it only requires the signature of a witness). Fifty-seven percent of the subjects were also unaware that physicians are not able to witness such a document. Items from the knowledge scale are compared to the research findings of Crego and Lipp (1998); they examined nurses' knowledge of advance directives (Appendix C). Interestingly, despite the satisfactory knowledge scores, 51.2% of the respondents indicated that they do not feel knowledgeable about the topic.

Values

The values scale indicated the overall attitude of the participant on end-of-life choices. The participants indicated strong opinions about what is important to them in regard to health care issues. On a scale of 1 to 7, the statement, "I want to live as long as possible regardless of the quality of life that I experience" had a mean score of 2.41 (SD=1.63). There were no significant differences when comparing other selected demographic items to the sample's responses to other value items. Appendix D details other results from this scale.

Correlations among the variables

Age and the total knowledge score was correlated at .312 (p 0.01 level). Thus the older the subject, the higher the total knowledge score. No other correlations were found in the study.

Other findings

Of the participants, 97.7% rated their health as excellent or good, and only 4.7% actually had completed advance directives. Family members of the respondents had completed advance directives at a rate of 40.7%. Only 25.6% of the participants indicated ever attending a class or workshop on the topic. Life experience findings are described in Appendix E.

Discussion

Undergraduate nursing students voluntarily participated in a survey to determine their knowledge level, values, and experience in regard to advance directives. Overall, the respondents were knowledgeable about the topic; however, there was some lack of knowledge about the details of completing advance directives. Older students were more knowledgeable about advance directives, though no other comparable differences were found. The majority of the participants rated their health as either excellent or good, and only a fraction of them actually had advance directives of their own. The fact that they perceive their health as excellent or good probably affects their perceived need for advance directives, which may account for the low completion rates. Age may also be a factor, since the mean age was 27.05 years.

Some of the limitations of this study are: (a) the results cannot be generalized because of the small sample size (86 participants) and the use of a purposive, non-probability sample, (b) participants may have provided responses they thought the researchers desired, and (c) the instruments used have limited reported validity and reliability indices. To strengthen this research, further psychometric testing is needed. Replication of this study in other university and college settings may provide a better view of the knowledge level of nursing students throughout the country.

Future research exploring nurses' and nursing students' attitudes and knowledge about advance directives is greatly needed. Nurses are in an ideal position to educate patients about advance directives. If health care workers reach a comfort level with discussing advance directives, hopefully more individuals will complete the forms for themselves. Ideally, people should consider and discuss the issue of advance directives before an illness or accident occurs and make their health care decisions while they are capable of doing so. It is imperative to educate ethnic groups about their health care rights, as well as to dispel the myth that advance directives are only for the sick and elderly. These types of changes would allow patients to have more control over their end-of-life wishes and allow them to die with dignity.

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Appendixes

Appendix A

Demographics Characteristics

Age (M=27.05, SD=7.32)

Gender	
Females	81.4%
Males	17.4%
Ethnicity	
Caucasian	84.9%
Asian	5.8%
Native American	3.5%
Hispanic	1.2%
African-American	1.2%
Other	1.2%
Religious Affiliation	
Other	32.6%
Protestant	31.4%
Catholic	27.9%
None	7.0%
Jewish	0%
Marital Status	
Single	48.8%
Married	40.7%
Divorced	9.3%

Appendix B

Knowledge of Sample

	Raw Score	Percentages
Mean	18.4186	83.72
Median	19.00	86.36
Mode	19.00	86.36
SD	2.14	9.748

Appendix C

Knowledge question	% correct in Crego's study
1) A durable power of attorney for health care formally names an individual to make medical decisions on your behalf when you can no longer decide for yourself. (TRUE)	98.0%
2) Living wills and durable powers of attorney for health care can only be processed by an attorney. (FALSE)	86.0%
3) Living wills and durable powers of attorney for health care must always be notarized. (FALSE)	51.0%
4) Living wills and durable powers of attorney for health care cannot be witnessed by the attending physician or administrator of the nursing facility where the patient is receiving care. (TRUE)	61.0%
5) Patients must have both a living will and a durable power of attorney for health care before end-of-life decisions are honored. (FALSE)	81.4%

Appendix D

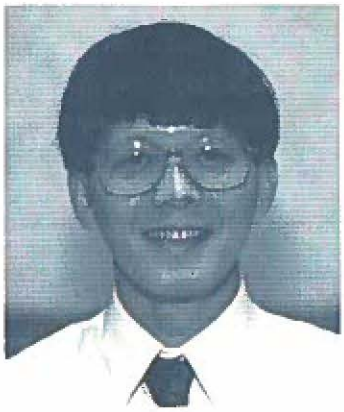
Values Scale (1 represents not important, 7 very important)

Item	Mean	SD
1. I want to be able to communicate with others.	6.66	0.68
2. I want to be able to make my own health care decisions.	6.57	0.79
3. I want to have my wishes followed if unable to speak.	6.74	0.62
4. I want my physician to follow my wishes.	6.88	0.32
5. I do not want to be in pain.	6.17	1.24
6. I do not want to die alone.	5.77	1.85
7. I don't want to be a financial burden to my family.	6.73	0.54
8. I want to maintain my capacity to think clearly.	6.71	0.68
9. I want to have a supportive physician.	6.72	0.71
10. I want to live as long as possible, regardless of the quality of life that I experience.	2.41	1.63

Appendix E

Other Data

Life experience questions	%
Does anyone in your household have a chronic illness?	
Yes	8.1%
No	90.7%
Has anyone in your household died?	
Yes	11.6%
No	87.2%
Have you ever had a life threatening illness?	
Yes	3.5%
No	95.3%
How do you rate your health?	
Excellent	50.0%
Good	47.7%
Fair	2.3%
Poor	0%
Have you completed advance directives?	
Yes	4.7%
No	95.3%
Have any of your family members completed advance directives?	
Yes	40.7%
No	57.0%
Have you been a patient in an ICU?	
Yes	7.0%
No	93.0%
Has a family member been a patient in an ICU?	
Yes	57.0%
No	43.0%
Have you had a class or workshop on advance directives?	
Yes	25.6%
No	74.4%
Your current status in the WSU nursing program?	
1st semester	32.6%
2nd semester	36.0%
3rd semester	24.4%
4th semester	4.7%
I am a registered nurse working towards my BSN.	
Yes	8.1%
No	4.9%



A Survey of Vietnamese Access to and Attitudes about Dental Health Care

Thang Kieu, *WSU McNair Scholar*
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Abstract

This study explores main factors affecting Vietnamese access to and attitudes toward dental health care. There is very little information on Vietnamese attitudes or access to dental health care. A 25-item questionnaire was completed by a volunteer sample of 279 Vietnamese adults aged 18 to 86 (50% female and 50% male). The hypothesis was that length of time living in the U.S., income, and education level would be the main factors affecting attitudes about and access to dental health care. Frequency of dental care was significantly related to income, education, age, and insurance. In addition, perceived barriers significantly affecting lack of dental care were not feeling comfortable in the dental office, language barrier, lack of transportation, lack of money, and beliefs that professional cleaning is unnecessary or unimportant.

This study explores the main factors affecting Vietnamese access to and attitudes toward dental health care. Knowledge and information is needed to improve access to dental health care for the Vietnamese population in the United States. In a survey of 30 dental hygienists in Wisconsin, Morey and Leung (1993) found low levels of knowledge about other cultures. R.E. Persson, G.R. Persson, Odont, Kiyak, and Powell (1998) surveyed the oral health and medical status of 295 dentate low-income older persons by using oral examinations, stimulated saliva, and interviews regarding oral health attitudes, knowledge, and behaviors. Persson and associates reported that "ethnic minority elders had significantly poorer periodontal health, with the worst conditions in Asians" (p. 70). A survey of access to dental care has found that the minority groups (Hispanics and African-Americans) "are less likely to visit a dentist than are whites, even after controlling for education, income, age, and other variables" (Manski & Magder, 1998, p. 200). Watson, Gibson, and Guo (1998) surveyed 213 female veterans and non-veterans, including African-Americans, Hispanics, Caucasians, and "other" groups and found that lack of dental insurance, low income, and poor dental health were important factors preventing regular dental care. In this study, the hypothesis was that length of time living in the U.S., income, and education level would be the main factors affecting attitudes and access to dental health care among Vietnamese adults.

Methods

A pilot test was developed and administered to 10 Vietnamese people. After revising the pilot test, Institutional Review Board (IRB) approval was obtained. The final questionnaire and consent form were written in both English and Vietnamese for those individuals who may not be able to read English or might be uncomfortable with English. The questionnaire and consent form were given to Vietnamese adults over 18 years of age attending the 1998 Asian Festival, at the Wichita Indochinese Center, and the Vietnamese Senior Center. Participation in this survey was entirely voluntary, and no name(s) or information that could be used to identify individuals was mentioned on the questionnaire. Steps were taken to ensure each individual only completed one survey. Of the 312 distributed surveys, 33 surveys were discounted for the following reasons: incomplete surveys (14); non-Vietnamese participants (8); participants under 18 years of age (10); and one edentulous participant.

Participants

The age of the individuals who completed the survey ranged from 18 to 86 years, with an average age of 40+18. Fifty percent of the participants were females and 50% males. Most of the respondents indicated that they speak Vietnamese at home (85%), but many answered the survey questions in English (40.5%) (See Table 1). This indicated that most Vietnamese in this survey understand English although they speak Vietnamese at home. The education level ranged from elementary school to college degrees, with most of the subjects having a high school education (36.5%) (Table 2). The monthly personal gross income ranged from under $500 to over $1,600. Fifty-three percent of the subjects earned monthly personal gross incomes of $800 or less (Table 3). The length of time living in the United States ranged from 1 to 38 years (mean 7.4, SD +5.9) (Table 4).

Table 1. Language

Spoken at Home	Number	Percent
Vietnamese	225	85.0
English	20	7.5
Both	21	7.5
Survey Questions Answered		
Vietnamese	96	34.4
English	113	40.5
Both	70	25.1

Table 2. Education

	Number	Percent
Elementary school	35	13.7
Middle school	54	21.2
High school	93	36.5
Some college	34	13.3
College degree	39	15.3

Table 3. Personal Income

Monthly Income	Number	Percent
Under $ 500	70	34.4
$500-$800	38	18.7
$801-$1,200	44	21.7
$1,201-$1,600	20	9.9
Over $1,600	31	15.3

Table 4. Time in U.S.

Years	Number	Percent
1 to 2	50	18.8
3 to 4	43	16.2
5 to 6	59	22.2
7 to 8	40	15.1
9 to 10	20	7.5
Over 10	53	20.0

Instrument

In order to assess Vietnamese attitudes and access to dental health care, a 25-item survey was used. The survey consists of (a) demographic questions soliciting information such as age, gender, marital status, number of members in family, language, occupation, and income, (b) close-ended questions from which participants could choose several options (e.g., how often do you have a dental check-up: every 6 months, every year, more than 1 per year, and only when your teeth ache or hurt, or other), and (c) one Likert scale item (how healthy do you think your teeth are, ranging from excellent (10) to very bad (0)).

Results

One question in the survey was the following: What barriers are preventing you from coming to a dental office to have your teeth scaled or professionally cleaned regularly? There were 10 barriers the participants could choose from. On an average, two barriers were marked. The most common barriers were the following: (a) lack of money (45%), (b) not getting care unless they had a toothache (24%), (c) fear of pain (21%), and (d) lack of time (21%). Thirteen percent of the subjects reported no barriers to regular dental hygiene care.

In responding to a question regarding dental health, most people perceived dental health as average (31%) or above average (33%). Perceived barriers significantly affecting frequency of dental care as shown in Table 5 were (a) not feeling comfortable in the dental office, (b) language barriers, (c) lack of transportation, (d) lack of money, and (e) beliefs that professional cleaning is unnecessary or unimportant. Fear of pain was not significantly related to frequency of dental care. In addition, frequency of dental care was significantly related to income, education, age, and insurance (see Table 6). Ranking of perceived dental health as shown in Table 7 was significantly related to length of time in the U.S., income, education, age, occupation, having dental insurance, frequency of dental care, and number of perceived barriers to dental care.

Table 5. Perceived Barriers

	Correlation	P-Value
Not feeling comfortable in the dental office	.126	.05
Language barrier	.024	.001
Lack of transportation	.135	.03
Lack of money	.509	.001
Professional cleaning is unnecessary or unimportant	.137	.029

Table 6. Frequency of Dental Care Was Significantly Related to

	Correlation	P-Value
Income	.23	.01
Education	.34	.01
Age	-.34	.01
Insurance	.51	.01

Table 7. Ranking of Perceived Dental Health Was Significantly Related to

	Correlation	P-Value
Length of time in U.S.	.28	.01
Income	.21	.01
Education	.41	.01
Age	-.54	.01
Occupation	-.15	.05
Dental insurance	.31	.01
Frequency of dental care	-.41	.01
# Barriers	-.29	.01

Discussion

The hypothesis that length of time living in the U.S., income, and education level are the main factors affecting attitudes and access to dental health care was supported. Having dental insurance was also a major factor. Similarly, Watson et al. (1998) found that people having private insurance visited a dental office more frequently; however, those who had poor dental health did not come to a dental office to have their teeth checked regularly. In addition, Mueller, Schur, and Paramore (1998) found financial barriers were

major factors to access to dental health care. Furthermore, Manski and associates (1998) stated that the examination of individual dental health care patterns should not be based entirely on insurance, education, and income. They suggested that attitudes, barriers, and language and cultural barriers were also significant factors to consider. Finally, Manski et al. proposed that "providers can help facilitate access to dental care by expanding outreach programs and multilingual support" (p. 200).

This study supports previous research: To increase dental care for diverse individuals, many factors and variables need to be considered. For example, it may be easier to recognize barriers such as language barriers, lack of transportation, or lack of money than perceived barriers such as not feeling comfortable in the dental office or believing that professional cleaning is unnecessary or unimportant.

What should dental hygienists do to address these perceived barriers? It is imperative that they become aware of the barriers. They need to recognize that people from other cultures may have different attitudes and to be sensitive to these various attitudes. Furthermore, they should take time to clearly and thoroughly explain to their patients what should be done and the importance of dental hygiene care. This requires that health care providers be patient and dedicated to their work and knowledgeable about people from other cultures.

Because this study involved a limited, convenience sample of Vietnamese individuals living in the Wichita, Kansas area, the results of this survey cannot be generalized without further study. However, it is very possible that the results will apply to the entire Vietnamese population.

Postural Sway in Individuals Aged 20-39 Years

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A study of postural sway in individuals aged 20 to 39 was conducted to assess characteristics in sway for varying stance positions. The main objective was determining the affects of age, gender, visual feedback, and postures on postural sway. This study was accomplished with the use of a force platform to measure the change in the center of gravity in each individual, a weight scale, an anthropometric kit to measure body dimensions, and LabVIEW software to compute the data collected. Twenty participants from a midwestern university were chosen, with an equal number of males and females.

This experiment used four stances: (a) the feet were placed side-by-side with a 3-inch gap between them (feet apart), (b) the feet were placed side-by side with no gap between them (feet together), (c) the dominant foot was placed diagonally in front of the other (semi tandem) and the feet were separated by a 3-inch gap, and (d) the dominant foot was placed directly in front of the other foot such that the toe of the foot in the back touched the heel of the dominant foot (tandem). For all postures, participants were required to face forward to the horizon with arms at the sides in a neutral position. Each stance was completed three times for accuracy and repeatability. Each stance had two trials—one with both eyes open and the other with both eyes closed.

A Microsoft Excel worksheet was used to calculate the sway index and amplitude (anterior-posterior and median-lateral direction). The JMP IN package was used to perform the statistical analyses. All analyses were performed at a significance level of a=0.05.

The postural sway in eight positions was determined. The data was analyzed to compute the sway index and the amplitude in the medial-lateral and anterior-posterior direction. The results showed that (a) age was a significant factor in the sway and amplitude in the anterior-posterior direction, (b) gender had a significant effect on the amplitude in the anterior-posterior direction, and (c) visual feedback affected the sway and amplitude in the anterior-posterior plane. The sway index and the amplitude in both the medial-lateral plane and anterior-posterior plane were not significantly affected by repetition, gender, and group-gender interaction. The results of this study are applicable and represent the U.S. population.

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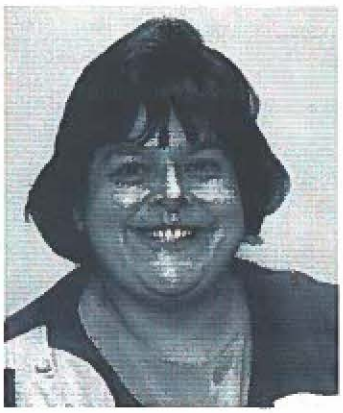

Social Work Students' Attitudes toward Lesbians and Gay Men

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In the United States today, lesbians and gay men are targets of considerable prejudice which is manifested in behavior ranging from verbal expressions of dislike to violent attacks (National Gay Task Force, 1984). Homophobic attitudes can display themselves in less conspicuous ways. Discrimination on the basis of sexual orientation in employment, housing, and public accommodations remains legal throughout the United States (Stiddard, Boggan, Haft, Lister, & Rupp, 1983). Same sex couples often lose custody of their children to the courts and are regularly seen as unfit parents (Susoeff, 1985). Finally and possibly most importantly, disclosing one's sexual orientation carries a risk of rejection from family, friends, and colleagues (Clark, 1977; Moses & Hawkins, 1982).

The National Association of Social Workers' (NASW) Code of Ethics bans discrimination on the basis of sexual orientation and encourages social workers to "act to expand access, choices, and opportunities for oppressed people and groups" (NASW, 1997). At the same time, NASW acknowledges that individual social workers and institutions of social workers are not immune to cultural attitudes and prejudices which may be anti-ethical to those of the social work profession.

This research examines differences among social work students in their reactions toward lesbians and gay men. Two questions are addressed: (a) to what extent do social work students experience homophobic attitudes; and (b) to what extent do males and females differ in homophobic attitudes. G.M. Herek's scale, Attitudes Toward Lesbians and Gay Men (ATLG), which is designed to assess heterosexuals' attitude toward homosexuals, was the instrument used for this study. The ATLG consists of 20 items relating to homophobic attitudes which are rated on a Likert scale. Within the ATLG scale, there are two 10-item sub scales: Attitudes Toward Lesbians (ATL) and Attitudes Toward Gay Men (ATG).

Eighty-two social work students at four Kansas universities voluntarily participated in this study. Demographic information provided facts on gender, age, class status, and race ethnicity. Most of the participants were white/Caucasian females aged 21 to 29 and seniors in college.

The aim of this project was not to explain the existence of homophobia but to explore evidence of homophobic attitudes among social work students. The results revealed that while the majority of social work students in the sample reported a low level of homophobia, approximately one-fourth of the participants responded at either a medium or high level of homophobia. Some of the individuals in the sample exhibited more homophobic responses toward gay men than toward lesbians. In addition, the male participants indicated more homophobic attitudes than females.

Due to the small sample size and small number of male participants, the results of this study are limited and may not be generalized. However, the results are consistent with findings from prior studies using the same scale. Despite the limitations of this research, the data may be useful in future explorations of homophobic attitudes within the field of social work. Further study of homophobia is warranted.

Discharge Planning for Physical Therapists

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Janet Wetta, *MPH, Educational Program Coordinator, Public Health Sciences, WSU Faculty Research Scholar*

Every day medical facilities across the country discharge patients to various continuing care locations such as sub-acute hospitals, rehabilitation hospitals, outpatient facilities, nursing homes, etc. Decisions are made at this time that may have a profound effect on a patient's prognosis, self-esteem, and future health. Many of these facilities have new physical therapists (PTs) or other professionals not familiar with Medicare/Medicaid provisions and the evolving supportive services. In order to facilitate the decision-making process, discharge planners need access to information regarding options available to their patients. Therefore, this paper serves as a resource guide for PTs in the Sedgwick County, Kansas area by providing information on insurance coverage and available services and facilities. The different alternatives discussed in this paper are acute care, inpatient care rehabilitation, long term care, home health, adult daycare, assisted living, and skilled nursing. The information was gathered through personal interviews, literature reviews, and contact with state agencies.

To begin, there are four recognized levels of care: acute, skilled, intermediate, and custodial. Acute care includes hospitals where patients need hospitalization while in the most critical stage of illness. Skilled care includes skilled nursing units, nursing homes, and some rehabilitation hospitals. These patients require ongoing care by a physician, nurse, or registered PT. Patients requiring rehabilitation must show potential for improvement. Intermediate care is provided in rehabilitation hospitals, homes, and outpatient facilities. These patients need some support and assistance, but are expected to go home. An example of custodial care is adult day care and assisted living. These individuals are not expected to show improvement because therapists have done all they can for them.

This guide answers three of the most common questions: (a) what facility will best suit my patient; (b) is my patient qualified to enter this facility or program; and (c) who will pay. Patients leave the hospital or rehabilitation hospital at different levels of functioning; therefore, due to varying needs, they may go to different destinations. Each of these places has requirements/qualifications to enter, and the therapist must know these in order to refer the patient to the appropriate level of care. Most of these require a doctor's order and a plan of care assessment or evaluation. Private insurance, private pay, or the government pays for these services and facilities. The government pays through Medicare/Medicaid and special subsidized programs such as the Specified Low-Income Medicare Beneficiary Program, the Qualified Medicare Beneficiary Program, and the Supplemental Security Income.

This guide provides information for elderly individuals who want to live independently at home. Such individuals can choose from programs such as Lifeline, the Friendship and Assurance Program, and the Medication Set-Up and Reminder Program. For other elderly individuals who may need closer supervision and protection while living independently, there are living arrangements like the Elder Cottage Housing Opportunity, Continuing Care Retirement Community, and Senior Apartment Living.

To summarize, this guide is intended to provide information on the different levels of care, Medicare/Medicaid insurance benefits, services and programs for the elderly, contact persons for different agencies, and the appropriate plan of discharge for a continuum of care. This information benefits patients and professionals in the process of discharge planning.

Memory Processes and Learning

Shenica Renee Graham, *WSU McNair Scholar*
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The memory houses the filtering mechanism, which ensures that not all-incoming data is advanced to subsequent storage levels. The brain stores all entered data, but not all data that is received is necessarily stored in the memory. Therefore, it is imperative that students know how to enter data, store, and retrieve it. This paper provides a step-by-step process to encode and decode memory information. Insight is given into memory processes, providing tools for effective learning. Some of the aspects discussed are initial stimuli, knowledge base (long-term memory), data storage, and retrieval. Students may use this information to strengthen and apply memory skills.

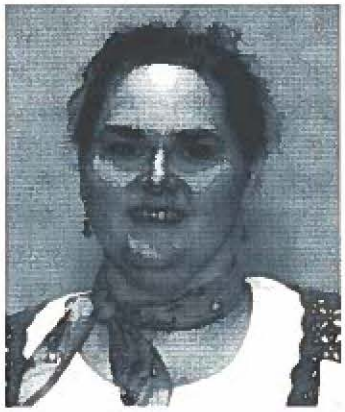
A common misconception about memory storage is that all perceived data enters the knowledge base (KB-long-term memory). Lack of differentiation between incoming stimuli and stored data is largely responsible for this misconception. Stimuli may be discarded at subsequent levels of functioning. Therefore, not all stimuli reaches the knowledge base. Data passing through all prior levels and reaching the KB becomes stored.

In order to acquire and store new information, students must either accommodate or assimilate new data. In accommodation, new, yet familiar information is added to the knowledge base without changing thought processes. On the other hand, assimilation incorporates unfamiliar data. Incorporating new information requires the rearrangement of past data. In some cases, prior information may need to be deleted.

Individual data are defined as digits. Until relationships between ideas are grasped, the mind attempts to retain each digit separately. Speed of mental processing decreases as storage capacity becomes increasingly overwhelmed. Grouping several pieces of information into one digit can minimize this problem. Several connected digits can be perceived as a single entity. Once relationships are formed, main ideas serve as cues for smaller details. To increase memory, students must learn to recognize relationships and connections among ideas. Chunking, the systematic grouping of data, is one approach to connect and retain information. For example, in 1887, Dr. A.C. Aitken used the method of chunking to memorize the first one thousand decimal places of the number pi. He arranged numbers in various sets to remember them.

Other examples of strategies to increase memory are the following: visual imaging, auditory imaging, mnemonic schemes, and the serial position. Visual and auditory imaging focuses on representing visual and auditory stimuli collectively. Mnemonic schemes are typically acronyms in which a few representative letters or words are chosen to simplify more complicated terms and concepts. The serial position curve is the probability that certain words in a list are most likely to be recalled. Strategies are crucial to enhance memory and are most effective when tailored to the individual.

Since not all incoming information is automatically stored, students must learn effective ways to retain the information they need. By grouping information at each level, retention and storage capacity may be increased. Learning various strategies to increase memory is critical to students' success in school. Attention must be given to memory processing and its influence on learning.



The Evolution of Marriage in Medieval Western Europe

Lorrie E. Kessler, *WSU McNair Scholar*
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Before one can study the Middle Ages, one must first define them. Since much of the history of marriage is intimately tied to the Christian Church, for the purposes of this paper Medieval has been arbitrarily classified as the time period coinciding with the rise of Christianity in the Late Roman Empire or the fourth century AD to the fourteenth century. Within this time span, the way marriage was looked upon and the way it was celebrated changed from a temporal focus to a spiritual one. Through contemporary writings and art, this paper traces the evolution of marriage from a secular ceremony to a sacred ceremony.

In ancient Rome, marriage was a civil contract between families. Intent rather than ceremony made a man and woman husband and wife. Since a child could not be counted upon to make a pragmatic decision, the father arranged the marriage. In the Middle Ages the purpose of marriage remained a tool for alliance and to insure the inheritance of the patrimony of the groom. Once the intended spouse was chosen and a marriage contract was agreed upon, the betrothal ceremony could take place followed by the nuptials when the bride and groom were of age.

The church played no role in the marriages of the early Middle Ages. Sexual relations of any kind were seen as evil by the early Church Fathers and were kept as far as possible from the realm of the sacred. This began to change in the ninth century with the rule of Charlemagne when priests began to play a more significant role in the secular government. Marriage was no longer looked on as evil but as a way to keep people from fornicating: sex within the marriage bed was acceptable in moderation, and outside of the marriage bed, it was sin.

The first of three principles promoted by the church regarding marriage was monogamy: a person could only have one spouse and divorce was not allowed except in the case of fornication and then the couple could not remarry. The second principle was exogamy: marriage within seven degrees of relation was incest and incestuous marriages had to be annulled. The third principle was elimination of pleasure: sex was only for procreation and should not be enjoyed because enjoyment of sex led to evil (Duby, 1983).

The takeover by the church of the rites and rule of marriage echoed the fight between the church and state for supreme power. The state used marriage as an object of social control over a kinship-based feudal society. The church viewed marriage as a method of moral and social control. By controlling the rites and rules of marriage, the church had power over the tool used by the state for social control of the land.

"Every . . . discovery about the past changes how we think about the present and what we expect of the future . . . . " (Breisach, 1994). Marriage ritual is a significant aspect of life in the modern Western World, but to truly understand the significance of marriage, rites, and rules, one must understand how they evolved.

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Attribution of College Student Math Anxiety

Mikeal Mahurin, *WSU McNair Scholar*
Robert Zettle, *PhD, Associate Professor of Psychology, WSU Faculty Research Scholar*

Math anxiety may be a contributing factor in many students' inability to attain a desirable level of math competence. Determining the attributions students make about math anxiety is key to understanding the causes and contributing factors.

Relationships have been found between gender and measures of math anxiety (Betz, 1978). Research suggests that females tend to report higher levels of math anxiety and are more willing to admit they are math anxious. Recent studies have found that math anxiety measures can also be affected by the perceptions of what others will think (Zettle & Houghton, 1998). Males may underrate their level of math anxiety because acknowledging anxiety may be viewed as socially unacceptable.

One hundred and ten college students (44 males, 66 females) enrolled in an introductory psychology class in a midwestern university participated in this study. Each participant was administered a questionnaire that depicted either a math anxious male or female, and then the participant was asked to rate how different factors contribute to the student's math anxiety. The scenarios were evenly divided: 55 respondents were given depictions of a math anxious male, and the other 55 were given depictions of a math anxious female. Odd numbered items suggested internal causes while even numbered items related to external causes for math anxiety. Examples of internal and external causes are the following: The character was never good at math (internal cause), and the character didn't study enough (external cause). The questionnaire included the Math Anxiety Attributional Scale (MAAS) and demographic questions such as age and gender. The MAAS is intended to measure the attributions students make about other students that are math anxious.

The results of this study showed some interesting factors in the attributions students make about math anxiety. Participants indicated that male math anxiety can be attributed to factors within their control and that such anxiety is a product of their own actions. On the other hand, female math anxiety was attributed to external factors beyond their control. These findings shed light on other research that indicates gender and social desirability play a role in the assessment of math anxiety (Zettle & Houghton, 1998). Males might be underrepresented in math anxiety studies due to the social desirability and attributions that are made about the causes of their anxiety.

Math anxiety has been a limiting factor in students' choice of majors and even future careers. In order to assess and identify math anxious individuals, increased knowledge about the attributions and social factors contributing to math anxiety is critical. To develop reliable diagnostic and intervention techniques, further research is warranted.

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The Siege of Wounded Knee: A Retrospective

Kim Matthews, *WSU McNair Scholar*
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On February 27, 1973, the Siege of Wounded Knee began on the Pine Ridge Indian Reservation in South Dakota. Members of the American Indian Movement (AIM), directed by one of the leaders, Russell Means, went to the trading post in the tiny hamlet. They secured weapons, ammunition, and other supplies in preparation for making a stand that would draw attention to Indian issues (Means & Wolf, 1995). Residents of Wounded Knee who were there at the time were bound and placed under guard. The trading post, homes, and other buildings in Wounded Knee were ransacked, looted, and/or used by some of the protesters for housing during the occupation. The protestors were immediately surrounded by U.S. Marshals, FBI, BIA police, and others. Negotiations and exchanges of gunfire took place for 71 days. Finally, on May 8, an agreement was reached and the protesters agreed to leave. Many of them were arrested after the occupation.

During and since the time of Wounded Knee, there have been many claims about what happened. These allegations bring up a couple of questions. Did the government deliberately twist information to make the protestors look like militants? If so, did this affect the success of Wounded Knee? In order to assess these charges, I reviewed many sources for information. These include media coverage from the time period, published works and films since the time period, FBI declassified documents regarding AIM and Wounded Knee, and Court records from the Wounded Knee Leadership Trials.

In reviewing the 1973 Siege of Wounded Knee, I have learned several things. First, the government did deny the media access to Wounded Knee during stages of the siege. The Justice Department felt they would not be able to protect the reporters from injury, so reporters were to stay behind the roadblocks. Officials provided press releases for the media; however, just as supporters were able to get in and out of Wounded Knee, so did the media. Secondly, even with poor, unfair, or slanted media coverage, and it was slanted both ways on occasion, the Harris Polls showed Americans generally supported the protestors. The attempts by the government to manipulate the media did not have any substantial effect on the success or failure of the occupation.

As a result of Wounded Knee, more people are aware of Indian issues. Some support the AIM and its use of confrontational politics, and some still see them as violent militants. Neither side in the siege was blameless. While I cannot justify the actions of the government, I also cannot justify the actions of AIM and its supporters. I believe the occupation and related protests were efforts to make the public aware of the realities facing many Native Americans. Historically, Native Americans have been treated unjustly by the government. With the civil rights era and all the other protests happening in the 60's and 70's, it seems the 1973 Siege of Wounded Knee was inevitable.

In the 1990 census, the Pine Ridge Indian Reservation was still one of the poorest places in the United States. Unemployment was at 32.7%, 60.5% of the people were living below the poverty line, 45.3% were on welfare, and 20.9% were lacking plumbing. These problems and others are many of the same ones that existed in 1973.

One of the priests who had been at Wounded Knee said he did not know how the people were able to survive the winters there. I was on the Pine Ridge Indian Reservation during the summer of 1998. I saw first hand some of the conditions the people were living in. I believe it would be difficult to live there any time of the year.

I hope that as a society we can begin to address and act on these situations in order to prevent any more events such as Wounded Knee.

Near Death Experience

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The Near Death Experience (NDE) is a phenomenal event that has sparked a large amount of curiosity among scientific researchers within the past few decades. Through research, scientists have attempted to gain a better understanding of this phenomenon and those who experience it. The NDE, as defined by the University of Virginia Medical School, is a set of events experienced by persons who are seriously ill or on the brink of death. The current controversy in the field surrounds not the verification of the NDE, but "the interpretation and significance of these experiences" (Maitz & Pekala 1991). Scientists provide varying interpretations and explanations of the NDE. This research offers insight into the NDE by examining contrasting points of view. Scientific research and personal accounts of this phenomenon are analyzed.

Death, as defined by the Encarta Encyclopedia, is the irreversible cessation of life that involves the complete change in the status of a living entity. The process of death is a complex event that occurs at five documented levels: (a) somatic death, (b) algor mortis, (c) rigor mortis, (d) livor mortis, and (e) putrefaction. Individual vital organs lose their vitality at different times within a level. For instance, the brain cells can survive for no longer than five minutes after somatic death and the kidneys can maintain their vitality for approximately thirty minutes.

With the advancements of resuscitation and respiratory technology in hospitals, physicians and other medical practitioners are able to maintain a person in a 'living' state for an undetermined length of time. For this reason, classifying death and giving it a distinct definition has contributed to the controversy surrounding the NDE. If death is defined as the final cessation of life, then how and why do individuals who experience the NDE return to life?

Researchers and scientists throughout the years have conducted countless hours of research to validate their contrasting views on the issue of the NDE. Scientists questioning the validity of the NDE have hypothesized many alternative explanations such as a flood of endorphins, temporal lobe epilepsy, normal physiological/psychological response to death, hypoxia and hypercarbia, and reproduction with the aid of hallucinogenic drugs. On the other hand, research proponents of the NDE have obtained hundreds of personal accounts that contain approximately the same events to validate their argument. This paper examines the controversies surrounding the issues of the NDE. An analysis of the NDE is crucial to our understanding of life and death.

Reference

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Structure-Activity Studies of the Chromaffin Granule Electron Transport Protein, Cytochrome b_{561}

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The adrenal chromaffin cell is regarded as a model neuron. The underlying mechanisms in the medulla and sympathetic neurons are strikingly similar. The medullary chromaffin cells have long been known to secrete catecholamines, norepinephrine, and epinephrine. Cytochrome b_{561} spans the chromaffin granule membrane and serves as the electron carrier protein of the chromaffin granule. Since ascorbate is not transported across the chromaffin granule membrane, it has been proposed that cytochrome b_{561} passes electrons from the cytoplasm to the intravesicular matrix to regenerate ascorbate.

Cytochrome b_{561} is a small globular protein containing heme buried in the hydrophobic interior of the molecule. Only the edge of the planar heme ring is accessible to the surface, and small channels on either side of the ring permit access of only small hydrophobic molecules to the heme iron. The way in which electron transfer to and from the deeply buried iron atoms occurs is largely conjectural. The object of this research is to examine the environment of hemes in the cytochrome b_{561} active site and their interaction with catecholamines and ascorbate in order to understand the molecular mechanism of the transmembrane electron transfer process. Catecholamine neurotransmitters in the central and peripheral neurohormonal system may be implicated in clinical disorders such as hypertension, cardiac abnormalities, and neurological dysfunctions like schizophrenia and other mental disorders. Therefore, understanding the in vivo catecholamine neurotransmitter biosynthesis at the molecular level is important for the etiology of these diseases and eventual development of effective therapeutic agents.

Methods

UV-vis spectroscopic instruments were used to examine the interaction of heme with catecholamines and ascorbate in a micellar environment. Cytochrome b_{561} was prepared by isolating chromaffin granules from bovine adrenal medulla collected from a local slaughterhouse. Absorbance measurement of a blank cuvette contained 800 microliter of buffer solution (3 ml Kpi, 1% beta-octylglucoside, 20% glycerol, 0.5 mm DTT pH 8, 150 mM KCl). The sample contained 795 microliter of buffer and 5 microliter of heme. After the blank and sample concentrations were scanned, 34 microliter of tyramine solution (500 mM tyramine HCl) and 16 microliter of buffer were added to sample. The cuvette was mixed and scanned after ten minutes. 8.7 microliter of ascorbic acid (100mM ascorbic acid) and 11.3 microliter of buffer were then added to sample and scanned in five minutes. 18 microliter of dithionite (100 mM dithionite a.k.a. sodium hydrosulfite) and 12 microliter of buffer were mixed and scanned in five minutes.

Discussion

Cytochrome b_{561} in Fig. 1 is in its oxidized and reduced form. With the presence of tyramine in Fig. 2, the absorption spectrum yields the presence of an extra peak and cytochrome b_{561} in its reduced form. Fig. 3 clearly shows that the extra peak is not oxidized or reduced cytochrome b_{561}. The extra peak remains in its oxidized form and cannot be reduced further. In Fig. 4, no changes occurred in free heme when tyramine was added. NMR spectra of heme with and without tyramine also yield no difference. This indicates tyramine does not react with free heme. The most time consuming part of this research was finding the desirable solvent. The best solvent was not found. Data obtained are insufficient to propose the regulation and control of catecholmine neurotransmitter biosynthesis. More research needs to be done on cytochrome b_{561}.

Results

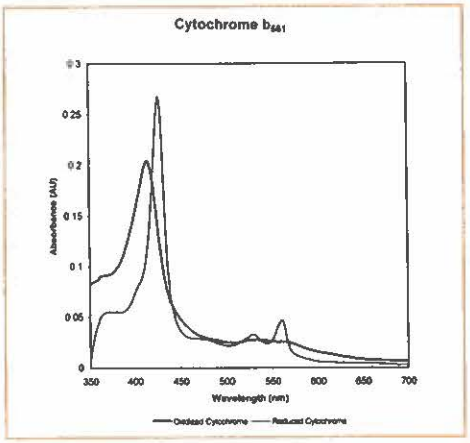

Fig. 1

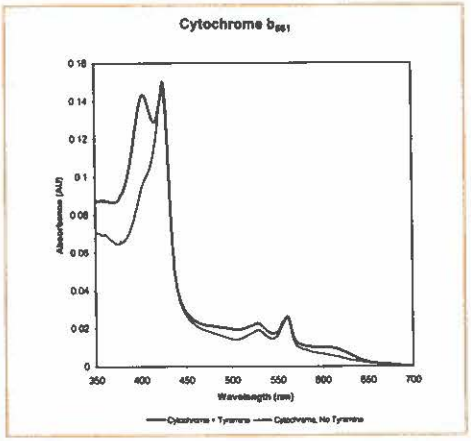

Fig. 2

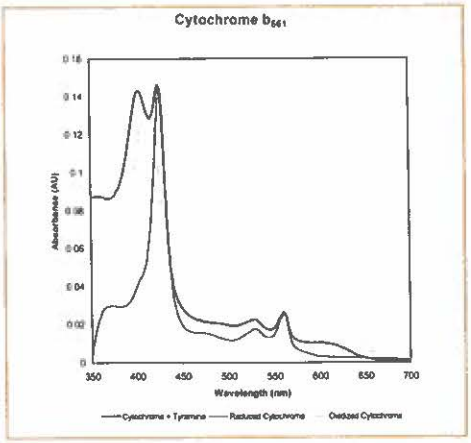

Fig. 3

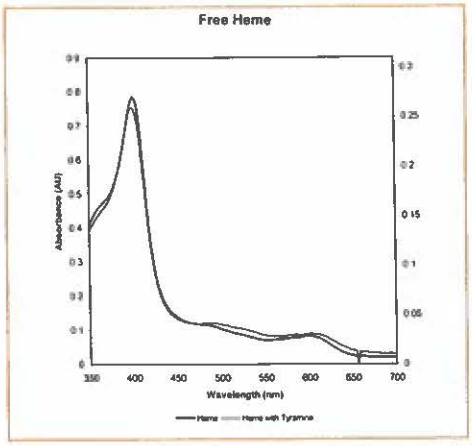

Fig. 4

The Effects of Prayer on Pretest Stress

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Over the last two decades a great deal of research has been conducted on the effects of prayer on the mind and body. Numerous studies support the idea that individuals who pray may experience systemic physiological changes such as a decrease in metabolism, heart rate, and breathing rate (Benson, 1974). Prayer has been shown to have positive effects on various diseases including depression, hypertension, cardiac irregularities, AIDS, and symptoms of cancer. In a study of midlife and aged patients recovering from coronary bypass surgery, individuals who prayed experienced reduced depression and general distress one year after having surgery (Ai, Dunkel, Peterson, & Bolling, 1998). Many researchers support that prayer is an effectual therapy in reducing stress and its ill effects.

Research also indicates many individuals in America pray. A study conducted by Princeton Religious Research Center in 1996 on U.S. Beliefs and Attitudes indicated that 90% of the U.S. population feel God loves them, while another 88% believed in the power of prayer (Emerging Trends, 1996). Prayer is the most frequently used form of religious expression. Because the majority of Americans believe in prayer, many individuals may be comfortable in using prayer as a therapy for the mind and body.

The effectiveness of prayer as a therapy to reduce stress has been researched; however, there is minimal research on the relationship of prayer and pretest stress. Therefore, this study investigates the relationship between prayer and test taking. College students' beliefs about the effect of prayer on pretest stress are examined. The hypothesis is that students who pray believe that prayer aids in reducing pretest stress and thereby improves their grades.

To examine the beliefs of college students regarding prayer and pretest stress, a 15-item descriptive/exploratory survey was administered to 33 health care students at a midwestern university. The questionnaire addresses three major issues: (a) stress and test taking, (b) number of respondents who prayed before taking a test, and (c) student beliefs about prayer and pretest stress. A three point Likert scale was used, with 1 being in agreement none of the time and 3 in agreement most of the time. The descriptive statistics included frequency and range. These were calibrated using the Statistical Package for the Social Services program (SPSS).

Of the 33 students, 82.8% were female, 17.2% were male, and 90% were white. Their ages ranged from 18 to older than 45; 48.3% were between the ages of 18 and 24.

One hundred percent of the participants reported that they believed in God and that God answers prayer, and 96.4% believed prayer had some impact on their stress level. When questioned about whether they feel relaxed after praying about a test, 37.9% of the students marked some of the time, and 27.6% felt relaxed most of the time. About 24% of the respondents prayed some of the time before a test, while 37.9% prayed most of the time. More than 50% of the students indicated they believe prayer helps enhance their grades by reducing pretest stress.

Some of the limitations of this study are (a) small sample size, (b) most of the participants were white females, and (c) the sample was not a random sample. This study, however, could serve as the foundation for future research in this area.

One of the most stressful components of being a student is test taking. Many universities offer classes on test taking strategies. Perhaps prayer is another significant strategy to consider in reducing pretest stress and improving student performance.

References

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