COCKROFT, MARIANNE CHANNAS, Ph.D. Self-Care Behaviors of College Students with Diabetes. (2013)
Directed by Dr. Robin Bartlett and Dr. Debra C. Wallace. 139 pp.

The purpose of this descriptive study was to explore the self-care behaviors of college students with diabetes, compare their behaviors to college students without diabetes, and explore the relationship between select demographic characteristics on self-care behaviors of college students with and without diabetes. The target population was college students between the ages of 18-24 who completed the American College Health Association-National College Health Assessment II in spring, 2009. The self-care behaviors examined through an analysis of the survey data were related to food, activity, rest, and prevention of hazards to life as identified in Orem's self-care deficit theory of nursing. An ecological framework was used to describe the demographic characteristics, or basic conditioning factors, at the intrapersonal, interpersonal, and community levels of influence.

A total of 1216 students met the inclusion criteria for age, with 528 students reporting they had been diagnosed or treated by a professional for diabetes in the past 12 months. Approximately 63% of the total participants were female and nearly 78% were White, Non-Hispanic.

The frequency of students with diabetes meeting the self-care requisites was extremely low, with less than 10% meeting the recommendations for daily fruit and vegetable intake, approximately 30% meeting the recommendations for weekly exercise, and less than 5% achieving adequate rest. Prevention of hazards to life was assessed by examining the frequency of meeting age and gender guidelines for responsible alcohol use and recommendations for weekly alcohol limitations, not smoking, not drinking and driving, and using a seatbelt. Thirty percent of the students with diabetes met the gender guidelines for responsible alcohol consumption and 46% limited their alcohol intake to no more than 1-2 times per week. Seventy

percent of the students reported smoking in the previous 30 days. Eighty percent reported they did not drink and drive in the last 30 days, and 70% reported they always use a seatbelt. While students with diabetes reported better outcomes in the self-care requisites of food, activity, and rest, they more frequently engaged in risk behaviors related to alcohol, smoking and unsafe driving practices than students without diabetes.

Multiple logistic regression analyses were used to examine the association of intrapersonal, interpersonal, and community levels of influence with meeting each self-care requisites. Predictors of self-care behaviors at the intrapersonal level included gender, race/ethnicity, age, grade average, stress, and health knowledge. Predictors found at the community level were status in Greek organizations, place of residence, and participation in organized athletic. Relationship status and marital status found at the interpersonal level were not found to predict the meeting of any of the self-care requisites.

New knowledge on the self-care behaviors of college students with diabetes was developed. Study findings provide insights into the needs for education, further research, and anticipatory guidance from healthcare providers and parents as young people with diabetes transition into college. Study findings may inform interventions that will provide this vulnerable population with greater opportunities for academic success and prevention of long-term complications of this complicated chronic illness.

SELF-CARE BEHAVIORS OF COLLEGE STUDENTS WITH DIABETES

by

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A Dissertation Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
2013

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To my mother, Rose, whose wisdom guided me to become a nurse.

APPROVAL PAGE

This dissertation written by MARIANNE CHANNAS COCKROFT has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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ACKNOWLEDGEMENTS

I wish to express my gratitude to the American College Health Association for use of the National College Health Assessment II, spring 2009, data; and The University of North Carolina at Chapel Hill, School of Nursing for the gift of time to complete this work.

I am sincerely grateful for my committee members, Dr. Jie Hu and Dr. Vincent Francisco for their support and guidance. Dr. Robin Bartlett and Dr. Debra Wallace, co-chairs, were selfless with sharing their time, encouragement, and expertise. Each member made a significant contribution to my study with their specific interests in diabetes, public health, quantitative methods, and adolescent health.

Final heartfelt appreciation is extended to my husband, children, family, and friends who supported this effort.

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CHAPTER I

INTRODUCTION

College students with diabetes are a vulnerable population. The change in residential, social, and learning environments when transitioning from living at home to attending college, along with stresses of academic achievement may significantly impact the daily management of diabetes for college students. Adjusting from child dependency on adult caregivers to expectations of independent self-care management of this highly complex chronic disease during a time of transition from adolescence to adulthood can bring challenges and increased risk for health problems (Anderson & Wolpert, 2004; Morrison, Dashiff, Abdullatif, & Moreland, 2012).

The transition from high school to college brings both challenges and opportunities for all adolescents. It is a time when establishing a sense of self and personal identity through social relationships is of high priority, and the stage where developing strong intimate relationships is of importance (Erikson, 1968). With increased independence and autonomy from family caregivers, college students encounter daily decisions regarding how they eat, study, spend their leisure time, and enact selected behaviors. In addition, students assume self-responsibility for sleep and rest, and establish new friends, support systems, and often new coping mechanisms for managing stress. The choices students make related to nutrition, exercise, sleep, and risk behaviors impact weight, academic success, and health. College students with diabetes face these same decisions, but may risk more serious health consequences from chosen actions due to the interrelatedness of diet, exercise, sleep, and risk behaviors such as alcohol use on glycemic control. While significant research and intervention efforts directed at adolescents with diabetes focus on self-management and glycemic control through age 18 (Guo, Whittemore, & He, 2011), little attention

has been given to assessing self-care behaviors associated with nutrition, exercise, sleep, and prevention of injury of college students with diabetes.

Background and Significance

Developmental Context

As 18-24 year olds, traditional college students may be identified as being in the stage of late adolescence (Brown et al., 2009), young adulthood (Mulye et al., 2009), or emerging adulthood (Arnett, 2000). Although there is no standard definition of "adolescent" (American Psychological Association, 2002) it is commonly accepted as beginning with the onset of physical changes associated with puberty. When adolescence ends and adulthood begins has more variation in interpretation, and may include when the person reaches legal adult status, or when the child lives away from parents and is financially independent, thus spanning a range in age from eighteen to the mid-twenties. Nevertheless, it is known that the evolution from childhood to adulthood is accompanied by physical, cognitive, social, emotional, and behavioral changes (Lerner & Steinberg, 2009).

As emerging adults, college students are generally healthy. There are challenges to examining health statistics of traditional college students, however, due to college students spanning the age ranges of 15-19 and 20-24 years used by various agencies. It is known that the leading causes of mortality for adolescents and young adults, i.e. injury, violence, and suicide, are largely preventable, with accidents (unintentional injuries) accounting for 44.7% of total deaths for 15-19 year olds, and 43.2% of the total deaths of individuals age 20-24 (Heron, 2012). The leading cause of unintentional injury for 15-24 year olds is motor vehicle accidents (Center for Disease Control and Prevention, National Center for Injury Prevention and Control, 2012) and nearly one third of all crash deaths involve alcohol impaired drivers (U.S. Department of Transportation, National Highway Traffic Safety Administration, 2010). The major causes of

morbidity among adolescents and young adults in the U.S. are associated with substance use, teen pregnancy, sexually transmitted infections, and obesity (Blum & Qureshi, 2011).

In October 2011, 12.8 million 16-24 year olds were enrolled in college (U.S. Department of Labor, 2012). Approximately 2.1 million of these students were new high school graduates, representing 68.3 percent of the students who graduated from high school between January and October 2011 (U.S. Department of Labor, 2012). College enrollment of the traditional college age population (18-24 years old) increased 12% between 2000 and 2010 and is projected to grow throughout the next decade (U.S. Department of Education, National Center for Education Statistics, 2011).

An increasing number of individuals with disabilities are attending college, with diabetes among those conditions that qualify for special services (Gordon, Rapp, Dimmick, & Jackson, 2011). Approximately 215,000 or 0.26% of the U.S. population under age 20, or 1 in 400 children and adolescents have type 1 or type 2 diabetes (American Diabetes Association [ADA], 2011). Based on the prevalence rate of 1 of every 400 children and adolescents having diabetes, it is estimated that approximately 5,300 freshman with diabetes entered college in the U.S. in 2011. Indeed 360 college students (1.3%) surveyed through the National College Health Assessment (NCHA)-II in fall 2011 reported being diagnosed with or treated by a physician for diabetes (American College Health Association-[ACHA], 2012a).

Diabetes

Diabetes is a group of diseases characterized by high blood glucose levels that result from defects in the body's ability to produce and/or use insulin (ADA, 2012a). Type 1 diabetes, formerly known as juvenile-onset or insulin dependent diabetes, is an autoimmune disease usually beginning during childhood. Type 1 diabetes accounts for 5% of the adults with diabetes. Type 2 diabetes, formerly referred to as adult-onset or non-insulin dependent diabetes, is a

metabolic disorder primarily seen in adults, however, in recent years type 2 diabetes has been increasing in younger age populations, especially among minority populations (Dabelea et al., 2007). Gestational diabetes occurs during pregnancy and may be a precursor to type 1 or type 2 diabetes.

During 2002-2005, the SEARCH for Diabetes in Youth study found 15,600 youth younger than 20 were newly diagnosed with type 1 diabetes annually compared to 3,600 youth newly diagnosed with type 2 diabetes annually (USDHHS, 2011). Non-Hispanic white youth had the highest rate of new cases of type 1 diabetes and this group had more type 1 than type 2 diagnoses. Asian/Pacific Islander and American Indian youth aged 10-19 had more cases of type 2 than type 1 diabetes diagnosed. The incidence of type 1 and type 2 diabetes were similar for non-Hispanic black and Hispanic youth aged 10-19. Among adults age 20 and over, more males than females (13 million vs. 12.6 million) are reported to have diabetes, as are individuals within racial minority groups (ADA, 2011). Non-Hispanic blacks account for 12.6% of cases, followed by Hispanics (11.8%), Asian Americans (8.4%), and non-Hispanic whites (7.1%). Non-Hispanic whites, however, have a higher prevalence of type 1 diabetes diagnosed during childhood (USDHHS, 2011).

Diabetes is the seventh leading cause of death in the United States and accounted for $174 billion dollars in total healthcare costs in 2007 (ADA, 2011). It is estimated that health care costs are 2.3 times higher for individuals with diabetes than costs for individuals without this chronic disease (U.S. Department of Health and Human Services [USDHHS], 2011). Additional cost burden can occur when complications arise, often due to poor daily self-management with resulting suboptimal glycemic control, increasing morbidity, and risk for premature mortality (Borus & Laffel, 2010).

Treatment of diabetes centers on life-long adherence to a health plan that is managed primarily by the individual. Domains of diabetes self-management include insulin administration (prescribed for all individuals with type 1 diabetes and sometimes used for treating type 2 diabetes), blood glucose monitoring, dietary behaviors, hypoglycemia preparedness, exercise, collaboration with healthcare staff, diabetes problem-solving, and diabetes knowledge (Guo et al., 2011). Successful management of diabetes can lead to avoidance of serious complications, such as cardiovascular disease, kidney disease, and microvascular disease (USDHHS, 2011).

Children with diabetes require extensive monitoring by parents or adult care-givers, but are expected to assume more responsibility for self-management as they mature. Unfortunately, adolescence is a time known to be associated with a decline in metabolic control due to a variety of physiological and psychosocial factors (Court, Cameron, Berg-Kelly, & Swift, 2009). Adolescents often demonstrate poor adherence to treatment regimens exacerbated by increased engagement in risky behaviors and rebellion to authority as they strive for independence (Kaufman, Gallivan, & Warren-Boulton, 2009). The special needs of persons with diabetes during the transition from adolescence to adulthood, however, have not been extensively explored (Anderson & Wolpert, 2004). While compliance with the daily health regimen ultimately rests on the individual with diabetes, environmental factors such as social and family support, a positive relationship with the health provider, and the development of self-care routines have been found to be beneficial to health outcomes (Davidson, Penney, Muller, & Grey, 2004). As health practices established during the transition from adolescence to adulthood may impact future adult health behaviors and health outcomes (Anderson & Wolpert, 2004), it is important to better understand the needs of college students with diabetes through a comprehensive exploration of their self-care behaviors in the context of the university setting.

Health of College Students with Diabetes

The transition to college and years spent pursuing higher education are associated with a variety of stressors for students, with academic pressure and chronic illness among their leading reported stressors (Dusselier, Dunn, Wang, Shelley, & Whalen, 2005). Stress and several mental health concerns are especially significant in college students with diabetes. Being out of the home was found to increase stress and challenges for adolescents with type 1 diabetes due to the interruption in established self-care routines and psychosocial pressures (Balfe, 2009a; Davidson et al., 2004). Teens struggle with the decisions regarding self-disclosure of their health needs, conflicts associated with diabetes regimens, and attempts to maintain an identity of normalcy with peers. Disordered eating and mood disorders such as depression are found to be more prevalent among adolescents with type 1 diabetes than those without the disease (Dahan & McAfee, 2009). In addition, Wdowik, Kendall, & Harris (1997) found stress in college students with diabetes to be a leading barrier to glycemic control, eating regularly, exercise, and sleep. Similarly, Balfe (2009a) found that successful management of diabetes and achievement of optimal glucose control of college students was affected by changes in routines, a new social environment, and stress. The higher levels of stress reported by those with diabetes than their peers without diabetes has resulted in an emphasis on the need for coping skills training to be incorporated into diabetes care (Grey, 2011). Further exploration of the health of college students with diabetes could inform care providers of the need for additional health promotion strategies.

The prevention of injuries associated with risk behaviors is an important aspect of self-care. Alcohol use and excessive drinking is a problem across university settings (Ham & Hope, 2003; Velazquez et al., 2011; Wagoner et al., 2012) and is associated with a variety of consequences, including doing something that was later regretted, engaging in unprotected sex, driving or riding with a driver under the influence of alcohol, and self-injury (Delva et al., 2004;

O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008; Siebert et al., 2003). While it is illegal for students younger than 21 in the U.S., underage alcohol use on college campuses is considered normative behavior when viewed through a developmental lens (Masten, Faden, Zucker, & Spear, 2009). Developmental tasks associated with neurological and cognitive processes may be immature, evidenced by behaviors such as poor self-regulation and weak social problem solving potentially resulting in more risky behaviors and resultant injuries (Brown et al., 2009).

Alcohol use can be a significant health concern for students with diabetes (Gordon et al., 2011). Although hyperglycemia can occur with sweetened beverages and those with a high level of carbohydrates, of particular concern is alcohol-induced hypoglycemia which can occur shortly after drinking and many hours after consumption (Dahan & McAfee, 2009). Symptoms of hypoglycemia may be mistaken for alcohol intoxication resulting in delayed assistance or mistreatment. In addition, poor judgment is an early behavioral response to alcohol use (Friedman, Robinson, & Yelland, 2011) and the combination of low blood sugar and alcohol can have an especially dangerous effect on driving (Cheyne, 2004). College students with diabetes acknowledge peer pressure to drink and find alcohol present at social gatherings (Miller-Hagan & Janas, 2002). A study of 450 undergraduate students with diabetes in a nationally representative sample found college students with diabetes were as likely as students without diabetes to consume alcohol, with 40% of the participants with diabetes reporting heavy drinking episodes (Ravert, 2009). This finding is supported by other studies in which college students with diabetes do not want to be seen as being different from other students and strive for a sense of social normalcy (Balfe, 2007; Eaton, Williams & Bodansky, 2001; Wdowik, Kendall, & Harris, 1997).

Other risk behaviors of adolescents with diabetes have been studied, including tobacco use, unprotected sex, and drug use (Frey et al., 1997; Tercyak et al., 2005). In a study of 155 adolescents aged 10-20 with type 1 diabetes, Frey et al. (1997) found 39% of the subjects

reported alcohol use, 34% reported smoking cigarettes, and 29% reported unprotected intercourse. Perception of risk was higher for peers than for themselves and the frequency of risky behaviors increased with age. In a study of 13-21 year olds with type 1 diabetes, Tercyak et al. (2005) found 25% of the sample (n=53) was a current smoker. This is concerning, given the potential for both macrovascular and microvascular complications exacerbated by smoking in individuals with diabetes (Eliasson, 2003). In general, adolescents with diabetes do not perceive themselves to be more vulnerable to consequences of risk behaviors than other adolescents, and having diabetes does not appear to significantly decrease their risk-taking behaviors (Charron-Prochownik et al., 2006; Frey et al, 1997). Research specific to college students with diabetes is needed to examine the prevalence of behaviors that both promote health and prevent harm.

Traditional college students fall outside the focus area for pediatric and adult medicine practices, thus, there has been limited attention given to this demographic population, especially in the management of chronic conditions, such as diabetes (Anderson & Wolpert, 2004). A report from college students as they transitioned from pediatric to adult healthcare services included expressed difficulties of diabetes self-management attributed primarily to psychosocial issues experienced through their attempts to normalize themselves amongst peers (Wilson, 2010). Health providers, including campus health services, are in a position to assist college students with diabetes to adapt during this transitional time. By engaging in health promotion and injury prevention behaviors, college students with diabetes may reduce risk for long term disease complications and experience optimal health and well-being.

Campus Health

Health promotion of individuals and communities is a key component of Healthy People 2020 (United States Department of Health and Human Services, 2012) and The Patient Protection and Affordable Care Act (ACA) of 2010 (H.R. 3590, 2011). Among the leading health indicators

of Healthy People 2020 are a focus on nutrition, physical activity, and preventive services. Like Healthy People 2020, Healthy Campus 2020 is a set of national objectives and strives to improve the health of a target population (ACHA, 2012b). Aimed at college students, faculty, and staff, Healthy Campus 2020 is a toolkit that includes goals to promote quality of life, healthy development, and positive health behaviors. Healthy People 2020, ACA, and Healthy Campus 2020 support initiatives to understand determinants of health, create healthy communities, and prevent development of secondary conditions in those with chronic disease.

Campus health services vary among college settings and may be a valuable resource for college students with diabetes if offering chronic illness care and the provision of health promotion, health protection, and disease prevention programs. The American Nurses Association (ANA), in collaboration with the ACHA, developed the Scope and Standards of College Health Nursing Practice, last published in 1997 (ANA, 1997). The mission of college health nursing is directed toward "enhancing the educational process by modifying or removing health-related barriers to learning, promoting optimal wellness, enabling individuals to make informed decisions about health related concerns, and empowering students to be self-directed and well-informed consumers of health care services" (ANA, 1997, p. 2). Among the beliefs that support the mission of college health nurses is the concept of self-care recognizing that each individual is responsible for his/her own health (ANA, 1997). The standards of college health nursing practice are based on a nursing model oriented to the client's wellness and self-care. Whether adolescents with diabetes engage in health protective self-care behaviors in college has been understudied and is the focus of this inquiry. By determining if self-care deficits exist among the college students with diabetes, college health nurses and other campus health providers can target areas of need.

Purpose of Study

The purpose of this study was to examine self-care behaviors of college students with diabetes, compare self-care behaviors of college students with diabetes to those students without diabetes, and explore if factors within an ecological framework influence these behaviors. Findings from this study may reveal which self-care behaviors are most practiced and/or neglected by students with diabetes and may indicate if interventions are needed to better prepare adolescents with diabetes for independent college living and assist them in the transition to this new learning environment. In addition, findings may inform campus health services of potential needs of this population so that assistance may be provided to students to optimize their college experience and avoid long term complications associated with diabetes mismanagement.

Theoretical Frameworks

In keeping with the philosophy and conceptual models which guide the *Scope and Standards of College Health Nursing Practice* and the ACHA, Orem's self-care deficit theory of nursing (Orem, 2001) and an ecological model for health promotion (McLeroy, Bibeau, Steckler, & Glanz, 1988) guided this study. In order to develop a healthy campus community, the ACHA recognizes the importance of addressing the multiple levels of influence that determine health and tracking the health status of students through assessment, monitoring, evaluation, and dissemination of findings (ACHA, 2012). Both frameworks recognize the reciprocal nature of individual behaviors and the social environment, and the influence of the environment on health.

Orem's self-care deficit theory has been widely used to guide nursing research, practice, and education (Fawcett, 1999; Pender, Murdaugh, & Parsons, 2011). It has been specifically applied to research and care of individuals with diabetes through theory testing (Frey & Denyes, 1989) and explanations of self-care among adolescents (Dashiff, McCaleb & Cull, 2006). Self-care is the practice of activities that individuals initiate and perform on their own behalf in

maintaining life, health, and well-being (Orem, 2001). Self-care practices contribute to the following achievements: 1. Support of life processes and promotion of normal functioning; 2. Maintenance of normal growth, development, and maturation; 3. Prevention, control, or cure of disease processes and injuries; 4. Prevention of or compensation for disability; and 5. Promotion of well-being (Orem, 2001). Three types of self-care requisites are identified that address universal, developmental, and health-deviation needs. Universal self-care requisites are common to all individuals throughout the life cycle and include the need for sufficient air, water, food, and processes of elimination, as well as maintaining a balance between activity and rest, maintaining a balance between solitude and social interaction, development within social groups to promote normalcy, and prevention of hazards to life (Orem, 2001). Developmental self-care requisites are associated with human growth and maturation processes and with conditions and events that occur during times of transition in the various stages of the life cycle. Health-deviation self-care requisites are associated with genetic and constitutional defects and deviations from normal structural and functional integrity and well-being (Orem, 1991, 2001). College students with diabetes must consider all three types of self-care requisites. They need to meet universal self-care such as requirements associated with nutrition and exercise; developmental self-care such as requirements to transition to independence of college living; and health-deviation self-care to regulate the requirements of living with diabetes. Therapeutic self-care demand refers to the actions necessary to meet all self-care requisites during a specific time period. Self-care deficit occurs when a therapeutic self-care demand is not met due to existing limitations. Self-care limitations may be the result of restrictions of knowing, judgment, decision making, and result-achieving actions. Presence of a self-care deficit may indicate there is a gap between what a person should do and what they can or are willing to do to meet self-care demands. The identification of self-care limitations of college students with diabetes can alert students, families,

and health professionals of the need for interventions such as education, skill development, or social support to prevent an emerging self-care deficit that could jeopardize health and contribute to long term complications associated with diabetes mismanagement. This proposed study aims to assess self-care of college students with diabetes by examining behaviors related to meeting universal self-care requisites of food, activity, rest, and prevention of hazards to life.

Ecological models and theories have been used to explain behaviors and guide behavioral interventions and are widely used in sociology, psychology, and public health (Sallis, Owen, & Fisher, 2008; Stokols, 1996). Ecological models include several core principles that describe the interrelatedness of environmental conditions and human behavior and well-being. First, is the premise that the environment includes physical, social, and cultural levels of influence on health behavior. In addition, there is an interplay between personal attributes and environmental factors that affect health. Finally, there is an interdependence of environmental conditions within and between multiple settings, with settings visualized as nested structures of proximal to distal areas (Stokols, 1996).

The ecological model used to guide the implementation of ACHA campus goals (McLeroy et al, 1988) reflects five determinants of health behavior: intrapersonal factors, interpersonal processes and primary groups, institutional factors, community factors, and public policy. The basic level of influence is the intrapersonal level that includes characteristics of the individual, including knowledge, attitudes, behaviors, self-concept, skill, and developmental history. The interpersonal processes and primary groups reflect relationships found within families, work groups, and friendship networks and include formal and informal social networks. Institutional factors include the formal and informal rules and regulations that are found within social institutions and organizations, such as a university. Community factors are represented by the relationships between formal organizations and informal networks, including groups such as

Greek organizations and athletic teams. Local, state, and national laws, such as the legal drinking age, are included in the policy level of influence. This proposed study assesses selected intrapersonal (age, gender, race/ethnicity, year in school, enrollment status, grade average, diagnosis of diabetes, health status, health knowledge, and stress), interpersonal (relationship status and marital status), and community (residence, membership in social organizations, and participation in organized athletics) determinants of self-care behaviors of college students with diabetes.

Orem (2001) refers to personal conditions or environmental circumstances in a given time or place that affect ways of meeting self-care requisites as basic conditioning factors. Examples of basic conditioning factors are age, gender, marital status, and conditions of living. Orem's basic conditioning factors can be identified within the levels of McLeroy's ecological model. Effectiveness of meeting self-care requisites may be influenced by age (intrapersonal level), relationship status (interpersonal level), and place of residence (community level). Self-care as a set of actions performed by an individual are found at the intrapersonal level. A model illustrating how Orem's self-care deficit theory of nursing and McLeroy's ecological model are conceptualized in this study is shown in Figure 1.

Conceptual Definitions

The Self-care deficit nursing theory (Orem, 2001) and an ecological model for health promotion (McLeroy et al., 1988) guided this study. Self-care is the patterned behavior outcome of interest. Three specific universal self-care requisites as described by Orem that were examined are: (a) maintenance of sufficient intake of food, (b) maintenance of a balance between activity and rest, and (c) prevention of hazards to life, functioning, and well-being. The selected requisites of interest and related actions in this study are identified as critical to diabetes self-management. While individual self-care behaviors, a characteristic of intrapersonal processes, were the main

concerns in this study, several additional ecological influences at the intrapersonal, interpersonal and community level were explored.

Maintenance of Sufficient Intake of Food

Goals of this requisite are "to preserve the integrity of physiologic processes and to take in the quantity required for normal functioning with adjustments for internal and external factors that can affect the requirement" (Orem, 2001, p. 227). Choosing healthy, nutritious foods at appropriate portions is vital to glycemic control for individuals with diabetes. This requisite was explored through students' self-report of fruit and vegetable consumption.

Maintenance of a Balance between Activity and Rest

Applicable actions associated with this requisite is in "recognizing and attending to manifestations of needs for rest and activity; and using personal capabilities, interests, and values as well as culturally prescribed norms as bases for development of a rest-activity pattern" (Orem, 2001, p. 227). Activity in the form of exercise and sleep are known to effect glycemic control in individuals with diabetes. In this study, activity was examined through self-reports of intensity and frequency of exercise. Rest was assessed through self-reports of feeling rested upon awakening, daytime sleepiness, sleep disturbances, effects of sleep difficulties on academic performance, and contributions of sleep difficulties to stress.

Prevention of Hazards to Life, Functioning, and Well-being

Actions that contribute to meeting this requisite include being alert to types of hazards that are likely to occur, taking action to prevent events that may lead to the development of hazardous situations, removing or protecting oneself from hazardous situations when a hazard cannot be eliminated, and controlling hazardous situations to eliminate danger to life or well-being (Orem, 2001, p. 227). In this study, alcohol consumption, tobacco use, and driving after drinking were assessed as they are risk behaviors relevant to the health and safety of college

students with diabetes that either influences glucose metabolism, contribute to disease complications, or impose danger. Students' self-reports of engagement in these risk behaviors, presence or desire for related information, and injury prevention efforts were explored.

Intrapersonal Processes

Age, gender, race/ethnicity, year in school, enrollment status, grade average, perception of health, information needs, and stress are individual characteristics of interest in this study.

Interpersonal Processes and Primary Groups

Relationship and marital status were assessed as they represent peer and family social support networks.

Community Factors

Community in this study refers to mediating structures to which individuals belong (McLeroy et al., 1988). Place of residence, membership in social organizations, and participation in organized college athletics at varsity, club, and intramural levels were examined as they may be important social resources and provide social identity to college students.

Need for the Study

The purpose of this study was to fill a gap in the nursing literature and examine self-care of college students with diabetes. For this study, self-care is theoretically defined as those individual behaviors associated with universal self-care requisites of food, activity, rest, and prevention of hazards to human life as measured by nutrition, physical activity/exercise, sleep, alcohol use, tobacco use, and driving practices. Relationships between these self-care requisites and basic conditioning factors at the intrapersonal, interpersonal, and community level of the ecological model were explored. By examining these relationships and identifying whether self-care deficits are present in college students with diabetes, nurses can develop interventions at multiple levels of the ecological model to address possible self-care limitations.

The limited studies of college students with diabetes have focused primarily on alcohol use (Balfe, 2007a; Miller-Hagan & Janas, 2002; Ravert, 2009) and challenges in self-management (Balfe, 2009a; Wilson, 2010) and are largely qualitative in study design. While these studies provide important information, many of the studies are limited in scope and the number of research participants (Balfe, 2007b; Eaton, Williams, & Bodansky, 2001). Fewer studies are found related to nutrition, activity, and sleep and no known studies examine prevention of hazards to life associated with tobacco use and driving practices exclusive to college students with diabetes. This descriptive study examined factors associated with universal self-care as reported by a large, nationwide sample of college students, with a particular emphasis on self-care of college students with diabetes.

Research Questions

Question 1

To what extent do college students with diabetes meet self-care requisites of:

A. Food (nutrition)

B. Activity (exercise)

C. Rest (sleep)

D. Prevention of hazards to life (alcohol use, smoking, and risky driving)?

Question 2

How does self-care of college students with diabetes compare to self-care of college students without diabetes in requisites of:

A. Food (nutrition)

B. Activity (exercise)

C. Rest (sleep)

D. Prevention of hazards to life (alcohol use, smoking, and risky driving)?

Question 3

In college students with diabetes and without diabetes, what is the relationship between basic conditioning factors found at the intrapersonal, interpersonal, and community levels and meeting the self-care requisites of:

A. Food (nutrition)

B. Activity (exercise)

C. Rest (sleep)

D. Prevention of hazards to life (alcohol use, smoking, and risky driving)?

Assumptions

Participants in this study are college students who completed the American College Health Association-National College Health Assessment II (ACHA-NCHA II) in spring 2009. An assumption is that students completing the survey answered questions with honesty to preserve the scientific integrity of the results. An additional assumption is that, as college students, respondents to the survey have the powers and capabilities to engage in self-care. A final assumption is that students who indicate that they have been diagnosed or treated by a professional for diabetes in the previous year have received education related to diabetes and diabetes management. While the ACHA-NCHA II survey data does not differentiate between type I, type II, or gestational diabetes, self-care related to food, activity, rest, and prevention of hazards to life are relevant to the wellbeing of college students with any form of diabetes.

Chapter Summary

A traditional age college student with diabetes is in a developmentally transitional phase of life moving from adolescence to adulthood. Experiencing more autonomy and independence is accompanied with challenges in establishing a positive identity in the university environment while adhering to positive health behaviors that affect diabetes self-care management. Diet,

exercise, and sleep are key components of diabetes management but may be compromised in college students due to multiple stressors and environmental factors. In addition social pressures exist to engage in alcohol consumption which is linked to numerous consequences, including altered glycemic control, and motor vehicle accidents, the highest cause of unintentional injury for 18 to 24 year olds. Despite their vulnerability, adolescents with diabetes do not perceive themselves to be at greater risk of harm than their peers without diabetes when engaging in risk behaviors.

Orem's self-care deficit theory and McLeroy's ecological model provides a framework in which to examine health behaviors of college students with diabetes. Orem's universal self-care requisites include food, activity, rest, and prevention of hazards to life, while McLeroy's model recognizes the multiple levels of influence that determine health, including intrapersonal characteristics, interpersonal processes, and community factors. This combined framework aligns with goals established by Healthy Campus 2020 to promote quality of life, healthy development, and positive health behaviors of college students.

This study aimed to fill a gap in the literature of college students with diabetes. There is no known study with a large sample size that provides baseline data in which the universal self-care behaviors of this population are described. By examining their self-care practices, findings can be used to promote health and provide interventions where self-care deficits exist. The ultimate outcome would be to prevent diabetes-related health complications, foster academic success, and promote quality of life for this vulnerable population.

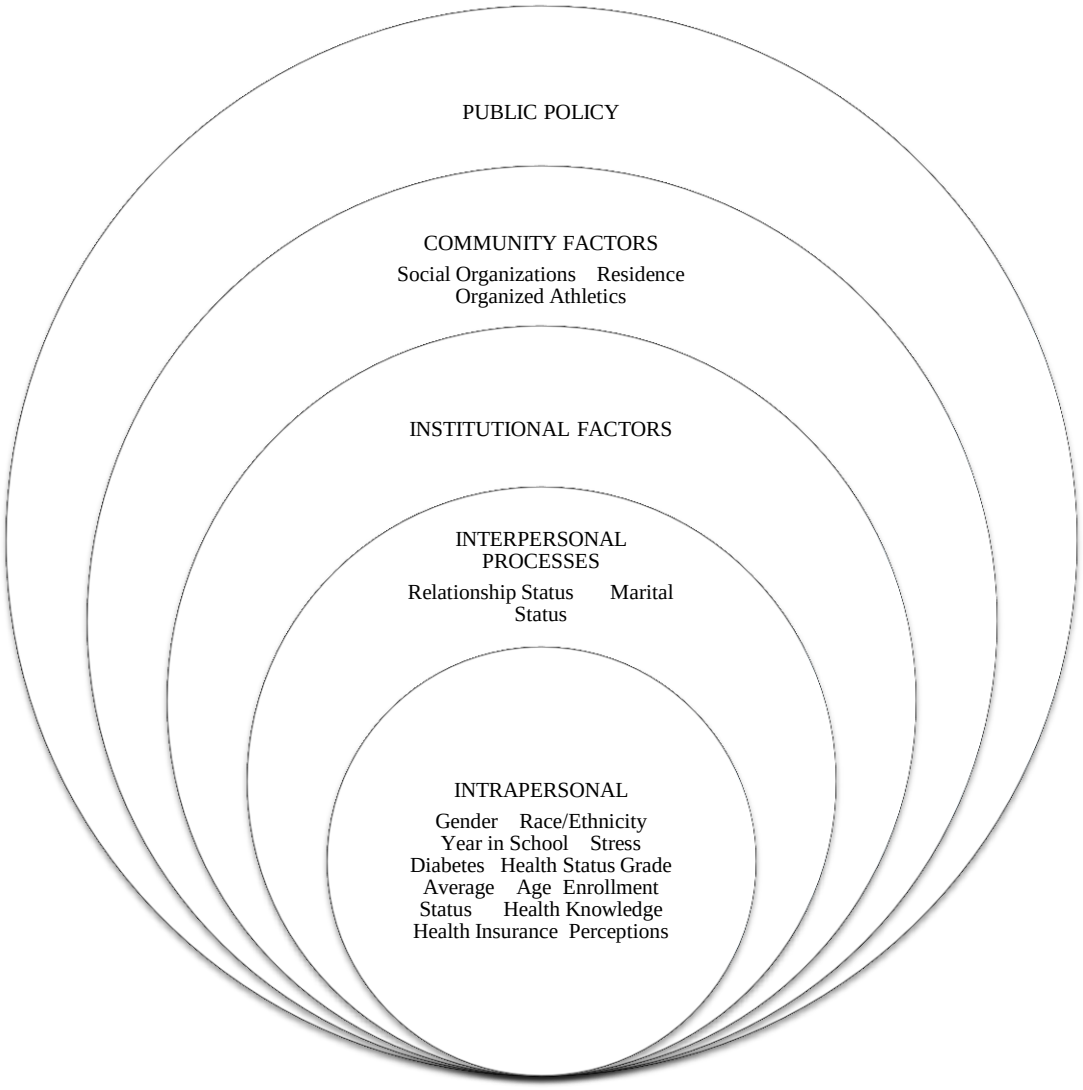

Figure 1. Conceptual model of the basic conditioning factors examined at the intrapersonal, interpersonal, and community levels of an ecological framework

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The purpose of this review of the literature is to synthesize what is known about the state of health of college students with diabetes. The topics of this review include the following universal self-care requisites described in the self-care deficit nursing theory (Orem, 2001): maintenance of sufficient intake of food; maintenance of a balance between activity and rest; and prevention of hazards to life, functioning, and well-being. These select self-care requisites are vital to the health management and wellbeing of individuals with diabetes. The method undertaken to investigate this phenomenon included research of articles using computer (CINAHL, PsychINFO, ERIC databases) and hand-search techniques. Inclusion criteria were relevant articles published in an English language journal between 2000 and 2012, focusing on college students with and without diabetes to provide comparison knowledge. Additional search terms included food, nutrition, activity, exercise, sleep, alcohol, smoking, and driving. The literature was critically analyzed for associations of the select self-care requisites to intrapersonal, interpersonal, and community levels of influence.

Maintenance of Sufficient Intake of Food

As a universal self-care requisite, the amount of food intake should meet body requirements for normal functioning adjusting for internal and external factors (Orem, 2001). The nutritional status of college students is measured by body mass index (BMI), weight, and food choices, and is closely linked to physical activity, stress, and alcohol use (ACHA, 2012a; Hudd, 2000; Lloyd-Richardson, Lucero, DiBello, Jacobson, & Wing, 2008). The growing

prevalence of individuals being overweight and obese across campus communities (Bulmer, Irfan, Barton, Vancour, & Breny, 2010; Hayes et al., 2009) indicates a health concern related to a self-care deficit. While some weight gain is considered developmentally appropriate for individuals between the ages of 18-25, and occurs among non-college attendees as well as those in two and four year programs (Zagorsky & Smith, 2011), there are social ecological factors that place college students at risk for weight gain and other problems associated with eating appropriate quantity and quality of food.

Intrapersonal Factors

Age, gender, ethnicity, year in school, physical activity, alcohol use, having diabetes, and stress are individual characteristics that have been found to influence nutritional status in college students. Considerable research has focused on undergraduate students and freshman weight gain (Hayes et al., 2009; Lloyd-Richardson, Bailey, Fava, & Wing, 2009; Lloyd-Richard et al., 2008; Smith-Jackson & Reel, 2012; Vella-Zarb & Elgar, 2009). While typically gaining less than the acclaimed "freshman fifteen", the majority of first year students tend to gain weight rapidly during their first semester resulting in more weight gain than same-age individuals who do not attend college (Holm-Denoma, Joiner, Vohs, & Heatherton, 2008; Lloyd-Richardson et al., 2009; Zagorsky & Smith, 2011). Intrapersonal predictors of freshman weight gain include decreased physical activity, high junk food consumption, evening snacking, recent dieting, high baseline weight, greater fat mass at baseline, high levels of perceived stress, and alcohol consumption (Vella-Zarb & Elgar, 2009). Although weight gained during the first semester tends to remain stable throughout the remaining freshman year of college (Holm-Denoma et al., 2008), Lloyd-Richardson et al. (2009) found there continued to be a gain in weight through the end of the sophomore year whereby the percentage of overweight students increased from 16% to 25.9% and the percentage of obese students increased from 4.3% to 9.2%. In a study of university

students in the United Kingdom, however, Finlayson, Cecil, Higgs, Hill, and Hetherington (2012) found large fluctuations in weight changes among first year students that included weight loss as well as gains indicating inter-individual differences. Zagorsky and Smith (2011) found in their longitudinal study of U.S. college students, 25% of college freshmen reported losing weight during their first year.

Hayes et al. (2009) found nearly one third of freshman studied at six historically Black universities reported being overweight, but the majority of these students classify their weight as being acceptable. Despues and Friedman (2007) explored ethnic and acculturation differences in health behaviors among undergraduate college students at a large public university. Among their participants, they found when compared to European American college students, Asian American college students were less likely to report eating fruits and salads but more likely to eat French fries, African American students were less likely to eat fruits, and Hispanic American students were less likely to report eating salad.

Ruthig, Marrone, Hladkyj, and Robinson-Epp (2011) assessed the diet of college students by asking them to rate the nutritional value of their diet on a scale from a very poor diet (mostly junk food) to a very good diet (no or hardly any junk food). In this study, female college students (n=140) reported poorer nutrition than male students (n=63). In contrast, Li et al. (2012) found female students engaged in more healthful eating-related behaviors, such as reading food labels and eating breakfast, while males ate more fiber and servings of fruits and vegetables. Female students gained more weight during their first semester of college than male students (Holm-Denoma et al., 2008), but male students gained more weight over time than female students (Lloyd-Richardson et al., 2009; Zagorsky & Smith, 2011).The increased weight gain by men may be attributed to their gain in muscle mass with increased frequency and intensity of physical

activity (Holm-Denoma et al., 2008). Women may, also, tend to self-report weight gain erroneously.

There tends to be more knowledge about female college students than male students on the topic of nutrition and eating habits, as women have a higher response rate to survey requests (Vella-Zarb & Elgar, 2009). In a meta-analysis of twenty-four research studies published on the topic of weight gain among college freshman, Vella-Zarb and Elgar (2009) found approximately 85% of the study participants were female. Women's eating habits are, also, more often exclusively studied due to the prevalence of eating disorders among women. In a study of female freshman students, Smith-Jackson and Reel (2012) used a qualitative approach and determined freshmen women experience intense fears about gaining weight, but view it as inevitable, largely due to changes in eating habits. In another study of female freshmen, Delinsky and Wilson (2008) found female freshman students gained small, but significant, amounts of weight (approximately three pounds) and found diet restraint to avoid weight gain predicted disordered eating, which increased over the course of the freshman year. While there are more studies of female undergraduate students than graduate students, weight concerns continue to exist in older students. Bulmer et al. (2010) found approximately one third of both undergraduate and graduate female students reporting being overweight or obese. Furthermore, among this group, only two thirds of graduate students and slightly more than half of undergraduate students rated their health as excellent or very good.

Stress, physical activity, and alcohol affect the nutritional status of college students in a variety of ways (Holm-Denoma et al., 2008; Hudd et al., 2000; Kelly-Weeder, 2011; Lloyd-Richardson et al., 2008; Zagorsky & Smith, 2011; Nelson, Lust, Story, & Ehlinger, 2009). Female students, who are reported to perceive higher levels of stress than male students (Hayes et al., 2009; Hicks & Miller, 2006; Hudd et al., 2000; Ruthig et al., 2011), report unhealthy

behaviors when stressed that lead to weight gain, such as consuming soda and junk foods and exercising less (Hudd et al., 2000). Moderate alcohol intake has been found to be associated with an increased likelihood of overeating, making unhealthy food choices due to an increased appetite after drinking, and an increase in BMI (Lloyd-Richardson et al., 2008). Such binge eating was subsequently associated with both healthy and unhealthy weight loss behaviors (Kelly-Weeder, 2011). Binge drinking was, also, found to be associated with a variety of adverse nutritional behaviors, such as eating breakfast less frequently, intake of fewer fruits and vegetables, and more fast food dining (Nelson et al., 2009).

There is limited research specific to self-care of college students with diabetes but it is known that diet management is considered to be a leading barrier to optimum glucose control among adolescents with type 1 and type 2 diabetes (Auslander, Sterzing, Zayas, & White, 2010; Ramchandani et al., 2000). Wdowik, Kendall, Harris, and Auld (2001) used focus groups and phone interviews to identify factors that affect the ability of college students with diabetes to engage in appropriate self-care behaviors. Of the 32 college students with diabetes contacted to participate in focus groups, a total of 10 students (8 females, 2 males, ranging in age from 18-35 years) attended one of two sessions. Fifteen individuals (9 females, 6 males aged 19-22 years) participated in the phone interviews. Diet management constraints were identified as a leading barrier to successful diabetes management, along with scheduling and time-management difficulties, stress, hypoglycemic reactions, and inadequate finances. Stress was found to result in sporadic eating habits and students acknowledged that they did not adhere to diet recommendations as often as they should. Students had difficulty planning ahead for meals and snacks even though they were aware of the positive benefits to eating healthy. Although weight was not a concern for male students in this study, females expressed concern that it was difficult to lose weight because of their diabetes.

Normal and problematic weight gain is present in many college students but has added significance for students with diabetes. Of particular concern is the increased risk of eating disorders as eating disorders are more common in individuals with type 1 diabetes than in the general population, especially among females (Colton, Rodin, Bergenstal, & Parkin, 2009). A longitudinal study of young adult females with type 1 diabetes found up to 25% of this population may develop clinically significant disturbed eating habits and attitudes that are associated with insulin misuse, poor glycemic control, poor health outcomes and high morbidity and mortality (Peveler, 2005). Withholding insulin is the most common method of purging in girls with type 1 diabetes and occurs in 30-39% of late teenage and early adult females, primarily for weight control (Colton et al., 2009). Fear of hypoglycemia and embarrassment about blood glucose testing or insulin administration in front of others are other cited reasons for insulin omission. Insulin restrictors reported lower frequency of diabetes self-care behaviors and are at increased risk of diabetes complications, including foot problems and nephropathy (Goebel-Fabbri, 2008).

Through qualitative studies conducted in the U.K., Balfe (2007a, 2007b, 2009a, 2009b) has examined the self-care routines, barriers, and challenges experienced by college students. As in the general college population, first year students with diabetes had the most difficulty in adjusting to university life, primarily due to their desire to establish a positive student identity and not appear different from other students. As they progressed further into their college career, students with diabetes were more concerned about achieving a balance between self-care practices that promoted better physical health, emotional wellbeing, and quality of life and student activities that could threaten their diabetes management. Developing an increased sense of responsibility, exercise, and knowledge of diabetes management were helpful intrapersonal behaviors found to improve diabetes self-care for college students (Ramchandani et al., 2000).

Interpersonal Processes

Establishing a social identity and developing relationships is a key component of the college experience. Interactions with family, roommates, and friends have been found to influence self-care related to nutritional status and eating behaviors. In a study of college freshmen, a positive relationship with parents predicted weight gain for women, whereas for men, troublesome relationships with parents predicted weight gain (Holm-Denoma et al., 2008).

A four-year longitudinal study was conducted by Economos, Hildebrandt, and Hyatt (2008), in which freshmen college students were studied to determine the effects of stress and health behaviors on weight change. Relationships were a source of stress for approximately 70% of both male and female students. Stress from parents decreased and stress from roommates and academic pressures increased over the course of time. Among men, increased alcohol consumption was correlated to weight gain. However, increased alcohol associated with peer pressure was related to weight loss, suggesting that when some males suffer academic or social stress, they may tend to lose weight. In this study, only workload stress was significantly associated with weight gain in women, and fruit and vegetable consumption was linked to weight loss.

In a study of randomly assigned roommates, Yakusheva, Kapinos, and Weiss (2011) explored weight gain as it pertains to peer influences among female students. They determined weight gained by females during the freshman year is strongly and negatively correlated to the initial weight of their roommate. Weight-loss behaviors, such as exercise and use of weight-loss supplements, of one roommate were taken on by the other roommate, resulting in less weight gain than would otherwise be expected.

College students with diabetes long to appear normal amongst their peers, however, that desire may negatively influence food choices, food intake, nutrition, and overall health (Balfe,

2007a; Balfe, 2007b; Balfe, 2009a; Balfe, 2009b; Wilson, 2010). Irregular schedules, lack of parent involvement, and peer pressures were identified as factors that negatively impacted nutrition (Balfe, 2009a; Ramchandani et al., 2000). Ramchandani et al. (2000) administered a questionnaire to 42 students in the U.S. exploring factors that affected glycemic control in college students with type 1 diabetes. In addition to identifying the interpersonal barriers to control, relationships with healthcare providers was noted as a factor that improved diabetes control.

In a study of 47 undergraduate students in the U.K., Eaton, Williams, and Bodansky (2001) found slightly more than half of college students with diabetes responded positively that having diabetes interfered with being a student. Upon conducting interviews (n=8), however, all students felt having diabetes did not affect their social life, but could affect the type of food eaten, and that eating extra pizza and fast food was considered acceptable. In contrast, Wilson (2010) found some college students with diabetes tended to reduce participation in social events and acknowledge difficulty in eating out and injecting medication.

Community Factors

The university setting provides multiple avenues for students to become engaged in the college community, such as academic classrooms, residence halls, eating establishments, special interest clubs, athletics, and social organizations. The community factors particularly relevant to nutritional self-care include the place of residence and dining facilities. Living in a dormitory, especially for freshmen students, has been found to influence and challenge self-care. In a review of the literature debunking the "freshman 15" myth, Zagorsky and Smith (2011) identify possible theories for weight gain found in first year college students, reasoning that institutional food is more calorie dense, students have an unbalanced diet without parental oversight, students have access to all-you-can-eat cafeterias and snack foods, budget conscience students find less expense associated with higher calorie foods, physiological changes are incurred by increased stress with

resulting overconsumption of high-calorie comfort foods and alcohol, students are sleep deprived, and experience decreased physical activity. Living in a dormitory was significant for weight gain in men but not for women, suggesting that the dorm environment may be associated with heavy drinking reported among freshmen men (Zagorsky & Smith, 2011). A food inventory conducted in residence halls revealed more students had unhealthy snacks in their rooms, such as desserts and sugar-sweetened beverages, than low-calorie drinks or fruits and vegetables (Nelson & Story, 2009). Surprisingly, more unhealthy snacks were purchased by parents than students. Li et al. (2012) conclude university students' nutrient intake is in need of improvement. Compared with undergraduate men, women tended to eat more frequently in the campus dining halls, and consumed less fast food (Li et al., 2012), but they should increase fiber content and fruits and vegetables in their diet.

The influence of the place of residence on freshmen weight gain and weight-related behaviors has been further examined by looking at specific aspects of dormitory characteristics, namely the presence of an on-site cafeteria, distance to central campus, and proximity to a gym (Kapinos & Yakusheva, 2011). Female students assigned to dormitories with on-site dining halls gained more weight and exercised less compared to female students in other housing. Female students living closer to a campus gym exercised more frequently, however, living closer to central campus reduced exercise. Males living in residence halls with on-site dining facilities reported significantly more frequent meals and snacks.

Freedman (2010) studied the link between gender, ethnicity, and place of residence on BMI and dietary habits, including food intake, meal patterns, and exercise habits of college freshmen. In this sample population, a large number of students were commuters living at home and 54% of freshmen lived on campus. Of the large multi-ethnic sample (White, Asian, Hispanic, Other), more Asian students (46%) lived off campus than on campus and more Whites

(36%) lived on campus. Twenty-five percent of the total respondents self-identified themselves as being overweight or obese. More overweight females lived on-campus but more overweight males were commuter students. More Asians reported being underweight and had the lowest rates of overweight and obesity compared to other groups. Student perception of weight change was significantly related to residence, with more students living on-campus reporting weight gain of at least 5 pounds and a worsening diet than students living off-campus. Fewer students living on-campus met the daily requirement for fruit and vegetable consumption and both groups had a significant drop in intake of dairy products after starting college. Students living on- campus ate fewer meals with only 28% of these students eating breakfast daily.

There is very little known about the influence of community factors on self-care and nutrition in college students with diabetes, although it is acknowledged that there is tension in college students with diabetes between wanting to be normal and being healthy in a university environment (Balfe, 2009b). Among college students in the U.K., living in a dorm was found to provide some structure and helped first year students establish routines and transition to university life (Balfe, 2009a). This structure was missing when moving out of the dorm in subsequent years and effected diabetes self-care for older university students. As Freedman (2010) determined, the college environment can be detrimental to nutritional status and healthy eating. A comparison of campus residence status and self-care of students with diabetes may fill a knowledge gap.

Maintenance of a Balance between Activity and Rest

The maintenance of balance between activity and rest is of fundamental importance to health and wellbeing (Orem, 2001). It includes energy expenditure through physical movement as well as recognizing and providing for personal requirements for rest. While intellectual and social activities are valuable and at the forefront of the college experience, it is the physical

activity and exercise in addition to sleep that are the important self-requisites of concern in this study.

Physical Activity

The Center for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion (2011b) describes physical activity as anything that gets one's body moving and recommends both aerobic activity and muscle strengthening exercises for adults. Physical activity has many benefits to individuals of all ages with implications for physical and mental health. Among college students, physical activity is a significant factor in weight changes, stress levels, perception of health, diabetes control, and academic performance (Holm-Denoma et al., 2008; Mellinger, 2003; Ruthig et al., 2011). The majority of college students engages in some type of physical activity and are satisfied with their fitness level (Hudd et al., 2000). A decade ago, running and weight lifting were identified as the most popular forms of activity reported at a U.S. Ivy-league university (Hudd et al., 2000). The physical activity objectives for exercise and strength training moved toward the target goals of Healthy Campus 2010 (Burwell, Dewald, & Grizzell, 2010) and the prevalence of physical exercise has increased among students in many European universities, as well (Steptoe et al., 2002). Nevertheless, the growing concerns regarding increasing trends in weight gain and links to chronic disease have resulted in a closer look at motivators and predictors of physical activity and exercise among college students. Several intrapersonal, interpersonal, and community influences on activity and rest among college students are found in the literature.

Intrapersonal factors. Gender and ethnicity were found to be an influence on predictors of physical activity among college students. Female students are found to exercise less than male students across cultures (Andrijašević, Paušić, Bavčević, & Ciliga, 2005; Hayes et al., 2009; Hicks & Miller, 2006; Magoc, Tomaka, & Thompson, 2010; Ruthig et al., 2011; Steptoe et al.,

2002). In a study of predominantly Hispanic college students in which 54% of the sample was overweight or obese, Magoc et al. (2010) found that while 61 % of students engage in exercise, the majority do not meet the CDC recommendations for moderate or vigorous physical activity. Females in this study placed less value on exercise than did men, and reported exercising less frequently, for shorter duration, and at lower intensity than men. Among freshmen students surveyed at six private Historically Black Colleges and Universities (HBCUs), Hayes et al. (2009) found male students were more likely to rate their health as excellent or very good compared to female students, engaged in more vigorous physical activity and strengthening exercises, perceived less stress, and watched less television than females. Similarly, Andrijašević et al. (2005) found college women to report less exercise, more stress, and more sedentary leisure activities than men while men were more likely to rate their health better than women, thus providing a link between increased exercise and overall perception of wellbeing. Stress has been reported to be higher among students who exercised less or did not participate in any sport regularly throughout the past decade (Hudd et al., 2000; Magoc et al., 2010).

Gender and cultural differences were detected when examining motivators of physical activity. Compared to European Americans, Asian Americans, African Americans, and Hispanic Americans were less likely to engage in health-promotion behaviors, including exercise (Despues & Friedman, 2007). White students were motivated to engage in physical activity by the desire for stress management, enjoyment, and weight management, whereas Black students were motivated by health pressures, weight reduction or control, and ill-health avoidance (Ajibade, 2011; Egli, Bland, Melton, & Czech 2011). Men were motivated to exercise for strengthening, competition, and challenge, though women were motivated by weight management and appearance (Egli et al., 2011).

While exercise is a critical component of diabetes self-management with poor metabolic control associated with decreased moderate physical activity (Tercyak et al., 2005), there is little known about the frequency and types of physical activity reported by college students with diabetes. College students with diabetes are aware of the importance of exercising, but struggle to find time to fit it into their busy schedules (Wdowik et al., 1997). Although high intention to follow recommended self-care practices was predictive of frequency of exercise, negative emotions, such as stress, were a deterrent to actual exercise participation (Wdowik et al., 2001). In a study of 53 adolescents age 13-21 with diabetes and 53 control adolescents without diabetes, Tercyak et al. (2005) found the frequency of engaging in moderate physical activity (approximately 2.5 days/week) comparable in both samples. While this study was not exclusive to college students, it does suggest college-aged adolescents with diabetes are not getting the recommended amount of physical activity to have health benefits. A comparison of physical activity of college students with diabetes and without diabetes is an aim of the proposed study.

Interpersonal processes. Social relationships from friends and family have been found to influence motivation to engage in physical activity among college students. Attachment theory and motivational determination theory were used to explain physical activity in college students (Ullrich-French, Smith, & Cox, 2011). Gruber (2008) examined peer relationships among 410 undergraduate students at a predominately Black university. Females in this study reported receiving more exercise and diet support from friends and peers than did males, and females received more encouragement related to exercise, diet, weight loss, and criticism about not exercising when their peer group consisted of mostly males. Male students received more support for exercise and diet behaviors when their peers were all or mostly females.

Community factors. In a survey of 138 mostly freshman (55%) African American female students at a HBCU, Ajibade (2011) determined those who lived on-campus were

significantly more likely to meet recommended amounts of physical activity than students who lived off- campus. Participating in moderate physical activity 4-7 days/week was reported by approximately 44% of students living on-campus compared to 19% of students who lived off-campus. Students in this study who lived on-campus were more likely to take physical activity classes. In contrast, a larger study of first year students at a HBCU, found students living off-campus reported engaging in exercise more often than students living on-campus (Hicks & Heastie, 2008). Finally, in a study conducted with 756 freshman students on an urban campus, Freedman (2010) found no difference in current exercise patterns based on residence, as both groups achieved high levels of exercise. Students living on-campus, however, reported exercising less since starting college. It is noted that there are no cars permitted on this campus. Thus, it is possible that the on-campus fitness and activity resources as well as university policies unique to a particular campus influence the degree of exercise and physical activity of its students.

Rest

There is no doubt that sleep is important during the college years to maintain health, optimize wellbeing, and achieve academic success (Austin, 2008; Orzech, Salafsky, & Hamilton, 2011). Sleep is, also, associated with a number of chronic diseases and conditions including diabetes, obesity, and depressed mood (Barone & Menna-Barreto, 2011; Perfect et al., 2012). Not only is insufficient sleep associated with the onset of these diseases, but sleep is of critical importance for their management and outcome. In addition, insufficient sleep is responsible for motor vehicle accidents, with drowsy driving considered as dangerous as driving while intoxicated (Center for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 2012). Research on the relationship of sleep and wellbeing in individuals with diabetes is gaining prominence in the literature, but does not adequately represent the college-age population. Given the knowledge of sleep deprivation in the general

college population with its negative effects on health and academic success, and the physiological response of sleep restriction on insulin sensitivity, more research is needed on the topic of sleep with college students with diabetes.

Intrapersonal factors. Sleep problems, assessed through self-reports of sleep quality and daytime sleepiness, have been linked to lower grade point average among full-time students (Gaultney, 2010; Howell, Jahrig, & Powell, 2004), physical illness and mood disorders (Lund, Reider, Whiting, & Prichard, 2010), excess alcohol use (Kenney, Labrie, Hummer, & Pham, 2012; Lund et al., 2010), and drowsy driving (Taylor & Bramoweth, 2010; Williams et al., 2012). The majority of students receive less than the recommended number of hours of sleep and many use alcohol and medications as sleep aids (Lund et al., 2010; Taylor & Bramoweth, 2010). Female college students report poorer sleep quality and sleepiness than males and are at greater risk of sleep disorders, including insomnia and nightmares (Howell et al., 2004; Orzech et al., 2011; Gaultney, 2010). In an analysis of sleep logs kept by 237 undergraduate students, Tsai and Li (2004) determined freshmen students slept less on weekdays compared to other students, but not on weekends. Better sleep quality was found by students at all grade levels on the weekends.

A study of seven adults with type 1 diabetes (mean age 44 years) showed that a single night of partial sleep restriction resulted in reduced insulin sensitivity suggesting that chronic sleep restriction might contribute to insulin resistance in patients with type 1 diabetes (Donga, 2010). In addition to effecting metabolic control in individuals with type 1 diabetes, impaired sleep may contribute to the development and control of type 2 diabetes (Barone & Menna-Barreto, 2011). Poor metabolic control further impacts sleep disturbances as it is associated with frequent episodes of nocturnal urination, thus creating a vicious cycle of cause and effect.

Focus groups conducted with 17 adults (mean age=55.5) with type 2 diabetes revealed the most problematic areas related to sleepiness included lack of productivity, difficulty making

rational and safe decisions, following through with routine tasks, decreased social interactions, and lack of motivation to exercise or cook meals (Chasens & Olshansky, 2008). The effect of a decrease in motivation on self-care related to nutrition and physical activity can seriously influence diabetes management. Poor sleep quality and daytime sleepiness was found to be associated with depressive symptoms and negatively influenced diabetes management in both adults with type 2 diabetes (Luyster & Dunbar-Jacob, 2011) and children with type 1 diabetes (Perfect, 2012).

Interpersonal processes. In a study of 1,125 undergraduate students at a large private university, emotional and academic stress, excess noise, cosleeping, and talking with friends were identified as common reasons for disturbed quality of sleep (Lund et al., 2010). A survey, interviews, and a sleep media campaign provided Orzech et al. (2011) with a view of sleep quality and disturbances, sleep habits, and effectiveness of sleep promotion materials in students living in residence halls at a large university. Only 10% of the mostly freshmen participants rated their sleep as very good. Many students reported having trouble staying awake while driving, eating meals, or engaging in social activities although interview comments alluded to students minimizing the importance of sleep. Students who reported conflicts with a friend, family member, significant other, or roommate experienced poor sleep quality. Likewise, students who self-reported mental health issues, including anxiety and depression, had worse sleep quality than those students who did acknowledge these conditions.

Community factors. In a study of 261 college students, Kenney et al. (2012) found approximately 64% of females and 40% of males to report poor quality sleep and 50% of the females and 53.5% of the males reported engaging in heavy episodic drinking the in the two weeks prior to the study. The cycle of poor sleep quality, excess alcohol use, and consequences of increased alcohol-related risk behaviors was particularly noted in students with affiliation to

Greek organizations. Those reporting Greek affiliation were significantly more likely than non-Greeks to use sleeping medication, engage in binge drinking, and experience greater alcohol consequences. Global sleep quality was found to be a moderator between heavy episodic drinking and alcohol consequences in this study.

A sleep media campaign conducted by Orzech et al. (2011) involved placing posters promoting the benefits of sleep in residence halls and distributing a health education newsletter with articles pertaining to sleep to all students residing on campus. Improved sleep quality was experienced by 9% of the students who responded to questions related to their personal experiences after seeing the health education materials.

Prevention of Hazards to Life, Functioning, and Well-being

Among the actions necessary to prevent hazards to life are being alert and knowledgeable about hazards that are likely to occur, taking action to protect oneself from harm, and controlling hazardous situations to eliminate danger to life or wellbeing (Orem, 2001). Three prevailing hazards to life for college students with diabetes are alcohol use, smoking, and unsafe driving. Efforts to combat these problems among the general college population have received national attention through established goals of Healthy Campus 2020 (ACHA, 2012b). The increasing pervasiveness of binge drinking among college students, incidence of smoking, and concerns related to driving under the influence of alcohol are addressed below.

Alcohol Use

Binge drinking, also known as high risk or heavy episodic drinking, is defined by the National Institute on Alcohol Abuse and Alcoholism as a pattern of drinking alcohol that brings blood alcohol concentration to 0.08 grams percent or above, which for a typical adult consists of consuming five or more drinks (for males) or four or more drinks (for females) in about two hours (U. S. Department of Health and Human Services, National Institute of Health, 2004).

Such drinking is more evident among college students than those not enrolled in college and is associated with a variety of harmful consequences. Although alcohol use among college students has had a slight downward trend since 2008 (Johnston, O'Malley, Bachman, & Schulenberg, 2012), it is still seen as a problem on many college campuses.

Intrapersonal factors. There have been some health-protective effects shown toward coronary heart disease with moderate alcohol use in older adults, however, there is little benefit to drinking alcohol for young adults and alcohol use is associated with higher risk for injury and death in this population (Storey, Forshee, & Weaver, 2008). In a review of the literature, alcohol, as a central nervous system depressant, has been found to contribute to depressed cognition and motor skills, impaired learning and memory, disruption of the sleep-wake cycle, and has been associated with suicide (Zeigler et al., 2005). In addition, underage-age and college-age drinkers are at greater risk of neurotoxicity and harmful cognitive effects of alcohol consumption than individuals who begin drinking later in life (Zeigler et al., 2005).

Among U.S. college students, binge drinking is more prevalent among males and Whites (Bulmer, Irfan, Mugno, Barton, & Ackerman, 2010; Kenney et al., 2012; Siebert, Wilke, Delva, Smith, & Howell, 2003), although trends show the gender gap is closing (Johnston et al., 2012). In the United Kingdom, Morton and Tighe (2011) surveyed 40 undergraduate students to explore prevalence of binge drinking as well as reasons and attitudes towards this behavior. Among the population studied, 92% of participants were classified as binge drinkers and cited opportunities to socialize, pleasure, wanting to feel intoxicated, enjoyment of taste, low cost, and student alcohol promotions as the primary reasons for drinking. Ninety percent of the students were not aware of sensible drinking guidelines (Morton & Tighe, 2011).

In a secondary analysis of data collected via the National College Health Assessment in Spring 2002 at a large southeastern, public university, Siebert et al. (2003) sought to examine

differences in drinking behaviors and consequences, harm reduction strategies, and health information sources between African American and White college students. Findings showed White students were more likely to consume alcohol in larger quantity and increased frequency and experience more alcohol-related consequences than African American students. There were no differences between groups in the behavior of driving after drinking in the previous 30 days, with 60.2% of Whites and 55.3% of African American students reporting this action. Both groups reported they usually received information on health-related topics from parents, and health educators and health center medical staff were the most believable resources, though they used them less often than parents and friends.

Self-protective behaviors aimed at reducing alcohol consequences, such as eating before or during drinking, using a designated driver, keeping track of the number of drinks consumed, and avoiding drinking games are promoted to reduce harm among college students. In a study of 1,355 undergraduate students, Delva et al. (2004) determined that suffering consequences of alcohol use is reported by most student drinkers. The most common problem among both men and women was doing something they later regretted. Additional reported problems include forgetting where they were or what they did, physically injuring themselves, having unprotected sex, and academic problems (Delva et al., 2004). Student drinkers who engaged in more types of protective behaviors more frequently were less likely to experience alcohol problems (Delva et al., 2004).

Despite the risks associated with glycemic control and alcohol, the majority of college students with diabetes choose to drink (Balfe, 2007a; Ravert, 2009). In a national sample of 450 undergraduate college students (age 18-25, 67.6% female) who self-reported being diagnosed with diabetes on the Spring 2006 National College Health Assessment, 41.8% reported binge drinking in the previous two week period, and 36.6% reported at least one alcohol-related

consequence in the past year. Sustaining an injury to themselves, doing something they later regretted, and forgetting where they were or what they did were the most frequently cited alcohol-related consequences (Ravert, 2009). College students with diabetes believe they can minimize alcohol-related harm if they are careful, but acknowledge they gathered information about drinking on their own, not from a healthcare provider (Miller-Hagan & Janas, 2002). The most commonly used self-protection strategy was eating before and/or during drinking, although eating was associated with higher levels of alcohol consumption (Ravert, 2009). Ismail (2006) compared blood glucose values of fourteen adolescents over sixteen years of age and found, although they experienced increased glucose lability following alcohol consumption in a social context, they were able to avoid hypoglycemia by eating prior to and after drinking, and using sweetened beverages as mixers.

Interpersonal processes. In addition to individual harm, alcohol related consequences also affect interpersonal relationships. In a large study of 4,271 students conducted on 10 college campuses in North Carolina, high-risk drinking behaviors were found to be associated with alcohol-related consequences, including being taken advantage of sexually, sexual misconduct, and likelihood of riding with an alcohol-impaired driver (O'Brien et al., 2008).

Interpersonal relationships can have a protective effect on drinking behaviors and consequences for some students (Velazquez et al., 2011; Wagoner et al., 2012). In a study of 13,700 students at two and four year colleges in Minnesota (Velazquez et al., 2011), more students in two-year programs were married or had a domestic partner, lived with parents, or had children. Students attending two-year colleges reported less binge drinking and fewer alcohol-related consequences. In a large, multi-campus study spanning three years of data collection, Wagoner et al. (2012) determined females who were married or in a steady relationship were significantly less likely to experience severe alcohol-related consequences.

The implementation of a community organizing approach to prevent alcohol related consequences associated with high-risk drinking among college students was effective in the domain of interpersonal harms (Wolfson et al., 2012). Among the many strategies within a social ecological paradigm were the education of students regarding personal liability, parental notification of student alcohol violations, provision of alcohol-free activities, and enactment of a party monitoring program.

College students with diabetes recognize the effect of alcohol on their health in the present and future, but through interviews of seventeen students (all white, eleven female and six male, all living away from home) at four universities in the U.K (response rate 11%,) to explore narratives of practice of university students aged 18-25 with type 1 diabetes, Balfe (2007a) found they choose to drink, especially in public places, to establish a social identity and achieve a sense of normalcy. To not drink was perceived to be risky to their identities, although drinking was often followed by feelings of guilt. While this pattern was noted primarily in first year students, older students had less risky drinking practices attributed to more security in their friendship relationships and peer group networks (Balfe, 2007a). Miller-Hagan and Janas (2002) conducted semi-structured interviews with fifteen college students, aged 18-40, with type 1 and type 2 diabetes, at a large university, to explore the impact of starting college on diabetes management and situational obstacles to diet-related self-care. Data on drinking was mentioned as an obstacle by all but one student. Participants perceived drinking to be the primary social activity and peer pressure to drink to be strong at this university. The students felt unprepared for college parties but developed management strategies for drinking through social support systems, such as developing friendships with those who did not drink. Not attending parties, and disclosing having diabetes to those peers pressuring them to drink were additional strategies. Some students volunteered to be the designated driver for friends who were drinking, and one student used his

leadership role in a fraternity to change drinking rules. Ravert (2009) found younger students with diabetes who relied on a friend as an alcohol management strategy tended to have higher alcohol consumption.

Community factors. Alcohol use is pervasive among students attending two year and four year colleges, and is seen among students living both on and off-campus, although some differences are found. Velazquez et al. (2011) found the prevalence of binge drinking among 18-25 year old males at four-year colleges was significantly higher than that of males at two-year colleges which may be associated with the presence of fraternity and sorority groups on campus and involvement in social activities. Indeed Greek membership has been found to predict high-risk drinking for both men and women (Wilke, Siebert, Delva, Smith, & Howell, 2005) and in a survey of 149 female varsity athletes, fifty percent of female collegiate athletes engaged in binge drinking compared to 44% of non-athletes (Gutgesell, Moreau, & Thompson, 2003). Wagoner et al. (2012) found the opportunity to receive free alcohol at fraternity and sorority parties and other social events was prevalent especially among students who were female, white, under 21 years of age, single, and part of a sorority or fraternity and was associated with greater odds of binge drinking and suffering moderate and severe alcohol-related consequences.

A recent trend related to alcohol use is the increased consumption of energy drinks marketed to college students speculatively attributed to their lifestyle, academic pressures, and desire for convenience (O'Brien et al., 2008; Velazquez, Poulos, Latimer, & Pasch, 2012). In a study of 585 freshmen at a large public U.S. university, results of an on-line survey showed consumption of energy drinks was found to be significantly associated with increased frequency and quantity of alcohol use (Velazquez et al., 2012). Students who were male, white, participated in intramural athletics, affiliated with fraternities or sororities, and younger were significantly more likely to consume energy drinks mixed with alcohol.

Smoking

Smoking is recognized as the leading preventable cause of death and one of the most critical risk factors for cardiovascular disease and cancer (Karter et al., 2008). Smoking and diabetes independently increase the risk of cardiovascular disease and people with diabetes who smoke have a greatly increased risk of heart disease, hyperglycemia, microvascular complications, insulin resistance, and circulatory problems (Karter et al., 2008; Kaufman et al., 2009; Tercyak et al., 2005). Rates of smoking among adolescents and adults have decreased in the past decade, but nearly one fifth of students have smoked cigarettes before they have graduated from high school (Johnson et al., 2012). Smoking among college students has fallen from a rate of 31% in 1999 to 15% in 2011 and is significantly less than peers who are not in college (Johnson et al., 2012). While research related to college students and smoking has grown in recent years, few studies target college students with diabetes, thus, little is known about the prevalence of smoking or smoking patterns in college students with diabetes.

Intrapersonal factors. Among college students, age, gender, and ethnic differences are found in smoking prevalence and patterns (Bulmer et al., 2010; Ruthig et al., 2011; Sutfin et al., 2012; Wetter et al., 2004). In a random sample of undergraduate college students, Sutfin et al. (2012) explored factors associated with daily and nondaily smoking. In addition to measuring tobacco use, the web-based survey examined contextual factors and health risk behaviors. The sample of 4100 students included 62.4% females, 78.8% non-Hispanic white, 8.4% African American, 3.5% Hispanic, 4.6% Asian/pacific-Islander and 4.75 Other. The sample was relatively evenly distributed across freshman through senior levels. There were 2911 students who identified themselves as nonsmokers, 832 were nondaily smokers, and 357 were daily smokers. Those who reported to be daily smokers were older than both nonsmokers and nondaily smokers. Compared to non-Hispanic whites, African American students were more likely to be

nonsmokers or nondaily smokers than daily smokers. Students who were daily and nondaily smokers were more likely to engage in risk behaviors including high risk alcohol use, illegal drug use, and having multiple sex partners in the past 30 days than students who were nonsmokers.

Wetter et al. (2004) conducted a four-year longitudinal study of 548 students at a large university for the purpose of examining changes in smoking behaviors and predictors of those changes. Over the course of the study, 87% of daily smokers and almost 50% of occasional smokers continued to smoke. Among nonsmokers, 11.5% began smoking occasionally while they were in college. Among baseline occasional smokers, male gender was positively associated with a higher smoking status level at follow-up. While the difference was not considered significant, Bulmer et al. (2010) found cigarette smoking among undergraduate females (19.7%) was less than that of graduate student females (25.3%) further supporting the findings that older students smoked more than younger students (Thompson et al., 2007).

In a comparison of health attitudes and behaviors of undergraduate students between the onset of an academic year and the end of the academic year, Ruthig et al. (2011) found tobacco use was relatively low at the beginning of the year with no gender differences. After six months, a reduction in cigarette smoking predicted better grades among male students, thus, providing a valuable link between health behaviors of men and academic performance.

First-year female college students were the subjects in a one-year longitudinal study in which prevalence, frequency, and initiation of hookah tobacco smoking was examined (Fielder, Carey, & Carey, 2012). Fielder et al. (2012) reported pre-college hookah use in 29% of their study participants with an increase in prevalence to 41% at the end of the academic year and 45% by the end of the summer. The majority of students in this study were White (66%). Despite its harmful nature due to higher nicotine dose, greater carbon monoxide, and larger smoke volume

than that found in cigarettes, hookah use is common among college students (Grekin & Ayna, 2012).

Despues and Friedman (2007) examined ethnic differences in health behaviors among college students through a survey of 521 undergraduate students (110 European American, 153 Asian American, 69 African American, 138 Hispanic American, 34 Multi-ethnic and 17 reported as Other). In this study, Asian Americans were more likely to report smoking cigarettes than were European Americans. This finding is in contrast to other studies in which minorities were more likely to smoke less than Caucasians (Ames et al., 2009; Ridner, 2005). In a study comparing Black and White college undergraduates, White racial status, male gender, and daily tobacco use was associated with cigarette smoking, while Black racial status, male gender, and nondaily tobacco use was associated with cigar smoking (Ames et al., 2009). White male students in this study were found to be significantly more likely to report use of more than one type of tobacco product in the past month. In addition, a significantly greater number of White tobacco users reported both alcohol use and engaging in binge drinking or drinking until drunk compared to Black tobacco users.

In addition to high-risk alcohol use, cigarette smoking has been found to be associated with risky driving, relational abuse, depression, less exercise, and utilization of emergency and mental health services (Halperin, Smith, Heiligenstein, Brown, & Fleming, 2010). These responses were found among students who were daily as well as nondaily smokers, indicating a higher risk for harm than students perceive.

Despite its known risks to health, adolescents and adults with diabetes do smoke. In a survey-based study of 6538 diabetic patients older than 25 years, 15% of the participants reported current smoking (Karter et al., 2008). In this study, gender was not significantly different, but those aged 25-44 years had the highest smoking rates, along with non-Hispanic African

Americans, those with lower educational attainment, those with shorter duration of diabetes, those not attending health education classes, and those with depressive symptoms (Karter et al., 2008). The highest prevalence of smoking was found among young adults with less than a high school education.

In a study to describe the health attitudes, beliefs, and risk behaviors of adolescents with diabetes, Tercyak et al. (2005) compared 53 individuals diagnosed with type 1 diabetes between the age of 13-21 years and 53 participants without diabetes matched on age, gender, and race. The findings revealed adolescents and young adults with diabetes were less likely to be lifetime smokers (had ever tried cigarette smoking) than those without diabetes. Among those that had ever smoked a cigarette, however, 65% were current smokers (had smoked one or more cigarettes in the past 30 days). Age was found to be positively associated with both smoking risk and lifetime smoking among participants with diabetes, with older adolescents viewing smoking as less addictive and more likely to have ever smoked (Tercyak et al., 2005). Adolescents who rated themselves to be in poorer health and those with greater depression symptoms were somewhat more likely to have smoked during their lifetimes (Tercyak et al., 2005).

Interpersonal processes. Friends and family members' smoking behaviors are known to influence smoking decisions in others (Ridner, 2005; Tercyak et al., 2005; Wetter et al., 2004). Tercyak et al. (2005) found 23% of participants with diabetes were exposed to smoking among their friends and Wetter et al. (2004) determined fathers of daily smokers were more likely to smoke than were fathers of nonsmokers. In addition, Wetter et al. (2004) found significant associations between peer smoking (best friend, partner, roommate and primary friends) and occasional smokers as well as daily smokers. In a sample of 788 college students, Ridner (2005) sought to explore environmental, personal, and behavioral factors that predict smoking. Nondaily

and daily smokers were more likely to report having a father who smoked than current nonsmokers, with daily smokers 10.6 times more likely to have a smoking father.

Colder, Flay, Segawa, and Hedeker (2008) examined smoking patterns during the transition to college among college freshmen with a previous history of smoking. Seven groups were studied based on smoking patterns and frequency. While there was variation among the groups throughout the freshmen year, the majority of students experienced a decline in smoking attributed to increasing academic demands which moderated the amount of partying and socializing, a time associated with increased smoking. Groups in which smoking increased were associated with increases in close friend approval of smoking, and an increase in time spent socializing in environments where others were smoking.

Community factors. The engagement in social groups, residence location, type of university, and campus policies are among the community factors that influence smoking (Sutfin et al., 2012; Thompson et al., 2007; Seo, Macy, Torabi, & Middlestadt, 2011). Affiliation with a Greek organization, either through membership or as a place of residence influenced smoking behaviors. Sutfin et al. (2012) found nondaily smokers were more likely to be members of Greek organizations than were daily smokers, suggesting that social smoking at parties is acceptable in this peer group. Thompson et al. (2007) examined prevalence and characteristics of smokers at 30 Pacific Northwest colleges and universities and found nearly 25% of students who lived in fraternities or sororities or who lived off campus smoked, compared to approximately 15% of students who lived in campus residences, campus apartments, at home with parents or other housing. In this study, smoking rates were lowest among those who lived in residence halls or at home with their parents. Daily smoking was found to be more common on public campuses than private universities (Thompson et al., 2007), but nondaily smoking was equally likely at both

types of schools (Sutfin et al., 2012). Cigarette smoking was, also, found to be more prevalent among students in 2-year colleges than 4-year institutions (Lenk et al., 2012).

Seo et al. (2011) examined the impact of a new smoke-free campus policy on college students' behaviors and attitudes related to tobacco use. Multiple waves of data were collected from students at two large public universities before and after one of the schools became smoke-free. The proportion of current cigarette smokers significantly decreased on the campus where smoking was prohibited in all indoor and outdoor areas of the school and the number of cigarettes usually smoked per day declined. The percentage of students who reported that two or more of their five closest friends smoked cigarettes, also, decreased significantly. In addition, students on the smoke-free campus reported changes in their attitudes toward the acceptable nature of smoking. No such changes were noted at the school that did not have a smoke-free campus policy. Although a campus policy change reflects an institutional level of influence, this study illustrates the impact that a ban on smoking within an academic community has on interpersonal relationships and an individual's attitudes toward smoking.

Risky Driving

While there are numerous studies targeting teen drivers, there are few aimed specifically at the college-age population and no known studies specific to college students with diabetes. A study of historical trends in causes of motor vehicle accidents among teen drivers utilized an ecological model to identify factors that affect teen driving behaviors (Shope & Bingham, 2008). Influences on driving behavior included personality factors, behavioral factors, developmental factors, driving ability, demographic factors, perceived environment, and driving environment within the physical and social domains.

Intrapersonal factors. It is known that crash rates are highest among the youngest drivers, declining each year of increasing age, with the lowest levels achieved after age 30 (Shope

& Bingham, 2008). Drivers younger than 20 are at high risk for crash involvement, and risks for males are highest when drinking and driving, driving at night, driving on a weekend, and traveling with passengers (Bingham, Shope, Parow, & Raghunathan, 2009). Female alcohol-related crashes tended to involve speeding, driving with passengers, and nighttime driving (Bingham et al., 2009).

Driving errors due to sleep deprivation are similar to the effects of alcohol, but attitudes and knowledge about drowsy driving do not reflect the dangers and risk for harm associated with sleep-deprived driving (Williams, Davies, Thiele, Davidson, & MacLean, 2012). In a study of 295 undergraduate students, a mixed method research design was used to test for differences in the level of assigned culpability between a sleep-deprived driver and a drinking driver involved in a fatal motor-vehicle accident as described in printed vignettes. In the printed stories, the drivers were either aware or unaware of their condition of driving while sleepy or under the influence of alcohol. Younger students placed less blame for a crash on a sleep-deprived driver than on a drinking driver. Driving after drinking was viewed more often as definitely wrong, while drowsy driving was recognized by some as merely a poor decision.

A large study of 1039 undergraduate students (72% female, 67% European American, 13% African American, 10% Latino, mean age 20.39) was conducted utilizing a questionnaire and sleep diaries for the purpose of examining consequences of inadequate sleep (Taylor & Bramoweth, 2010). Analysis of the data found 16% of the respondents reported falling asleep while driving and 2% reported an accident due to sleepiness. Male students were significantly more likely to fall asleep while driving than females (Taylor & Bramoweth, 2010).

A small portion of road traffic accidents are caused by drivers with diabetes (American Diabetes Association, 2012), however, hypoglycemia during driving does occur and can cause motor vehicle accidents (Stork, van Haeften, & Veneman, 2006). The decision to drive while

experiencing low blood glucose is largely determined by awareness of hypoglycemia, yet in a study of 100 insulin-treated adults with type 1 or type 2 diabetes (mean age 52.9 years), only 65% of the participants reported they would consider checking blood glucose before each driving episode (Jackson-Koku, Morrison, Morrison, & Weston, 2010).

A study of adults (aged 20-65) with type 1 or type 2 diabetes examined the relationship of hypoglycemia awareness on the decision not to drive during an episode of hypoglycemia (Stork, van Haeften, & Veneman, 2007). Among patient participants with type 1 diabetes with normal awareness of hypoglycemia, safe decisions were made concerning driving, however, individuals who were unaware of their hypoglycemia (43%) frequently chose to drive with low blood glucose levels. Twenty-five percent of patients with type 2 diabetes and normal awareness of hypoglycemia chose to drive despite being positive or unsure of whether they had low blood glucose (Stork et al., 2007).

Alcohol combined with hypoglycemia has a compounding effect in reducing cognitive performance, resulting in an especially dangerous condition for drivers. In experimental studies of seventeen adults (14 male, average age 35 years) with type 1 diabetes, a cumulative effect of alcohol and hypoglycemia caused significant deterioration of cognitive function, such that participants experienced longer reaction times on hazard perception tests, and perceived less risk after only small amounts of alcohol (Cheyne, 2004). The prevalence of college students with diabetes engaging in driving after drinking is not known.

Interpersonal processes. In a review of crash records obtained from the Michigan State Police, Bingham et al. (2009) sought to identify factors that increase the likelihood that a teen driver will have an alcohol-related crash. When alcohol is coupled with other conditions, such as riding with passengers, the risk of being involved in an alcohol-related crash was as much as 18

times greater for male teen drivers and 11 times greater for female teen drivers compared with adults. (Bingham et al., 2009).

Tin Tin et al. (2008) conducted a secondary analysis of 15-18 year old teens in New Zealand secondary schools (n=3408, 47% males). Having friends who used alcohol increased the risk of driving after drinking, however parental alcohol use did not significantly influence this risk. In addition, teens who report having a positive relationship with their parents were found to be less likely to report driving after drinking (Tin Tin et al., 2008).

Community factors. Students who reported their usual place of drinking to be at parties, bars or nightclubs, outdoors, cars, at work, or at school appeared to be two to three times more likely to report driving after drinking than those who did not indicate these as their usual places of drinking. (Tin Tin et al., 2008).

While a systematic review of the literature to explore the impact of diabetes on motor vehicle accidents and violations/citation showed conflicting results (Kagan, Hashemi, & Korner-Bitensky, 2010), it is agreed that there is a knowledge gap among drivers with diabetes regarding safety recommendations and health providers need to alert patients to their risks for motor vehicle accidents (ADA, 2012; Bodansky & Bodansky, 2009; Griffith & Tengnah, 2011).

Summary of Health of College Students

The American College Health Association (ACHA) conducted a review of data collected between 2000 and 2007 to determine the progress in meeting goals established in Healthy Campus 2010 (Burwell et al., 2010). Although 91% of students surveyed in 2008 rated their general health status as good, very good, or excellent (ACHA, 2009), Burwell et al. (2010) found the proportion of students who reported their general health as excellent had decreased from 18.95 to 15.9%. In addition, nine of the top ten health barriers to academic performance and seven of the top ten medical problems studied by the ACHA-National College Health Association

moved in a negative direction from targeted goals (Burwell et al., 2010). College students are not meeting recommendations for fruit and vegetable consumption or sleep, and demonstrate risk behaviors associated with alcohol use. While students are engaged in physical activity there is a growing prevalence of students being overweight and obese.

There is evidence that targeted goals related to gender, race, and ethnicity are not being met. Burwell et al. (2010) found the proportion of female students and ethnic groups describing their quality of life as good or better was further below male and White students than previously reported. Gender disparities were found across and within cultures reflecting the need to address determinants of health with sensitivity to subgroups within the college population. Gender and ethnic disparities have been reported in health perceptions and health behaviors among African American (Hayes et al., 2009; Hicks & Miller, 2006), Asian American, and Latino American (Despues & Friedman, 2007) college students. For example, female students at a predominantly Black university engaged in fewer physical activities than males and more often rated their overall psychological health higher, as being very good or good, while males were reported to use drugs and engage in binge drinking more than female students (Hicks & Miller, 2006).

Negative trends in attitudes and health behaviors of European college students mirror some of those seen in the U.S. and reflect global concerns of the health habits and lifestyles of young adults (Steptoe et al., 2002). The decline in level of health beliefs was associated with changes in the prevalence of healthy practices, such as a reduction in fruit consumption and increased smoking. While there is recognition of the responsibility of the individual for health (Steptoe et al., 2002), all levels of the ecological model must be considered when assessing and analyzing the self-care of college students with and without diabetes, as environmental influences are recognized as significantly impacting behavior change and health.

Summary of Health of College Students with Diabetes

Like the general student population, students with diabetes strive for academic success and well-being. They, too, must navigate the stress associated with coursework and universal self-care requisites of food, activity, rest, and prevention of harm. College students with diabetes have the additional challenge of maintaining blood glucose control, a challenge in even the best circumstances and environments. Considerable research related to children and adolescents with diabetes through age eighteen exists, and usually addresses self-care management. Diabetes self-care management of adolescents largely focuses on glucose monitoring as more frequent glucose monitoring is associated with better glycemic control (Helgeson, Honcharuk, Becker, Escobar, & Siminerio, 2011). There is additional evidence that more frequent glucose monitoring is associated with better nutrition and exercise behaviors that can positively impact glycemic control (Helgeson et al., 2011), and adolescents with better glycemic control report better quality of life and general health (Weissberg-Benchell & Antisdel, 2000). Difficulties of college students with diabetes maintaining self-care practices stem from challenges within the university environment and students' desires not to let diabetes interfere with their student experience (Balfe, 2009; Eaton et al., 2001).

Literature related to college students with diabetes is sparse and research consists predominantly of studies with small sample sizes or uses qualitative methods. Recruitment for large quantitative studies is hampered by the relatively small number of students with diabetes on any given campus and low response rates (Balfe, 2009). Despite the limited body of knowledge, there is evidence that self-care of students with diabetes is suboptimal and further study of this population is needed to determine what types of interventions are needed to address identified self-care deficits. Gaps aimed to be filled with this proposed study include:

- Assessment of universal self-care requisites of college students with diabetes conducted through a quantitative study design utilizing a large national sample of college students with diabetes.
- Assessment of unexplored universal self-care requisites of college students with diabetes related to rest, smoking, and risky driving.
- A comparison of universal self-care requisites of college students with diabetes to college students without diabetes.
- A comprehensive exploration of the relationships between intrapersonal factors, interpersonal processes, and community factors and self-care behaviors of college students with diabetes and without diabetes.

Conclusion

College students with diabetes are vulnerable to numerous insults to health stemming from deficits in self-care, yet there is a deficiency in research of this target population. Research by nurses of college students with diabetes is glaringly absent. Nursing research is needed to better understand the health behaviors and self-care practices of this group to identify strengths and areas of concern. With support, these students should be able to successfully transition to college life and achieve success (Mellinger, 2003). Nurses are in a prime position to provide such support, discuss harm reduction strategies with students, and develop and implement interventions to improve the quality of life and academic achievement of college students with diabetes

CHAPTER III

METHODOLOGY

Brief Overview

This study examined self-care of a large population of college students with diabetes and compared students with diabetes to their peer college students without diabetes. The specific focus of the study was on the universal self-care requisites of food, activity, rest, and prevention of hazards to life defined in Orem's self-care deficit nursing theory (Orem, 2001). The overarching framework was McLeroy's ecological model (McLeroy et al., 1988). The basic conditioning factors described by Orem fall within several levels of the ecological model described by McLeroy and together form an integrated conceptual model used in this study (Figure 1). Both the theory and framework are described in detail in chapter 1.

Design

The study was non-experimental, using a multifaceted research approach. The study was descriptive in that it explored health-related characteristics of a population, i.e. college students with diabetes (Hulley, Newman, & Cummings, 2007). It is comparative in that it compared two groups (college students with diabetes and without diabetes) based on multiple attribute independent variables and their similarities and differences in self-care behaviors. Binary logistic regression modeling assessed associations between select characteristics of students as multiple independent variables and self-care as dependent variables of students with diabetes and without diabetes.

This study was conducted through an analysis of existing data collected by the American College Health Association (ACHA) through the National College Health Assessment (NCHA)

II. A secondary data analysis was suitable in this study as the data contained in the ACHA-NCHA II are appropriate to answer the research questions (Johantgen, 2005). In determining the appropriateness of the study design, several factors as described by Vartanian (2011) were considered. First, the sample populations of college students surveyed with the ACHA-NCHA II were the targeted subjects of this study. Of particular interest was the ability to examine the subset of students with diabetes. As previously noted, research of college students with diabetes is sparse, largely due to recruitment challenges and small numbers of such students on a given campus. The sample of college students with diabetes provided in the ACHA-NCHA II is large and provided an opportunity to examine this subset of the broader population of college students across the U.S. Second, the dependent variables, self-care behaviors associated with nutrition, activity, sleep, alcohol use, smoking, and driving are contained in the data. Third, the necessary independent variables reflective of the intrapersonal, interpersonal, and community levels of the ecological model of interest are available. In addition, the data have an adequate identifier for students with diabetes, as a survey question specifically asks if a student has been diagnosed or treated for diabetes by a professional in the past twelve months. Finally, few studies of college students with diabetes have been conducted in the U.S., are quantitative in design, or have large sample sizes. While the data set cannot be generalized to the college population within the U.S. due to the self-select nature of its use by colleges and universities (ACHA, 2009a), it does provide a reference point in understanding health and health behaviors of college students, including those students with diabetes who were of special interest in this study.

The American College Health Association-National College Health Assessment II is a research survey available to universities in the U.S. to examine student health habits, behaviors, and perceptions (ACHA, 2009a). First administered in Spring 2000 as the American College Health Association-National College Health Assessment followed by the revised ACHA-NCHA

II that began use in Fall 2008, the survey has been given to more than 900,000 students and used by over 500 institutions of higher education to capture health data, trends, and factors that affect academic success and well-being (ACHA, 2013). The survey includes questions on topics such as risk behaviors, nutrition, exercise, physical health, mental health, and academic performance.

The data for this study were collected in spring 2009 and was chosen due to it being the most currently available with the largest sample size (spring 2009, n=87,105 compared to fall 2010, n=30,093). The schools that administered the survey in spring 2009 included public, private, 2-year and 4-year colleges and universities, with the majority of schools being public 4-year or higher institutions. The schools included in the reference group used a random sampling technique to administer the survey (ACHA, 2009c). The schools are nearly equally distributed across all northeast, midwest, south, and western regions of the U.S. Six schools were outside the U.S. Campus size varied and included responses from those with <2500 students to those with >20,000. The majority of schools had a student population of 10,000-19,000. Campus settings included very large cities and rural communities, with the majority of schools found in small cities.

The mean response proportion for paper and online survey completion in spring 2009 was 30%. This rate of response falls within the normal range of other survey research conducted with college students (Wilke, 2005), and is considerably higher than some studies of college students with diabetes in which the response rate was 11% (Balfe, 2007a). The age range of respondents was 18-30+, with an average age of 22.33. Female students represented 63.3% of the participants. First year students represented the largest proportion of undergraduate students (22.9%), with second year (20.2%), third year (19.6%), fourth year (15.8%), and fifth year (4.9%) comprising the rest of the sample. Graduate or professional students represented 15.7% of participants. Survey respondents were largely full-time students (92.7%) and described

themselves as white (73.6%). Asian or Pacific Islanders comprised 11.4% of participants followed by Hispanics or Latino (6.6%), Blacks/non-Hispanic (5.3%), and Biracial or Multiracial (3.5%). American Indian, Alaskan Native, or Native Hawaiian (1.3%) was the least represented race/ethnicity (ACHA, 2009c).

The reliability and validity of the ACHA-NCHA II has been established through a process of triangulation, with statistical analyses and comparisons with other nationally representative databases, including the 1995 National College Health Risk Behavior Survey conducted by the Centers for Disease Control, the Harvard School of Public Health 1999 College Alcohol Study, and the United States Department of Justice: The National College Women Sexual Victimization Study of 2000. In addition, several pilot studies were conducted by the ACHA (ACHA, 2009a).

Human Subjects Protection

The Institutional Review Board (IRB) of The University of North Carolina at Greensboro determined that this study did not constitute human subjects research as defined under federal regulations [45 CFR 46.102 (d or f)] and did not require IRB approval. A Data Use Request Form was submitted to the ACHA requesting permission to access electronic data in a form combatable with SPSS computer software. This request was approved as noted in the letter found in Appendix A. Once received, the data was stored on an external hard drive and the original data file was locked in a secure file cabinet in a home office to ensure protection. Data were accessible only to those individuals who have been specified on the Data Use Request Form submitted to the ACHA.

Sample

This study included those students who completed the ACHA-NCHA II survey in spring 2009 (ACHA, 2009b). Data from 87,105 students at 117 schools were available from that time

period representing a diverse sample of geographic region and campus size. Criteria for inclusion of the diabetes study group were those students between the ages of 18-24 who acknowledged that within the past 12 months, they had been diagnosed or treated by a professional for diabetes. While one percent, or 876 students, indicated they were diagnosed or seen by a health provider for diabetes in the previous 12 months (ACHA, 2009d), 528 of these students met the age criteria. A comparison group of 688 students without diabetes was randomly selected from the 68,798 students who reported they were between the ages of 18-24 and had not been diagnosed or treated by a professional for diabetes in the past 12 months. The 688 students in the comparison group represents approximately one percent of the students meeting the inclusion criteria, a similar proportion as that of student with diabetes found in the reference group. Thus, a total sample of 1216 students was examined in this study.

Because it is anticipated that the proportion of students meeting a self-care requisite will vary substantially by the type of requirement, power analyses were performed over a range of possible scenarios to estimate what detectable effect sizes (odds ratios) were with sufficient power in planned logistic regression analyses. These calculations were performed in nQuery Advisor® v7 (Statistical Solutions, Saugus, MA). It was determined that an odds ratio of 2.0 can be detected with at least 80% power given a sample size of approximately 500 when the proportion of students meeting the requirements is approximately 5%, assuming a two-sided test and .05 significance level. These calculations would be conservative if the percentage meeting the requirement is higher.

Adequate sample size for the study was confirmed through a retrospective analysis of the generalized multiple logistic regression model that was used to answer the most complex research question. Eleven independent variables were used in the regression model. The recommended minimum number of cases for each independent variable in a logistic regression model is ten

(Hosmer & Lemeshow, 2000; Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996). This guideline was met in the analysis of question 3. A two-sided *p*-value <0.05 was considered statistically significant and confidence intervals (95%) were estimated where applicable to aid in interpretation of results.

As shown in Table 1, the randomly selected 688 students without diabetes is similar to the reference group of 68,110 non-diabetic students in gender (63.2% female in selected group and 65.4% in reference group), race/ethnicity (77.3% White, Non-Hispanic in the selected group and 76.3% in the reference group), age (mean age 20.31 in selected group and 20.30 in the reference group), and grade average (mean grade average 3.21 in both groups). There were no statistically significant differences between the selected sample group and reference group of non-diabetic students on the selected demographic characteristics using chi-square test for categorical variables and t-test for continuous variables.

Table 1

Comparison of Select Characteristics of Students without Diabetes (N=68,798)

	Selected Group (n=688) n (%)		Reference Group (n=68,110) n (%)		*p* value
Gender					.302
Female	433 (63.2)		44,334 (65.4)		
Male	252 (36.8)		23,329 (34.4)		
Transgender	0 (0.0)		78 (0.1)		
Race/Ethnicity					
White, Non-Hispanic	532 (77.3)		51, 978 (76.3)		.535
Black, Non-Hispanic	41 (6.0)		3,495 (5.1)		.328
Hispanic/Latino	53 (7.7)		4,377 (6.4)		.174
Asian/Pacific	70 (10.2)		7,399 (10.9)		.563
Islander	9 (1.3)		813 (1.2)		.783
American					
Indian/Alaskan, Native	20 (2.9)		2,462 (3.6)		.322
Hawaiian					
Biracial/Multiracial					
	Mean	SD	Mean	SD	
Age	20.31 (688)	1.596	20.30 (68,110)	1.627	.805
Grade Average	3.21 (672)	.688	3.21 (66,649)	.692	.919

Measurement

Basic Conditioning Factors

Demographic characteristics, or basic conditioning factors, included age, gender, race/ethnicity, year in school, enrollment status, grade average, diabetes, health status, health knowledge, stress, health insurance, perceptions, relationship status, marital status, residence, membership in social organizations, and participation in organized athletics. Each of these variables is linked to the intrapersonal, interpersonal, or community level of influence of the ecological model. The measurement index for the demographic characteristics are described below and specific survey items examined are shown in Table 2.

Age. Students between the ages of 18-24 were the focus in this study.

Gender. Students could choose from female, male, or transgender among the gender options. Only students who self-identified themselves as female or male were included in this study.

Race/ethnicity. White, Black or African American, Hispanic or Latino/a, Asian or Pacific Islander, American Indian, Alaskan Native, or Native Hawaiian, Biracial or Multiracial, and Other were the options from which students were asked to describe themselves, choosing as many ethnicities that applied. In this study, race/ethnicity was dichotomized as White/Non-White.

Year in school. Students indicated what year within an undergraduate program they were enrolled or if they were enrolled in a graduate or professional program. This variable was not included in the regression analysis of question 3 as it is associated with age.

Enrollment status. Students indicated if they were enrolled in full-time or part-time studies.

Grade average. Grade average was recoded as a scale variable using a maximum of 4.0 indicating mostly A's to a minimum of 1.0 to indicate mostly D's/F's.

Diabetes. The acknowledged diagnosis or treatment for diabetes in the past 12 months was used as an inclusion criterion.

Health status. Students were asked to describe their health as excellent, very good, good, fair, poor, or don't know. A dichotomous variable was created to reflect students' perceptions of health as excellent/very good/good or fair/poor.

Health knowledge. Within the survey tool, students could indicate whether they had received health information and whether they desired health information from their university or college on a variety of topics. In this study, health knowledge was assessed through the students' report of not receiving vs. receiving health information on the topics of nutrition, physical

activity, sleep, alcohol, tobacco, and injury prevention. Data in Table 4 reflects frequencies and percentages of students who reported not receiving information on the noted topics and their desire for such information.

Stress. Students were asked to rate their overall level of stress in the previous 12 months from no stress to tremendous stress. For the regression analysis**,** stress was assessed through the creation of a dichotomous variable represented by reports of average stress/ less than average stress/no stress and more than average stress/tremendous stress.

Health insurance. Choices included primary coverage from college/university plan, parent plan, another plan, do not have health insurance, or do not know.

Perceptions. Perceptions of students were assessed by examining how they perceived the use of tobacco and alcohol of other students. Response options ranged from "never used" to "used daily."

Relationship status. Students were asked to select if they were not in a relationship, in a relationship but not living together, or in a relationship and living together. A dichotomous variable was created to designate in a relationship or not in a relationship.

Marital status. Students could respond as single, married/partnered, separated, divorced, or other. A dichotomous variable was created to differentiate married/partnered from other marital status options.

Residence. Students were asked if they lived in a campus residence hall, fraternity or sorority house, other college/university housing, parent/guardian's home, other off-campus housing or other. Place of residence was dichotomized for the regression analysis to depict students living with parents or students living independently.

Membership in social organizations. Membership in social organizations was measured through a student's report of membership in Greek fraternity or sorority (not a member vs. member).

Participation in organized athletics. Participation in varsity team sports, club sports, or intramural sports was combined into one dichotomous variable as participates vs. does not participate.

Table 2

Basic Conditioning Factors

Ecological level	Basic conditioning factors and Measurement Index	ACHA - NCHA II items
Intrapersonal	Age (18-24)	46
Intrapersonal	Gender (Male, Female, Transgender)	47
Intrapersonal	Race/Ethnicity (White, Black or African American, Hispanic or Latino/a, Asian or Pacific Islander, American Indian, Alaskan Native, or Native Hawaiian, Biracial or Multiracial, Other)	54
Intrapersonal	Year in school (1st year undergraduate, 2nd year undergraduate, 3rd year undergraduate, 4th year undergraduate, 5th year or more undergraduate, Graduate or professional, Not seeking a degree,Other)	51
Intrapersonal	Enrollment status (Full-time, Part-time, Other)	52
Intrapersonal	Grade Average (A, B, C, D/F, N/A)	63
Intrapersonal	Diabetes (Has been diagnosed or treated by a professional within the last 12 months).	41
Intrapersonal	Health status (Excellent, very good, good, fair, poor, don't know); presence of disabilities or medical conditions (attention deficit and hyperactivity disorder, chronic illness, deaf/hard of hearing, learning disability, mobility/dexterity disability, partially sighted/blind, psychiatric condition, speech or language disorder, other disability); history of acute or chronic health conditions	1, 31, 41, 65

Intrapersonal	Health Knowledge: Information (not) Received (alcohol, eating disorders, injury prevention, nutrition, physical activity, relationship difficulties, sleep difficulties, stress reduction, tobacco use)	2
Intrapersonal	Health Knowledge: Information (not) Desired (alcohol, eating disorders, injury prevention, nutrition, physical activity, relationship difficulties, sleep difficulties, stress reduction, tobacco use)	3
Intrapersonal	Stress (No stress, less than average stress, average stress, more than average stress, tremendous stress within the last 12 months); traumatic occurrence or difficulty handling situations related to sleep difficulties	33, 37
Intrapersonal	Perceptions of other students' substance use	9
Intrapersonal	Primary source of health insurance (college/university sponsored plan, parents' plan, another plan, no health insurance, not sure)	62
Interpersonal	Relationship status (Not in a relationship, In a relationship but not living together, In a relationship and living together)	56
Interpersonal	Marital status (Single, Married/partnered, Separated, Divorced,Other)	57
Community	Residence (Campus residence hall, Fraternity or sorority house, Other college/university housing, Parent/guardian's home, Other off-campus housing, Other)	58
Community	Membership in social organization	59
Community	Participation in organized athletics (varsity, club, intramural)	64

Self-care Behaviors

Selected survey questions from the ACHA-NCHA II were used to assess universal self-care. The self-care measures examined included food, activity, rest, and prevention of hazards to life. The measurement index for each self-care requisite is described below and the specific survey items analyzed are detailed in Table 3.

Maintenance of Sufficient Intake of Food

To assess the self-care requisite of food/nutrition, four factors were examined:

1. Daily consumption of fruits and vegetables. Rationale: Healthy Campus 2020 (ACHA, 2012b) promotes ≥ 2 servings of fruits and ≥ 3 servings of vegetables per day. Fruits and vegetables are essential to a healthy diet for individuals as they are

fibrous foods that are good sources of nutrients, are low in fat and calories, and have no cholesterol (ADA, 2000).

2. BMI. Rationale: Being overweight or underweight may indicate a self- care deficit in the appropriate quantity of food intake. Normal BMI is 18.5-24.9 (CDC, 2011a).
3. Acknowledgement of an eating disorder/problem. Rationale: May indicate a self-care deficit. Identification of an eating disorder was established through a combination of self-reports of anorexia and bulimia into a dichotomous variable (no vs. yes).
4. Weight management. Rationale: Being overweight or obese increases the risk of diabetes complications. There are healthy strategies to lose weight. (ADA, 2012e). Use of healthy weight loss strategies was examined as a means for determining if appropriate actions are taken if a self-care deficit was present. Vomiting, taking laxatives, or using diet pills were combined to form a dichotomous variable identifying unsafe weight loss strategies (no vs. yes).

For the regression analysis, meeting the self-care requisite for food was assessed through a dichotomous variable that was created to reflect meeting the national recommendations for fruit and vegetable intake, or not meeting the recommendations.

Maintenance of a Balance between Activity and Rest: Activity

To assess the self-care requisite of activity, one factor was examined:

1. Participation in physical activity. Rationale: moderate-intensity aerobic exercise for at least 30 minutes on at least 5 days/week, or vigorous-intensity aerobic exercise for at least 20 minutes at least 4 days/week, or an equivalent mix of moderate/vigorous aerobic activity; and muscle-strengthening exercises at least 2 times/week meets recommendations set by the CDC (2011b) and the ADA (2012d).

For the regression analysis, assessment of meeting the self-care requisite of activity was achieved through the creation of a new dichotomous variable to represent whether or not the national recommendations for exercise were met.

Maintenance of a Balance between Activity and Rest: Rest

To assess the self-care requisite of rest, five factors were examined:

1. Acknowledgement of sleep problems being very difficult to handle
2. Feeling rested upon awakening
3. Presence of daytime sleepiness
4. Presence of sleep difficulties
5. Acknowledgement that sleep difficulties have affected academic performance in past year. Rationale: responses to any of the above items may identify a self-care deficit.

For the regression analysis, feeling rested every morning, no daytime sleepiness, and no difficulty falling asleep in the past 7 days were combined to form a dichotomous variable to measure whether or not the self-care requisite of rest was met as these characteristics are indicators of sleep quality (Buysse, Reynolds, Monk , & Berman, 1989).

Prevention of Hazards to Life

To assess the self-care requisite of prevention of hazards to life, ten factors relevant to alcohol use (6), smoking (1), and risky driving (3) were examined:

1. Frequency of alcohol use in past 30 days. Rationale: Use of alcohol several times/week by individuals with diabetes may interact with oral medications and should be discussed with their physician (ADA, 2012c).
2. Quantity of alcohol use at last social event. Rationale: ≤1 drink for females, ≤2 drinks for males per day on average is considered moderate intake for adults with diabetes (ADA, 2012c) and without diabetes (U.S. Department of Agriculture and U.S. Department of

Health and Human Services, 2010). To determine if moderate drinking patterns were practiced, a new variable was created, representing gender guidelines for consuming one drink for women and two drinks for men along with legal age requirements.

3. Quantity of alcohol use at a sitting. Rationale: five or more drinks of alcohol at a sitting may indicate high risk drinking, which for a typical adult consists of consuming five or more drinks (for males) or four or more drinks (for females) in about two hours (U. S. Department of Health and Human Services, National Institute of Health, 2004).
4. Use of alcohol management strategies. Rationale: Strategies such as eating food while drinking are recommended by the ADA (2012c). A new dichotomous variable was created to measure if at least one protective strategy was practiced, or not.
5. Acknowledgement that alcohol use has affected academic performance in last year. Rationale: may indicate a self-care deficit.
6. History of abuse or addiction to alcohol.
7. Used cigarettes, cigars, tobacco from a water pipe, or smokeless tobacco in last 30 days. A new variable was created combining the use of cigarettes or other tobacco products.
8. Has driven after drinking. Rational: nearly one third of all crash deaths involve alcohol impaired drivers (U.S. Department of Transportation, National Highway Traffic Safety Administration, 2010).
9. Has driven after drinking five or more drinks of alcohol. Rationale: May indicate a self-care deficit.
10. Wears a seat belt when riding in a car.

For the regression analysis, self-care related to prevention of hazards to life was assessed through behaviors related to alcohol, tobacco, and risky driving determined by self-reports of drinking and driving and seatbelt use. Each factor was dichotomized to reflect risky behaviors vs.

non-risky behaviors. A combined variable for alcohol use was created to reflect legal drinking and alcohol quantity as moderate or less per gender guidelines. Not using any form of tobacco was dichotomized into one variable of not used or used tobacco in the last 30 days. Drinking and driving of any amount, combined into one variable (no vs. yes), and always using a seat belt (no vs. yes) were the two measures of assessing risky driving practices.

Table 3

Universal Self-care Variables and Measurements

Self-care Variables	Survey Questions
Food	How do you describe your weight? Responses include "very underweight," "slightly underweight," "about the right weight," "slightly overweight," and "very overweight." How many servings of fruits and vegetables do you usually have per day? Responses include "0 servings per day," "1-2 servings per day,", "3-4 servings per day," and "5 or more servings per day." Within the last 12 months, have any of the following affected your academic performance? ("eating disorder/problem" is a selection choice). Within the last 12 months, have you been diagnosed or treated by a professional for anorexia or bulimia? Height and weight to determine BMI. Within the last 30 days, did you do any of the following? Responses include "exercise to lose weight", "diet to lose weight", "vomit or take laxatives to lose weight", and "take diet pills to lose weight."
Activity	On how many of the past 7 days did you do "moderate-intensity cardio or aerobic exercise for at least 30 minutes," "vigorous-intensity cardio or aerobic exercise for at least 20 minutes," and 8-10 strength training exercises for 8-13 repetitions each?" Possible responses range from "0 days" to "7 days."
Sleep	Acknowledgement of "sleep difficulties" as being very difficult to handle in the past 12 months. On how many of the past 7 days did you get enough sleep so that you felt rested when you woke up in the morning? The responses range from "0 days" to "7 days."

	In the past 7 days, how much of a problem have you had with sleepiness during your daytime activities? Reponses include “no problem at all,” “a little problem,” “more than a little problem,” “a big problem,” and “a very big problem.” In the past 7 days, how often have you: awakened too early in the morning couldn’t get back to sleep, felt tired, dragged out, or sleeping during the day: gone to bed because you just could not stay awake any longer; had an extremely hard time falling asleep? Responses range from “0 days” to “7 days”. Within the last 12 months, have any of the following affected your academic performance? (“sleep difficulties” is a selection choice).
Prevention of hazards to life	Within the last 30 days, on how many days did you use cigarettes, smokeless tobacco, tobacco from a water pipe, cigars, and alcohol? Responses include “never used”, “have used, but not in last 30 days,” “1-2 days,” “3-5 days,” “ 6-9 days,” “ 10-19 days,” “20-29 days,” “used daily.” The last time you “partied”/socialized how many drinks of alcohol did you have? Responses could include 0-99. Over the last two weeks, how many times have you had five or more drinks or alcohol at a sitting? Responses could include “N/A, don’t drink” to “10 or more times.” During the last 12 months, when you “partied”/socialized, how often did you: alternate non-alcoholic with alcoholic beverages, avoid drinking games, choose not to drink alcohol, determine, in advance, not to exceed a set number of drinks, eat before and/or during drinking, have a friend let you know when you have had enough, keep track of how many drinks you were having, pace your drinks to 1 or fewer per hour, stay with the same group of friends the entire time you were drinking, stick with only one kind of alcohol when drinking, use a designated driver? Responses include “N/A, don’t drink,” “never,” “rarely,” “sometimes,” “most of the time,” “always.” Within the last 12 months, have any of the following affected your academic performance? (“alcohol use” is a selection choice). Within the last 12 months, have you been diagnosed or treated by a professional for substance abuse or addiction (alcohol or other drugs)? Responses include “no” to “yes” and a selection of treatments. Within the last 30 days, did you: drive after drinking any alcohol at all; drive after drinking five or more drinks of alcohol? Responses include “N/A, don’t drive,” “N/A, don’t drink,” “no,” “yes.”

	Within the last 12 months, how often did you wear a seatbelt when you rode in a car?

Analysis

Data were analyzed using IBM SPSS Statistics version 21.0. The codebook for the ACHA-NCHA II survey, fall 2008-spring 2011, was provided by the ACHA. Assumptions in statistical analyses were empirically checked where applicable, and remediations, including transformations (e.g., log, square root) or nonparametric analyses, were considered if violations were found. Data were screened to detect patterns and amount of missing data and values out of range. Several variables were combined or recoded to reflect conceptual definitions of self-care requisites or statistical requirements as described above. Several options for handling missing data were considered, including employing SPSS Missing Values Analysis to replace missing values and using multiple imputations. As missing data was minimal related to the study sample, no such strategies were employed and missing data was deleted from analysis as done by the ACHA (ACHA, 2009c). One variable, BMI, was deleted from analysis due to amount of extreme self-report measures of height and weight. One value of age 20.6 was replaced with an actual age of 20 and recoded.

Research Questions and Analysis Plan

For the purpose of this study, the primary interests were in the prevalence of the universal self-care behaviors of students with diabetes (Question 1), a comparison of the universal self-care behaviors between students with diabetes and students without diabetes (Question 2), and the associations between the basic conditioning factors at the intrapersonal, interpersonal, and community levels of influence and the universal self-care behaviors (Question 3).

Question 1. To what extent do college students with diabetes meet self-care requisites of:

A. Food (nutrition)

B. Activity (exercise)

C. Rest (sleep)

D. Prevention of hazards to life (alcohol use, smoking, and risky driving)?

Descriptive statistics, including measurements of central tendency, variability, frequency, and percentages, were used to describe the responses to survey questions measuring self-care requisites of food, activity, rest, and prevention of hazards to life. The descriptive statistical techniques were used to describe distributions of variables and make descriptive comparisons.

Question 2. How does self-care of college students with diabetes compare to self-care of college students without diabetes in requisites of:

A. Food (nutrition)

B. Activity (exercise)

C. Rest (sleep)

D. Prevention of hazards to life (alcohol use, smoking, and risky driving)?

Question 2 was analyzed by comparing the descriptive statistics, including measurements of central tendency, variability, frequency, and percentages to describe the responses to survey questions measuring self-care requisites of food, activity, rest, and prevention of hazards to life of students with diabetes and those without diabetes. Students without diabetes were identified by a negative response to the survey question asking if they have been diagnosed or treated by a professional in the past 12 months for diabetes. Chi-square testing was used to test for associations between the two groups of students based on their diabetic status (Waltz, Strickland, & Lenz, 2005) in bivariate analysis.

Question 3. In college students with diabetes and without diabetes, what is the relationship between basic conditioning factors found at the intrapersonal, interpersonal, and community levels and meeting the self-care requisites of:

A. Food (nutrition)

B. Activity (exercise)

C. Rest (sleep)

D. Prevention of hazards to life (alcohol use, smoking, and risky driving)?

The goal of the statistical analysis for this question was to explore the relationship between the outcomes (responses to survey questions measuring self-care requisites of food, activity, rest, and prevention of hazards to life) and the potential predictors (the demographic characteristics/ basic conditioning factors found at the intrapersonal (age, gender, race/ethnicity, year in school, enrollment status, grade average, diabetes, health status, health knowledge, and stress), interpersonal (relationship status, marital status), and community level (residence, membership in social organization, participation in organized athletics). Descriptive statistics were initially calculated using measures of central tendency, frequencies, and percentages. Continuous variables were checked for outliers and normality in univariate analysis, and transformations considered, when necessary (Tabachnick & Fidell, 2007). Associations were assessed using logistic regression modeling as the dependent variables were dichotomous (Tabachnick & Fidell, 2007). Goodness of fit was assessed in the regression modeling to ensure appropriateness of results. Generalized linear modeling statistical method was employed to account for variation in error terms that may be non-normal or not by chance. The analyses for each of the two student groups (with diabetes and without diabetes) were conducted to directly estimate and examine the predictive influences in the two groups. The predictor variables were entered simultaneously.

Summary

The study aimed to fill a gap in the literature on the health and well-being of college students with diabetes. By employing quantitative methods to measure self-care behaviors using the large sample of students provided by the ACHA-NCHA II, baseline information was gathered to explore both the health protective behaviors and self-care limitations of this vulnerable population. The self-care theory and ecological framework that guided this study give nurses and other health care providers a means to develop and implement health promotion programs for college students with diabetes.

CHAPTER IV

RESULTS

Introduction

This chapter describes the findings of the study that explored self-care behaviors of college students with diabetes. Demographic characteristics of the sample are identified within the intrapersonal, interpersonal, and community levels of an ecological framework. The self-care behaviors of college students with diabetes are described and compared to students without diabetes. Finally, the relationships between intrapersonal, interpersonal, and community factors and the self-care behaviors are examined. Findings are presented in order of the specific research questions related to self-care requisites of food, activity, rest, and prevention of hazards to life.

Sample

The study sample included 1,216 students. The mean age of the study sample was 20.33 (SD=1.6). Within the total sample, 62.7% of the students were female and 37 % were male. Four students (.3%) identified themselves as transgender. Minorities comprised 25.8 % of the study sample, with Asian/Pacific Islander being the most frequent racial/ethnic reported. Students ranged from first-year undergraduate students to students enrolled in graduate or professional programs. Approximately ten percent of students were enrolled either in their fifth year or higher or in graduate and professional studies, with 90% in undergraduate studies. The majority of the sample (95.4%) were full-time students, more than half were not in relationships (53.8%), and many lived in campus residence halls (41.6%).

There were 528 students with diabetes and 688 students without diabetes in the study sample. Group characteristics within the intrapersonal, interpersonal, and community levels are discussed below and detailed in Table 4.

Basic Conditioning Factors

In this study, thirteen intrapersonal characteristics were of interest. They include gender, race/ethnicity, year in school, stress, presence of diabetes, perceived health status, grade average, self-care behaviors, enrollment status, age, health knowledge, health insurance, and perceptions of other students' behaviors. The self-care behaviors of college students were the primary foci of the study and are detailed more fully within the findings of question one and question two.

Gender. Females accounted for more than 60% of both diabetic and nondiabetic students. All students who identified themselves as transgender were among the students who reported being treated for diabetes. Due to the low number of students who identified themselves as transgender (n=4), this gender group was not included in further analyses.

Race/ethnicity. The majority of students in both groups were White, Non-Hispanic (78.2% with diabetes and 77.3% without diabetes.) The minority group with the highest number of students was that of Asian/Pacific Islander heritage.

Year in school. The largest proportion of student respondents were freshmen, characterizing 28.7% of the group with diabetes and 27.5% of the group without diabetes. All other undergraduate levels were well-represented in the two groups.

Age. Students with diabetes and without diabetes were similar in age with mean age of students with diabetes 20.35 (SD=1.6) and without diabetes 20.31 (SD=1.6). The largest group of students was 19 years of age for both students with diabetes and without diabetes. The smallest group of participants was students age 24.

Enrollment status. Persons in both groups were primarily full-time students.

Grade average. The mean grade point average reported by the students without diabetes was 3.21 (SD=.69) and 3.10 (SD=.72) for students with diabetes.

Stress. There was no significant difference between the two groups in their level of stress. Students predominantly rated their stress as average or more than average stress.

Perceived health status. Students with diabetes perceived their health status to be significantly worse than students without diabetes, rating their health as fair or poor more often than students without diabetes (χ^2=43.998, *df*=5, *p*<.001).

Health insurance. Health insurance coverage between the two groups of students was similar, with most students covered under their parent's health plan.

Health knowledge. Students with diabetes reported receiving information on all the topics related to self-care more frequently than students without diabetes. The difference in health information received was significant on the topic of nutrition (χ^2=7.096, *df*=1, *p*<.01). More than 50% of the students with diabetes and without diabetes desired information from their educational institution on the topics of nutrition, exercise, and sleep.

Perceptions of other students. Participants perceived high levels of smoking cigarettes and using alcohol more than three days in the last 30 days in other students.

Relationship status. A higher proportion of students with diabetes were not in a relationship compared to students without diabetes.

Marital status. The majority of students were single and non-partnered**.** A small proportion of students in each group was married.

Social organizations. A greater percentage of students with diabetes than without diabetes reported they were members of a Greek social organization.

Residence. The largest portion of students resided in campus residence halls. A greater proportion of students with diabetes reported living in off-campus housing or with parents/guardians compared to students without diabetes.

Organized athletics. A greater proportion of students with diabetes reported being a varsity athlete or participated in club sports or intramural sports than students without diabetes, but the findings were not statistically significant.

Table 4

Characteristics of Students (N=1216)

	Students With Diabetes n = 528		Students Without Diabetes n = 688	
Intrapersonal Factors	n	%	n	%
Gender				
Female	324	62.0	433	63.2
Male	195	37.3	252	36.8
Transgender	4	0.8	0	0.0
Race/Ethnicity				
White, Non-Hispanic	413	78.2	532	77.3
Black, Non-Hispanic	41	7.8	41	6.0
Hispanic/Latino	26	4.9	53	7.7
Asian/Pacific Islander	49	9.3	70	10.2
American Indian/Alaskan, Native Hawaiian	11	2.1	9	1.3
Biracial/Multiracial	22	4.2	20	2.9
Year in School				
1st year undergraduate	150	28.7	188	27.5
2nd year undergraduate	113	21.6	141	20.6
3rd year undergraduate	110	21.1	159	23.3
4th year undergraduate	99	19.0	122	17.9
5th year undergraduate or more	23	4.4	20	2.9
Graduate/Professional	24	4.6	48	7.0

Age				
18	70	13.3	87	12.6
19	120	22.7	166	24.1
20	106	20.1	137	19.9
21	105	19.9	137	19.9
22	67	12.7	89	12.9
23	35	6.6	51	7.4
24	25	4.7	22	3.2
Enrollment Status				
Full-time	498	95.2	653	95.6
Part-time	19	3.6	23	3.4
Grade Average **				
A	151	29.0	244	35.7
B	275	52.8	330	48.3
C	76	14.6	96	14.1
D/F	11	2.1	2	0.3
Stress				
No stress	17	3.2	12	1.8
Less than average stress	42	8.0	61	8.9
Average stress	186	35.4	269	39.3
More than average stress	213	40.5	273	39.9
Tremendous stress	68	12.9	69	10.1
Perceived Health Status **				
Excellent	36	7.1	100	14.8
Very good	178	34.9	281	41.6
Good	202	39.6	237	35.1
Fair	80	15.7	47	7.0
Poor	13	2.5	8	1.2
Don’t know	1	0.2	2	0.3
Health Insurance				
College/university plan	61	12.3	77	12.2
Parent’s plan	379	76.7	484	76.5
Another plan	28	5.7	32	5.1
Do not have health insurance	23	4.7	29	4.6
Not sure	3	0.6	11	1.7
Health Information Not Received				
Alcohol	134	25.7	179	26.2
Injury Prevention	350	67.7	473	69.5
Nutrition **	204	39.2	320	46.9
Physical activity	200	38.5	269	39.4
Sleep	381	73.1	525	77.0
Tobacco use	311	59.8	436	64.0

Health Information Desired				
Alcohol	157	30.7	180	26.9
Injury Prevention	190	37.1	221	33.1
Nutrition **	292	57.1	396	59.3
Physical activity	282	55.0	367	54.9
Sleep	289	56.4	357	53.0
Tobacco use	147	28.8	144	21.5
Perceptions of Other Students				
No cigarette use	20	3.8	39	5.7
Alcohol use < 3 days in last 30 days	53	10.2	68	10.0
Interpersonal Processes				
Relationship Status				
Not in a relationship	295	56.3	356	52.0
In relationship, not living together	188	35.9	276	40.3
In relationship, living together	41	7.8	53	7.7
Marital Status				
Single	482	91.8	637	93.5
Married/partnered	26	5.0	28	4.1
Separated	1	0.2	0	0.0
Divorced	1	0.2	1	0.1
Other	15	2.9	15	2.2
Community Factors				
Social Greek Organizations				
Not a member	457	87.5	601	88.8
Member	65	12.5	76	11.2
Residence				
Campus residence hall	206	39.4	297	43.4
Fraternity/Sorority house	16	3.1	12	1.8
Other campus housing	32	6.1	59	8.6
Parent/guardian's home	79	15.1	75	10.9
Other off-campus housing	179	34.2	224	32.7
Other	11	2.1	18	2.6
Organized Athletics				
Varsity athlete: No	460	88.8	619	91.4
Yes	58	11.2	58	8.6
Club sports: No	451	87.2	598	89.3
Yes	66	12.8	72	10.7
Intramural sports: No	393	76.0	525	78.1
Yes	124	24.0	147	21.9

** $p<.01$ using chi-square test

Research Question 1

To what extent do college students with diabetes meet self-care requisites of: food (nutrition), activity (exercise), rest (sleep), and prevention of hazards to life (alcohol use, smoking, and risky driving)?

Food

Daily intake of five or more fruits and vegetables were reported by 7.8% of students with diabetes. The majority of students reported they did not have an eating disorder or problem in the last 12 months. Approximately 12% of the students with diabetes reported unsafe weight-loss strategies.

Activity

The meeting of activity recommendations through a combination of exercise and muscle strengthening practices was reported by 27.6% of students with diabetes.

Rest

Twenty-five (4.8%) of the students with diabetes reported obtaining enough sleep to feel rested every morning in the past week. Daytime sleepiness was a problem for many of the students (90.7%). The majority of the students with diabetes reported they did not have difficulty handling sleep problems in the past 12 months. Sleep latency, or difficulty falling asleep in the past 7 days, was reported by 64.0% of the students.

Prevention of Hazards to Life

Alcohol. Alcohol use guidelines established by the ADA and U.S. Department of Agriculture were utilized to determine the meeting of this self-care requisite. Almost 30% of the students with diabetes met the age and gender description of what constitutes moderate alcohol consumption or less during the most recent time of partying or socializing. This was identified as being at least 21 years of age and consuming no more than one drink for females and two drinks

for men. Approximately one third of the students with diabetes reported they never used alcohol (21%) or used it but not in the last 30 days (11%). Protective drinking strategies, such as use of a designated driver, staying with the same group of friends, eating before/during drinking, and keeping track of numbers of drinks were employed by 95.6% of the students most of the time or always.

Tobacco. Approximately 70% of students with diabetes reported they did not use cigarettes or other tobacco products in the last 30 days.

Risky driving. The majority of students with diabetes (80.4%) reported they did not drive after drinking any alcohol and 95% reported they did not drive after having five or more drinks of alcohol in the last 30 days. More than two-thirds of students reported they always wore a seatbelt in the car in the last 12 months. See Table 5 for details of the self-care behaviors of students with diabetes.

Research Question 2

How does self-care of college students with diabetes compare to self-care of college students without diabetes in requisites of: food (nutrition), activity (exercise), rest (sleep), prevention of hazards to life (alcohol use, smoking, and risky driving)?

Food

Table 5 summarizes the comparisons of the self-care behaviors related to food, activity, rest, and prevention of hazards to life for students with diabetes and without diabetes. Regarding food, more students with diabetes met the recommendations for intake of fruits and vegetables than students without diabetes. Students without diabetes, however, reported significantly better self-care measures than students with diabetes related to other factors associated with food. A larger proportion of students without diabetes perceived themselves to be of an appropriate weight ($p<.001$), had no history of an eating disorder within the last 12 months ($p<.001$), did not

experience academic problems due to an eating disorder in the last 12 months (p<.001), and did not use unsafe weight loss strategies in the last 30 days (p<.001).

Activity

Students with diabetes reported significantly better achievement of meeting exercise recommendations in the past 7 days than students without diabetes (p=.034).

Rest

There were no significant differences between students with diabetes and without diabetes regarding reports of feeling rested every morning or not experiencing daytime sleepiness. Significant differences were found in other measures of rest. A smaller proportion of students with diabetes reported no difficulty falling asleep in the past 7 days (p=.005), no difficulty handling sleep problems within the last 12 months (p=.001), and no academic problems due to sleep difficulties within the last 12 months (p=.010).

Prevention of Hazards to Life

While there were no significant differences between students with diabetes and without diabetes in meeting the criteria for legal and moderate alcohol consumption, significant differences existed in other risk behaviors related to alcohol, tobacco, and driving. A smaller proportion of students with diabetes reported consistent use of at least one protective drinking strategy in the last 12 months than students without diabetes (p=.002). A smaller percentage of students with diabetes reported no academic problems due to alcohol within the last 12 months than students with diabetes (p=<.001) and no history of substance abuse or addiction in the last 12 months (p=<.001).

A smaller proportion of students with diabetes reported no use of cigarettes or other tobacco products in the last 30 days than students without diabetes (p=.026). In addition, a smaller percentage of students with diabetes reported no drinking and driving in the last 30 days

than students without diabetes (p=.038). Finally, a smaller proportion of students with diabetes always used their seat belt in the last 12 months than students without diabetes (p=.001).

Table 5

Comparison of Self-care Behaviors (N=1216)

	Students With Diabetes (n=528)		Students Without Diabetes (n=688)		χ^2
	n	%	n	%	*p*
Food					
Meets fruits and vegetables recommendations	41	7.8	36	5.2	.073
Perceived to be the right weight	237	44.9	389	56.5	.000**
No history of eating disorder in last 12 months	488	93.3	673	98.5	.000**
No academic problems due to eating disorder in last 12 months	486	93.5	670	98.7	.000**
Did not use unsafe weight loss strategies in last 30 days	458	87.4	642	94.1	.000**
Activity					
Met exercise recommendations on the past 7 days	143	27.6	151	22.2	.034*
Rest					
Felt rested every morning in past 7 days	25	4.8	30	4.4	.747
No daytime sleepiness in past 7 days	49	9.3	61	8.9	.791
No difficulty falling asleep in past 7 days	188	36.0	302	44.0	.005**
No difficulty handling sleep problems within last 12 months	338	64.3	502	73.3	.001**
No academic problems due to sleep difficulties within last 12 months	381	73.3	542	79.6	.010**

Prevention of Hazards to Life					
Meets age and gender criteria for legal and moderate alcohol use	153	29.8	203	29.8	.987
Used alcohol < 3 days within last 30 days	240	46.0	322	47.1	.705
No binge drinking in last 2 weeks	304	57.7	416	60.6	.299
Consistently used at least one protective drinking strategy in last 12 months	504	95.6	673	98.5	.002**
No academic problems due to alcohol within last 12 months	464	88.9	646	94.4	.000**
No history of substance abuse or addiction in last 12 months	488	93.5	677	99.0	.000**
No use of cigarettes or other tobacco products in last 30 days	365	69.8	513	75.6	.026*
No drinking & driving in last 30 days	423	80.4	581	84.9	.038*
No driving after 5 or more drinks last 30 days	498	95.0	662	96.9	.093
Always used seat belt last 12 months	373	70.9	542	79.2	.001**

Note: proportions and numbers may not equal 100% due to rounding and missing values
p values correspond to chi-square test
*$p<.05$ **$p\leq.001$

Research Question 3

In college students with diabetes and without diabetes, what is the relationship between basic conditioning factors found at the intrapersonal, interpersonal, and community levels and meeting the self-care requisites of: food (nutrition), activity (exercise), rest (sleep), and prevention of hazards to life (alcohol use, smoking, and risky driving)?

Eleven demographic characteristics, or basic conditioning factors, were selected representing the intrapersonal, interpersonal, and community levels of influence as possible

predictors in meeting the self-care requisites of food, activity, rest, and prevention of hazards to life. The characteristics selected as independent variables in the Generalized linear model binary logistic regression analyses were gender (female), race/ethnicity (White), age, grade average, stress (average/less), health information (not received), relationship status (in a relationship), marital status (married), membership in social organizations (no fraternity or sorority), place of residence (lives with parents), and participation in organized athletics (participates).

Food

Table 6 provides details of the logistic regression analysis for meeting the self-care requisite of food. Considering all factors, one intrapersonal factor and one community factor were significant predictors. In students with diabetes, being White (AOR=3.348, 95% CI=1.107-10.126) and living with parents (AOR=3.022, 95% CI=1.310-6.969) predicted meeting the self-care requisite of food. The regression model for students without diabetes was not statistically significant (p=.229).

Table 6

Regression Analysis of Meeting the Self-care Requisite of Food

	With Diabetes			Without Diabetes		
Independent Variable	β	SE	*p*	β	SE	*p*
Gender (female=1)	- .066	.386	.864	.491	.401	.221
Race/ethnicity (White=1)	1.208	.565	.032	.409	.468	.382
Age	.149	.107	.162	- .005	.121	.966
Grade average	.448	.266	.092	.653	.303	.031
Stress (less=1)	- .226	.369	.541	.343	.368	.350
No information received on topic	.278	.368	.450	- .118	.365	.746
Relationship status (yes=1)	- .482	.386	.212	-.312	.381	.412
Marital status (married=1)	- .515	1.106	.641	.637	.807	.429
Greek membership (no=1)	- .588	.515	.254	.848	.759	.264
Residence (with parents=1)	1.106	.426	.009	- .305	.759	.688
Organized athletics (yes=1)	.129	.414	.756	.620	.379	.101
	Likelihood ratio χ^2=21.060, *df*=11, *p*=.033 (n=484)			Likelihood ratio χ^2=14.066, *df*=11, *p*=.229 (n=644)		

Dependent variable: meets fruits and vegetables recommendations.

Activity

As shown in Table 7, participation in organized athletics was a statistically significant predictor for meeting the self-care requisite of activity for students with diabetes (AOR=2.068, 95% CI=1.308-3.270). One variable at the intrapersonal level (health knowledge) and two variables at the community level (membership in social organizations and participation in organized athletics) were identified as statistically significant in meeting the self-care requisite of activity for students without diabetes. In students without diabetes, receiving information regarding activity predicted meeting the exercise recommendations (AOR=.594, 95% 95% CI=.388-.910). Not being a member of a Greek social organization was associated with meeting activity recommendations (AOR=1.999, 95% CI=1.013-3.944) and students without diabetes who participated in organized athletics were more likely to meet activity recommendations (AOR=2.113, 95% CI=1.403-3.182).

Table 7

Regression Analysis of Meeting the Self-care Requisite of Activity

	With Diabetes			Without Diabetes		
Independent Variable	β	SE	*p*	β	SE	*p*
Gender (female=1)	-.232	.228	.307	- .045	.210	.832
Race/ethnicity (White=1)	.274	.261	.293	.465	.244	.057
Age	- .017	.066	.794	- .031	.067	.649
Grade average	.054	.153	.725	.039	.149	.791
Stress (less=1)	.329	.219	.132	.163	.200	.415
No information received on topic	- .113	.227	.619	- .520	.217	.017
Relationship status (yes=1)	- .128	.224	.567	- .218	.202	.281
Marital status (married=1)	.057	.529	.914	-1.130	.763	.138
Greek membership (no=1)	- .056	.320	.861	.693	.347	.046
Residence (with parents=1)	.040	.317	.900	- .074	.349	.832
Organized athletics (yes=1)	.727	.234	.002	.748	.209	<.001
	Likelihood ratio χ^2=23.426 *df*=11, *p*=.015 (n=478)			Likelihood ratio χ^2=37.792 *df*=11, *p*<.001 (n=636)		

Dependent variable: meets activity recommendations.

Rest

Details of the regression analysis for the self-care requisite of rest are found in Table 8. Four intrapersonal factors (gender, age, grade average, and stress) were found to be statistically significant predictors of meeting the self-care requisite of rest. For students with diabetes, being older (AOR=1.154, 95% 95% CI=1.023-1.303), having a higher grade average (AOR=1.383, 95% CI=1.043-1.833), and experiencing average or less than average amounts of stress (AOR=2.459, 95% CI=1.648-3.667) was predictive of meeting the self-care requisite for rest. Among students without diabetes, being male (AOR=.643, 95% CI=.456-.907), older age (AOR=1.143, 95% CI=1.029-1.270), and experiencing average or less than average amounts of stress (AOR=2.233, 95% CI=1.609-3.099) was associated with meeting the self-care requisite for rest.

Table 8

Regression Analysis of Meeting the Self-care Requisite of Rest

	With Diabetes			Without Diabetes		
Independent Variable	β	SE	*p*	β	SE	*p*
Gender (female=1)	-.159	.212	.455	-.441	.175	.012
Race/ethnicity (White=1)	-.444	.233	.057	.209	.191	.273
Age	.144	.062	.020	.134	.054	.013
Grade average	.324	.144	.024	.074	.122	.547
Stress (less=1)	.900	.204	<.001	.803	.167	<.001
No information received on topic	.088	.226	.697	-.018	.195	.928
Relationship status (yes=1)	-.160	.204	.432	.029	.170	.866
Marital status (married=1)	-1.159	.606	.056	.041	.421	.923
Greek membership (no=1)	.182	.317	.566	.132	.268	.622
Residence (with parents=1)	.323	.284	.255	.204	.274	.456
Organized athletics (yes=1)	.211	.222	.343	.159	.184	.387
	Likelihood ratio χ^2=44.999 *df*=11, *p*<.001 (n=485)			Likelihood ratio χ^2=43.195 *df*=11, *p*<.001 (n=644)		

Dependent variable: achieves quality sleep.

Preventions of Hazards to Life

Determining predictors to meeting the self-care requisite of prevention of hazards to life were analyzed with four outcomes: moderate or less alcohol consumption, not using tobacco, and no risky driving as evidenced by not drinking and driving and seat belt usage.

Alcohol use. Four intrapersonal factors (gender, race/ethnicity, age, and grade average) were statistically significant in predicting meeting the self-care requisite of prevention of hazards to life related to alcohol use. Among students with diabetes, being of younger age (AOR= .870, 95% CI=.764-.991) and having a higher grade average (AOR= 1.393, 95% CI=1.030-1.884) predicted meeting the alcohol criteria. In students without diabetes, being male (AOR=.603, 95% CI=.416-.874), Non-White (AOR=.654, 95% CI=.442-.970), and achieving a higher grade average (AOR-1.594, 95% CI=1.215-2.091) were associated with meeting self-care requisites for alcohol. Table 9 provides further details of these findings.

Table 9

Regression Analysis of Meeting the Self-care Requisite of Prevention of Harm: Alcohol Use

	With Diabetes			Without Diabetes		
Independent Variable	β	SE	*p*	β	SE	*p*
Gender (female=1)	-.318	.227	.160	-.506	.190	.008
Race/ethnicity (White=1)	-.343	.243	.158	-.424	.201	.035
Age	-.139	.066	.036	-.082	.061	.178
Grade average	. 332	.154	.031	.466	.139	.001
Stress (less=1)	.295	.215	.170	.228	.183	.214
No information received on topic	.199	.251	.429	.378	.218	.082
Relationship status (yes=1)	-.366	.221	.098	.030	.187	.872
Marital status (married=1)	. 649	.518	.210	-.082	.474	.862
Greek membership (no=1)	.596	.373	.110	.387	.325	.234
Residence (with parents=1)	.444	.289	.124	.440	.288	.127
Organized athletics (yes=1)	.027	.239	.911	-.165	.205	.420
	Likelihood ratio χ^2=25.463 *df*=11, *p*=.008 (n=482)			Likelihood ratio χ^2=37.648 *df*=11, *p*<.001 (n=643)		

Dependent variable: meets criteria for legal and moderate alcohol use

Tobacco use. The preventive behavior of not using tobacco was predicted by gender, grade average, and health knowledge for students with diabetes. Students who were female (AOR=2.179, 95% CI=1.395-3.401) and achieved a higher grade average (AOR=1.429, 95% CI=1.073-1.905) were more likely to not use tobacco. Not receiving information related to tobacco was positively associated with not using tobacco in students with diabetes (AOR=1.533, 95% CI=1.012-2.322). For students without diabetes, two intrapersonal factors were predictive of not using tobacco, i.e. being female (AOR=1.804, 95% CI=1.215-2.678) and having a higher grade average (AOR=1.643, 95% CI=1.245-2.168). Details regarding these findings are found in Table 10.

Table 10

Regression Analysis of Meeting the Self-care Requisite of Prevention of Harm: Tobacco Use

	With Diabetes			Without Diabetes		
Independent Variable	β	SE	*p*	β	SE	*p*
Gender (female=1)	.779	.227	.001	.590	.202	.003
Race/ethnicity (White=1)	-.285	.252	.258	-.391	.229	.087
Age	.013	.064	.837	.082	.063	.195
Grade average	.357	.147	.015	.497	.142	<.001
Stress (less=1)	.373	.218	.087	.116	.194	.548
No information received on topic	.427	.212	.044	.298	.195	.126
Relationship status (yes=1)	-.111	.217	.608	.136	.198	.492
Marital status (married=1)	-.256	.501	.609	-.217	.475	.648
Greek membership (no=1)	.386	.309	.213	-.011	.294	.970
Residence (with parents=1)	.453	.323	.161	.632	.350	.071
Organized athletics (yes=1)	.276	.239	.247	.307	.213	.149
	Likelihood ratio χ^2=28.914 *df*=11, *p*=.002 (n=479)			Likelihood ratio χ^2=30.875 *df*=11, *p*=.001 (n=636)		

Dependent variable: does not use tobacco.

Drinking and driving. Age and grade average were predictors of not drinking and driving for students with diabetes. Among students with diabetes, younger age (AOR=.713, 95% CI=.615-.826) and a higher grade average (AOR=1.411, 95% CI=1.009-1.974) was positively associated with not drinking and driving. Three intrapersonal factors (race/ethnicity, age, and not receiving information on the topic of alcohol) and one community factor (place of residence) were predictors of safe driving related to alcohol for students without diabetes. Being Non-White predicted not drinking and driving for students without diabetes (AOR=.533, 95% CI=.304-.933) as did being of younger age (AOR= .637, 95% CI=.543-.746), and not living with parents (AOR= .389, 95% CI=.197-.766). Also, not receiving health information on the topic of alcohol was

associated with not drinking and driving (AOR=1.933, 95% CI=1.096-3.409) for this group. Details of these findings can be found in Table 11.

Table 11

Regression Analysis of Meeting the Self-care Requisite of Prevention of Harm: Drinking and Driving

	With Diabetes			Without Diabetes		
Independent Variable	β	SE	*p*	β	SE	*p*
Gender (female=1)	.190	.261	.465	.087	.241	.720
Race/ethnicity (White=1)	.128	.279	.646	-.630	.286	.028
Age	-.339	.076	<.001	-.452	.081	<.001
Grade average	.344	.171	.044	.215	.164	.189
Stress (less=1)	.214	.251	.392	-.016	.229	.943
No information received on topic	.046	.288	.872	.659	.289	.023
Relationship status (yes=1)	-.259	.249	.297	.236	.235	.314
Marital status (married=1)	1.463	.782	.061	.392	.595	.510
Greek membership (no=1)	.429	.355	.227	.592	.323	.066
Residence (with parents=1)	.027	.352	.938	-.945	.346	.006
Organized athletics (yes=1)	.029	.281	.917	.043	.260	.868
	Likelihood ratio χ^2=33.696 *df*=11, *p*<.001 (n=484)			Likelihood ratio χ^2=47.550 *df*=11, *p*<.001 (n=641)		

Dependent variable: no drinking and driving

Seat belt. As noted in Table 12, two intrapersonal factors (gender and grade average) and one community factor (place of residence) were predictive of seat belt use. In students with diabetes, students who were female (AOR=1.628, 95% CI=1.047-2.534), had a higher grade average (AOR=1.514, 95% CI=1.130-2.028), and lived with parents (AOR=2.028, 95% CI=1.039-3.958) were more likely to always wear a seat belt when driving. Only having a higher

grade average predicted seat belt use for students without diabetes (AOR=2.179, 95% CI=1.622-2.928).

Table 12

Regression Analysis of Meeting the Self-care Requisite of Prevention of Harm: Seatbelt Use

	With Diabetes			Without Diabetes		
Independent Variable	β	SE	*p*	β	SE	*p*
Gender (female=1)	.488	.226	.031	.043	.217	.841
Race/ethnicity (White=1)	.358	.241	.137	.141	.227	.535
Age	-.016	.065	.805	-.040	.066	.545
Grade average	.415	.149	.005	.779	.151	<.001
Stress (less=1)	.115	.219	.600	-.315	.206	.126
No information received on topic	-.003	.226	.988	-.087	.221	.695
Relationship status (yes=1)	-.276	.218	.206	-.119	.205	.562
Marital status (married=1)	-.044	.511	.931	1.361	.761	.074
Greek membership (no=1)	-.135	.326	.677	.260	.326	.425
Residence (with parents=1)	.707	.341	.038	.544	.354	.125
Organized athletics (yes=1)	-.232	.235	.323	.070	.226	.758
	Likelihood ratio χ^2=26.479 *df*=11, *p*=.006 (n=480)			Likelihood ratio χ^2=37.287 *df*=11, *p*<.001 (n=639)		

Dependent variable: uses seat belt.

As shown in Table 13, each of the basic conditioning factors was a predictor of meeting at least one of the self-care requisites for either students with diabetes or those without diabetes (with the exception of relationship status and marital status.) Grade average was the most frequent predictor, associated with all of the self-care requisites except food and activity.

Table 13

Summary of Basic Conditioning Factors as Predictors of Self-Care

	Food	Activity	Rest	Prevention of Hazards			
				Alcohol	Tobacco	Risky Driving	
						Drinking & Driving	Seat Belt
Gender			O	O	X O		X
Race/ethnicity	X	O		O		O	
Age			X O	X		X O	
Grade average			X	X O	X O	X	X O
Stress			X O				
Health information		O			X	O	
Relationship status							
Marital status							
Greek membership		O					
Place of residence	X					O	X
Organized athletics		X O					

X=students with diabetes
0=students without diabetes

Summary

The study sample included 1216 participants, 528 college students with diabetes and 688 without diabetes. The average age of the total sample was 20.33 and was majority female and White. The largest minority group was of Asian/Pacific Islander heritage. The largest group of students was in their freshman year and the majority of participants were enrolled as full-time students.

Characteristics between the two study groups were similar in gender, race/ethnicity, year in school, age, enrollment status, stress, and participation in Greek social organizations, and organized sports. The majority of students were single and had health insurance primarily

through a parent's plan. Most students lived in residence halls or off-campus housing. Students with diabetes reported significantly lower grade average and perceived themselves to have worse health than their non-diabetic peers.

The analytic methods used in this study to answer Question 1 yielded several important findings about the self-care behaviors of students with diabetes. A small portion of students met the recommendations for daily fruits and vegetables. Activity recommendations were met by only a quarter of the students. Most students reported they did not get enough sleep to feel rested every morning and had a problem with daytime sleepiness. Students with diabetes engaged in the harmful behaviors of alcohol use, tobacco use, and risky driving.

A comparison of the self-care behaviors of students with diabetes to those with without diabetes to answer Question 2 showed students with diabetes met the self-care requisites for food and activity more often than students without diabetes, but the rates for both groups of students in meeting fruits and vegetable recommendations and exercise guidelines were low. Both groups of students showed evidence of not achieving adequate rest. There were no significant differences between students with diabetes and without diabetes in quantity or frequency of alcohol use. Prevention of hazards to life was demonstrated more often with higher percentages of students not using tobacco products and using seat belts than meeting alcohol use criteria. Students with diabetes were more likely to use tobacco and to not always use their seat belt compared to students without diabetes.

The comparison of the two groups of students revealed significant findings related to the vulnerability of students with diabetes. Students with diabetes reported a higher incidence of eating disorders, sleep disturbances, and history of substance abuse. They also tended to not use protective drinking strategies as often. In addition, students with diabetes showed more academic problems related to eating disorders, sleep difficulties, and alcohol.

The regression model used to answer question 3 revealed predictive influences of self-care at the intrapersonal and community levels within the ecological framework. All independent variables at the intrapersonal and community levels of influence were predictive factors of meeting at least one self-care requisite for students with diabetes or without diabetes. There was variation in which basic conditioning factors were related to self-care outcomes between the students with diabetes and without diabetes. The two characteristics representing interpersonal processes, relationship status and marital status, were not significant influences of any self-care requisites. Grade average was found to be the characteristic most frequently associated with self-care behaviors for students with diabetes and without diabetes.

CHAPTER V

DISCUSSION

Introduction

The purpose of this study was to examine the self-care behaviors of college students with diabetes related to meeting the universal self-care requirements associated with food, activity, rest, and prevention of hazards to life. A comparison of the self-care behaviors of college students with diabetes to those without diabetes provided an opportunity to explore similarities and differences between the two groups. An examination of the relationships between intrapersonal, interpersonal, and community factors and the meeting of the self-care behaviors provided knowledge of the predictive influences on meeting self-care requisites. An interpretation of the principal findings, implications, and conclusions of this study are discussed as are recommendations for further research.

Basic Conditioning Factors

The sample of college students with diabetes in this study was larger than previous studies of this special population (Balfe, 2007b; Eaton, Williams, & Bodansky, 2001; Ravert, 2009). As with several other large studies of general college students, the sample consisted of more female than male students, was mostly White, and more students were in their freshman year than any other year in school (Lund et al., 2010; O'Brien et al., 2008; Orzech et al., 2011; Sutfin et al., 2012; Taylor & Bramoweth, 2010; Vella-Zarb & Elgar, 2009). Basic conditioning factors (demographic characteristics) of the sample of college students with and without diabetes revealed similarities in perceived stress, relationship status, marital status, membership in Greek social organizations, place of residence, and participation in organized athletics.

Differences between the student groups were found in grade point average (GPA) and perceived health status. Students with diabetes reported a lower GPA and a more negatively perceived health status. Students with diabetes acknowledged significantly more difficulty with academics as a result of problems related to eating disorders, sleep disturbances, and alcohol which may account for the larger percentage of students with diabetes earning grades of D/F.

Students with diabetes rated their health as fair/poor more often than students without diabetes. Previous studies reported similar perceptions of health by adolescents and young adults with type 1 diabetes (Tercyak et al., 2005) and adults with type 2 diabetes (Hu, Wallace, & Tesh, 2010). Furthermore, students with diabetes in this study reported greater frequency of acute and chronic health conditions, including allergies, asthma, hypertension, and depression. Such physical and mental health comorbidities can negatively affect disease management and quality of life (Bernstein, Stockwell, Gallagher, Rosenthal, & Soren, 2013; Hu et al., 2010; Matziou et al., 2011).

Maintenance of Sufficient Intake of Food

The recommendations for daily intake of five or more fruits and vegetables were met by less than 10% of the students in either study group. While students with diabetes met this recommendation more frequently than those students without diabetes, there was not a significant difference between the groups. It was anticipated that given the importance of good nutrition to diabetes management, that more students with diabetes would incorporate healthy food choices into their nutritional practices more regularly. The finding that self-care related to food of college students with diabetes is similar to their non-diabetic peers may lend support to findings from previous studies that showed students with diabetes desire to achieve a sense of normalcy among college peers, such as joining friends in spontaneous fast food outings or eating from vending machines (Eaton et al., 2001; Wdowik et al., 1997).

In addition to fruit and vegetable intake, several additional factors related to weight management were considered in the assessment of meeting food requirements. Compared to students without diabetes, students with diabetes reported significantly more problems related to weight perceptions, history of eating disorders, and use of unsafe weight loss strategies. Students acknowledged eating disorders as negatively effecting academic performance. Eating disorders among individuals with diabetes are a growing concern as they affect metabolic control and are associated with a high risk of medical complications and increased mortality (Colton et al., 2009; Peveler et al., 2005).

Significant predictors of meeting the self-care requirement for food among students with diabetes included race/ethnicity and place of residence. The likelihood of meeting the self-care requirement for food was higher among students who were White and who lived with parents than students who were Non-White and lived independently in on-campus or off-campus housing. There are no known comparative studies specific to college students with diabetes that consider place of residence or ethnicity to nutritional status, although in a study of college freshmen, Freedman (2010) found more students living at home met the recommendations for fruits and vegetables than students living on-campus.

There were no significant predictors of meeting the self-care requisite for food in students without diabetes.

Maintenance of a Balance between Activity and Rest

Activity

Physical activity is associated with weight changes, stress levels, perception of health, and academic performance in college students (Holm-Denoma et al., 2008; Ruthig et al., 2011). The added importance of physical activity in the life of an individual with diabetes is a key element of diabetes education, optimal self-management, and the prevention of complications in

this chronic illness (Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Diabetes Translation, 2012). Thus, there is concern that less than a third of students with diabetes met the recommended guidelines for exercise and muscle strengthening activities in the specified time period. Less than 25% of students without diabetes met the activity recommendations, far fewer than found in other studies (Irwin, 2007). The finding that students with diabetes met the exercise recommendations more frequently than students without diabetes was significant and may be a reflection of their knowledge regarding the increased importance of exercise to their body and desire to engage in good health practices (Balfe, 2007b).

Participation in organized campus athletics was the only predictive factor for meeting the exercise recommendations for students with diabetes. Previous studies have found participation in campus recreational sports is associated with improved self-esteem (Forrester & Beggs, 2004) and has other benefits including an increased sense of campus community, enhanced quality of life, better sense of physical well-being, stress reduction, and a better academic experience (Lindsey & Sessoms, 2006; Shifman, Moss, D'Andrade, Eichel, & Forrester, 2012). No previous studies related to organized athletics were found that were exclusive to college students with diabetes. Given the multiple benefits associated with campus recreational activities, however, and the association between leisure time physical activity and health-related quality of life among adults with type 2 diabetes (Hu et al., 2010), college students with diabetes may achieve substantial improvements to health and well-being through participation in campus organized athletics.

In addition to participation in organized athletics, receiving health information on the topic of physical activity and not participating in a Greek social organization were predictive of meeting the requirements for physical activity among students without diabetes. In a study

comparing the constraints of participation in intramural sports between international and non-international students, not knowing what activities were available was identified as a barrier to participation (Shifman, Moss, D'Andrade, Eichel, & Forrester, 2012). Thus, information provided to students could prove to be more valuable if it contained specific details related to opportunities for engagement in addition to the benefits of participation. Contrary to the findings in the current study, Miller, Noland, Rayens, and Staten (2008) found students who were members of a fraternity or sorority were significantly more likely to use campus recreational facilities. In addition, membership in a Greek social organization was found to be a predictor of vigorous exercise compared to moderate intensity exercise (Miller, Staten, Rayens, & Noland, 2005).

Rest

Of all the self-care requisites examined in this study, achieving adequate rest had the most negative results for students with and without diabetes. Less than five percent of the students in both groups felt rested every morning in the week prior to the survey, over 90% experienced daytime sleepiness, and approximately 60% had difficulty falling asleep. More students with diabetes reported difficulty handling sleep problems during the course of the previous year and academic difficulty that was attributed to sleep disturbances than students without diabetes. Previous studies of general college students support this finding that many students report poor sleep quality and daytime sleepiness (Lund et al., 2010; Orzech et al., 2011). There are no known studies related to sleep and college students with diabetes.

Poor sleep quality has known detrimental effects related to health promotion and chronic disease prevention in the general population (Center for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 2012). Poor sleep quality has additional negative effects on college students' academic performance and engagement in risk

behaviors (Gaultney, 2010; Howell et al., 2004; Kenney et al., 2012; Lund et al,, 2010; Orzech et al., 2011). Further health consequences of inadequate rest for individuals with diabetes include reduced quality of life, depressed mood, lower grades, decreased motivation, and changes in metabolic control (Barone & Menna-Barreto, 2011; Chasens & Olshansky, 2008; Donga et al., 2010; Perfect et al., 2012). Although the findings of this study demonstrate the prevalence of sleep disturbances among college students with diabetes, this at risk group may not be fully aware of the consequences to their health and well-being.

In this study, three factors were significantly related to meeting the self-care requisite of rest in students with diabetes, i.e. age, grade average, and stress. Older students, those with higher GPA, and those students who acknowledged less than average or average stress were more likely to experience better quality sleep determined by feeling rested every morning, no daytime sleepiness, and no difficulty falling asleep. Age, often correlated to year in school, was similarly associated with sleep patterns in previous studies of general college students, as freshmen reported less sleep duration than upper classmen (Orzech et al., 2011; Tsai & Li, 2004). In a study of college students and sleep disorders, Gaultney (2010) found students who reported no sleep disorders had a higher GPA than students who reported at least one sleep disorder. In the current study, experiencing average or less than average stress was the strongest predictor of meeting the self-care requisite of rest for both students with and without diabetes. In prior studies of college students, stress in the form of interpersonal conflicts with a friend, family member, roommate, or significant other was associated with poorer sleep quality, as were worries about academics and other mental health issues such as depression and anxiety (Lund et al., 2010; Orzech et al., 2011).

Older age and gender were additional predictors of meeting the self-care requisite of rest for students without diabetes. Males were more likely to achieve better sleep quality. Gender

differences were similarly found in previous studies of college students and sleep with females at greater risk for insomnia, stress-related sleep difficulty, shorter sleep duration, and sleep latency (Gaultney, 2010; Lund et al., 2010; Orzech et al., 2011; Tsai & Li, 2004).

Prevention of Hazards to Life, Functioning, and Well-being

Alcohol

The proportion of students with diabetes and without diabetes who met the age and gender criteria for moderate or less alcohol consumption was nearly identical. Factors incorporated in the determination of responsible drinking included being of legal age for drinking beverages containing alcohol and meeting gender guidelines for the amount of alcohol intake in a given time period. Only one third of students in both groups met the age and gender criteria of moderate or less alcohol consumption, and approximately 40% of the students in both groups reported binge drinking in the previous two weeks. The incidence of binge drinking reported by students with diabetes is similar to findings from a previous study using 2006 National College Health Assessment data (Ravert, 2009). While at least one protective drinking strategy, such as eating before and/or after drinking, using a designated driver, or staying with the same group of friends while drinking, was used by almost all students, students with diabetes engaged in these harm preventing behaviors less frequently than students without diabetes. College students with diabetes reported a significantly higher incidence of substance abuse or addiction in the last 12 months than students without diabetes. This finding adds to the literature as there is scant research on the relationship between substance abuse and diabetes despite a known increased mortality due to alcohol and drug use in individuals with type 1 diabetes (Hamilton, Lloyd, & Phillips, 2012).

The predictors of meeting the age and gender criteria for responsible drinking practices among students with diabetes included being of younger age and having a higher GPA. The

predictor of younger age is supported in other large survey studies of general college students in the U. S. (Nelson et al., 2009; O'Brien et al., 2008) who found upper-level undergraduate students (reflecting an older age) reported more alcohol use and binge drinking than freshmen. In contrast, Balfe (2007a), using an interview method with 17 college students with diabetes in the U.K., found older students with diabetes engaged in less medically risky drinking practices and drank less in bars as they were less concerned about establishing a social identity, developed social networks in which their diabetes was respected, and focused more on maintaining healthy behaviors.

The relationship between academic performance and alcohol use has been primarily studied with academic performance as the outcome (Ruthig et al., 2011; Singleton & Wolfson, 2009). The findings of this study are unique in that they reveal GPA as a predictor of legal and responsible alcohol use. In addition to higher GPA, gender and race/ethnicity were further predictors of legal and moderate or less use of alcohol in students without diabetes. In this study, male students and non-White students were more likely to meet these criteria than female and White students. The gender finding is supported by a prior study in which more female students engaged in high-risk drinking than male students (Wilke et al., 2005). In contrast, findings by Nelson et al. (2009) show that males had significantly higher levels of alcohol consumption compared to females. Data on trends of alcohol consumption among undergraduate students show female students increasing in their volume and frequency of alcohol use (Bulmer et al., 2010). The finding in this study related to race/ethnicity is supported in other studies in which being White significantly predicted higher measures of alcohol consumption, including high-risk drinking, compared to non-whites (Bulmer et al., 2010; Delva et al., 2004; Wilke et al., 2005).

Smoking

Nearly 30% of the students in this study reported the use of tobacco products in the last 30 days with more frequent use by students with diabetes than those without diabetes. This finding is especially concerning given the increased danger to health of smoking in individuals with diabetes (Karter et al., 2008). Furthermore, smoking among college students in the general population is associated with high-risk alcohol use, risky driving, relational abuse, depression, less exercise, and utilization of emergency and mental health services (Halperin et al., 2010). Smoking predictors of college students with diabetes have not been well documented in the literature.

In this study, being female, having a higher GPA, and not receiving educational materials about tobacco use were significant predictors of not smoking in students with diabetes. Only gender and GPA were predictors for students without diabetes. As found in this study, more female students than male students are reported to be nonsmokers (Ames et al., 2009; Sutfin et al., 2012) while other studies found gender not to be a significant predictor of smoking behavior (Ridner, 2005; Thompson et al., 2007; Wetter et al., 2004). Thompson et al. (2007) similarly found fewer students with a higher GPA were current smokers. Not receiving information on the topic of tobacco use from the college attended by the research participants may be explained as the perceived lack of need of such materials for individuals who are already non-smokers.

Risky Driving

Drinking and driving and seatbelt use were the final determinants examined in meeting the self-care requisite of prevention of hazards to life. While approximately 80% of the students with diabetes reported they did not drink and drive in the last 30 days, a higher percentage of college students with diabetes reported unsafe driving behavior than their non-diabetic peers. Two factors predicted not drinking and driving for students with diabetes, i.e. being of younger

age and having a higher GPA. As it is illegal in the United States for individuals younger than 21 years of age to drink alcohol, and the majority of younger students reside in campus dormitories often without access to vehicles, it is reasonable that being younger would result in less drinking and driving. In a large study of over 4000 participants across 10 universities in North Carolina, more underclassmen in their freshman and sophomore years, typically of younger age, were reported to be nondrinkers than students in their junior and senior years (O'Brien et al., 2008). The finding that a higher GPA predicted less risky driving supports the literature regarding teen driving practices in that teens with better grades in school tend to have less risky driving behavior (Shope & Bingham, 2008).

In addition to younger age, three other predictors of not drinking and driving for students without diabetes included being Non-White, not receiving health information on the topic of alcohol, and not living with parents. In a study of African American and White college students, Siebert et al. (2003) found no significant difference between the two groups of students in driving after consuming any amount of alcohol, a contrasting finding to the current study. As with the finding in which no health information received on the topic of tobacco was a predictor for positive behaviors, it is possible that students who did not engage in alcohol risk behaviors did not feel inclined to take educational materials on the topic of alcohol. The finding that students who did not live with their parents were less likely to drink and drive than if they lived with their parents may be attributed to the majority of college students in this study living either in campus housing or off-campus communities. A recent study reported students living in on-campus housing were less likely to drink and drive (Quinn & Fromme, 2012). Living on-campus was found to serve as a protective factor in that students living on-campus often did not have a car and found social events near campus that did not involve driving.

Nearly 30% of the students with diabetes (compared to 20% of students without diabetes) in this study did not always wear their seatbelt, placing them at increased risk of injury in a motor vehicle crash. Three factors predicted seatbelt usage in students with diabetes, i.e. being female, having a higher GPA, and living with parents. Only higher GPA was a predictor in students without diabetes. A previous study similarly found male teenage drivers, teens with better grade averages, and teen drivers who live with parents have less risky driving (Shope & Bingham, 2008).

Summary

Prior to this study, little was known about the state of health of college students with diabetes. The findings of this descriptive study provide a new foundation from which scientific knowledge related to this vulnerable population can grow. The self-care requisites related to food, activity, rest, and prevention of hazards to life are marginally met by college students with diabetes. The self-report of their self-care behaviors are not markedly different than behaviors of students without diabetes. While students with diabetes are slightly more successful at meeting recommendations related to fruit and vegetable intake and exercise, they fare worse in achieving rest, and preventing harm from alcohol, smoking, and risky driving than students without diabetes. This study adds to the literature on college students with diabetes by describing some general characteristics of this population, recognizing the incidence and prevalence of their self-care behaviors, and identifying predictive factors significantly related to meeting the self-care requisites.

Orem's self-care deficit nursing theory was applied to develop this new knowledge regarding the state of health of college students with diabetes. By gaining an understanding of the universal self-care behaviors of this particular group of students, behavior norms and deficits

were identified. Examining the basic conditioning factors revealed the predictive influences to meeting self-care requisites and gave insight into connections to the self-care limitations.

The ecological framework used to identify the basic conditioning factors provided an opportunity to explain the influence of individual, social, and community factors on self-care behaviors. By far, the majority of predictors were found at the intrapersonal level of influence, indicating individual characteristics were stronger predictors of health behaviors than those representing interpersonal or community levels. Gender, race/ethnicity, and age, non-modifiable characteristics, predicted each of the self-care requisites for either students with diabetes or without diabetes. A high grade average predicted meeting all self-care requisites except food and activity, whereas low to average amounts of individual stress predicted only the self-care requisite of rest. Receiving information on the topic of exercise increased the likelihood of engaging in physical activity, while not receiving related information positively influenced no tobacco use and not drinking and driving.

A surprising finding was the lack of significance in association of relationship status or marital status in meeting any self-care requisites for students with diabetes or without diabetes. Relationship status and marital status are factors that represent social influences found at the interpersonal level of the ecological model within this developmental cohort. In a previous study, peer relationships were found to positively influence drinking behaviors in students with diabetes (Miller-Hagan & Janas, 2002) and being married or in a steady relationship was protective against alcohol-related consequences in students without diabetes (Wagoner, 2012). In addition, psychosocial issues related to peer pressure when engaged in social activities with friends have been identified as a barrier to diabetes self-management for college students (Wilson, 2010).

At the community level, meeting the self-care requisite of activity was predicted by not being a member of a fraternity or sorority for students without diabetes and by participating in

organized athletics for both groups of students. Activity was the only self-care behavior to be influenced by these community factors. Living with parents was predictive of meeting the self-care requisite of food and seatbelt use for students with diabetes and, not living with parents was predictive of not drinking and driving for students without diabetes.

Implications

Practice

This study has helped to identify areas in which primary care providers, public health practitioners, and campus health personnel can guide prospective, new, and continuing college students with diabetes in their quest for healthy adult living and academic success. Healthcare providers can be proactive in helping the individual with diabetes establish a positive transition to college life and develop healthy behaviors that will last long into their adult lives. This study supports the need for primary care providers to offer more education for older adolescents as they graduate from high school and prepare for college (Mellinger, 2003; Peters et al., 2011). In addition to providing guidance related to diabetes self-management skills that optimize metabolic control, such as through blood glucose monitoring, diet, and exercise regimens, topics related to rest, alcohol, tobacco, and safe driving need to be addressed. Providing a tool kit for the college student with resources for adjusting to the college environment, such as ADA guidelines for fruit and vegetable consumption, exercise, and alcohol use could prove to be helpful as a means to improve diabetes care for this population. A worthwhile service may be for the pediatric primary care provider to be available to the adolescent with diabetes during the time of transition to college. Maintaining open communications with the individual during the transition to college through computer technology such as email or text messages may provide needed professional support that can reduce stress during this time of transition to a new living environment (Kyngäs, 2004).

Many pediatric practices serve children until the age of eighteen, the time many students graduate from high school and begin their college experience. During this time, individuals with diabetes must transfer to an adult health practitioner and begin a new relationship with an unfamiliar caregiver. If this professional relationship has not been established prior to the adolescent beginning college, a lapse in health services may occur and continuity of care may be lost. Transitions between health providers can jeopardize quality of care (Naithani, Gulliford, & Morgan, 2006). The American Diabetes Association recommends practitioners begin preparing for the transfer between pediatric and adult practices a year prior to the transition to a new service (Peters et al., 2011). Special attention should be given to screening the adolescent for mental health and eating disorders and including education on contraceptives, sexually transmitted diseases, alcohol, and other substance use.

Campus Health System

This study has practice implications for campus health providers as many goals of Healthy Campus 2020 are applicable to the findings, including improving academic performance adversely affected by stress, sleep difficulties and anxiety; reducing the proportion of students who report experiencing eating disorders; increasing the proportion of students eating five or more servings of fruits and vegetables per day; increasing the proportion of students who meet the federal guidelines for exercise and muscle strengthening activities; reducing the proportion of students who use tobacco, engage in high risk drinking, and report driving after drinking alcohol; and increasing the proportion of students who receive information from their institution on health promotion topics (ACHA, 2012b). Specific to the needs of students with diabetes, staff in college health services could provide supportive and educational services for students with diabetes as soon as they gain admission to the college or university by inviting students to utilize campus health services for resources or other healthcare needs. Informing students of locations of food

services for after-hours food purchases, opportunities of activities such as recreational facilities and intramural sports teams, and smoking cessation programs may assist students in meeting the self-care requisites of food, activity, and prevention of harm. Providing such anticipatory guidance in the transition from family caregivers to independent college living may lessen the stress for incoming students and their parents/guardians.

The desired goal for normalcy and not being different than their college peers without diabetes is reflected in the findings of this study. The challenge for campus communities is to establish a new benchmark for normal self-care behaviors, one that will improve health and well-being for all students. More universities are recognizing the health needs of their students and are creating wellness centers to encourage healthy behaviors. Wellness centers are likely to include facilities for physical activities and peer mentors to support healthy behaviors (Strand, Egeberg, & Mozumdar, 2010). Community level interventions to change the campus drinking environment have proven to be successful in decreasing alcohol-related injuries and interpersonal consequences of alcohol consumption (Wolfson et al., 2012). Favorable changes to smoking behaviors are also found at universities who have adopted smoke-free campus policies (Seo et al., 2011).

Using a community organizing approach, universities could offer residential housing that is designated as a healthful living community in which students select to engage in higher standards of nutrition, activity, sleep patterns, and substance-free behaviors. Such a living environment could improve self-care behaviors for all students and have a positive impact on academic achievement through improved nutrition, exercise, sleep, and risk-free behaviors (Ruthig et al., 2011; Singleton & Wolfson, 2009). Students with diabetes living in such a space could find needed support for maintaining healthy behaviors through shared interests in healthy living.

Adolescents with chronic disease recognize the value in having peers who are living with similar illness (Kyngäs, 2004). Campus health services could be a liaison for students with diabetes who wish to be connected to other students with this condition. Connecting with other students with diabetes may afford opportunities to develop a supportive network of individuals with shared health concerns and challenges.

Education

College students with diabetes are a unique population in that they are managing a complex chronic illness while living in the context of a new learning and social environment. How to prepare the students for this challenging phase of life and help them adapt to the many changes they encounter is an important role for public health practitioners and educators. The majority of students reported a desire for more information from their educational institution on the self-care topics of nutrition, exercise, and sleep. Developing programs of preventive health care with health promotion features for this at-risk population is a priority. The finding that having a high GPA was a predictor of meeting most of the self-care requisites indicates a relationship between education and engaging in healthy behaviors.

The findings of this study are applicable to nurse educators who teach public health, pediatric, and adult health nursing. Nurse educators must inform the next generation of nurses of the self-care behaviors of college students with diabetes and of the need to help these vulnerable adolescents transition to adulthood. A focus on tertiary preventive measures can not only prevent complications of diabetes, but may foster academic success, as well. As caregivers, nurses are invaluable in incorporating growth and development theories, family dynamics, and individual goals into a wellness plan.

Families

Findings from this study have several implications for how practitioners can help families and how parents can help their child prepare and adapt to college. Parents should be reminded of the developmental phase their college student is experiencing and be prepared to offer anticipatory guidance in the many challenges their child will likely face during their college experience. Parents and students may benefit by being proactive in learning what campus resources are available to assist students with diabetes before making college decisions.

To promote healthy behaviors, parents can provide fruits and vegetables as healthy snacks and encourage their child's participation in organized sports. While families may have had previous conversations about the importance of nutrition and exercise in diabetes self-management, practitioners may need to provide resources to parents to equip them in having discussions with their child about the harmful effects of smoking, alcohol use, and risky driving that are specific to an individual with diabetes. Students with diabetes who lived at home were more likely to drink and drive. With this knowledge, parents should help students develop a plan for use of a designated driver or make other accommodations to avoid driving after alcohol consumption.

Research

There is limited research of college students with diabetes. Findings from this study could be expanded by including a comparison of self-care behaviors of students with diabetes to other campus characteristics, such as the size of the campus, two year vs. four year institution, public vs. private setting, and choice of housing option. An examination of self-care behaviors of students with type 1 vs. type 2 diabetes could also be conducted and the influence of a campus support group for students with diabetes on self-care behaviors could be explored. Qualitative studies of college students with diabetes could be conducted to explore the facilitators and

barriers to meeting the self-care requisites and a community-based participatory research approach could provide solutions to the identified barriers to meeting self-care requisites. Also, prospective studies exploring self-care behaviors in response to proposed interventions such as creating a designated healthy-living housing community could be conducted. Finally, an analysis of outcomes including self-care behaviors, glucose control, and academic achievement of students with diabetes who engage in select interventions, such as joining organized athletic activities, could be conducted through a longitudinal study design.

Limitations

While there are many benefits to conducting an analysis of the ACHA-NCHA II data set to answer the research questions, including the provision of a national representation of college students and large sample size, there were limitations. Specific information about diabetes was not available, such as the type of diabetes, the length of time since diagnosis, or evidence of diabetes control as determined by measurements of hemoglobin A1C. Another limitation was that the survey provided self-reported data at one point in time and may include respondent bias. BMI measures were questioned due to some reported extreme heights and weights. Another limitation was the inability of the researcher to construct survey items to meet all research interests. The self-select nature of the administration of the survey by universities restricts the generalizability of the findings (ACHA, 2009a).

Conclusion

College students with diabetes are a vulnerable population. This study was unique in its focus on universal self-care behaviors that have not been sufficiently studied with this population. Whereas previous studies have examined issues of diabetes self-management related to metabolic control (Ramchandani et al., 2000), psychosocial issues (Wilson, 2010), and alcohol use among college students with diabetes (Balfe, 2007a; Miller-Hagan & Janas, 2002; Ravert, 2008), this

study filled a gap in the literature on topics of nutrition, activity, rest, tobacco use, and risky driving.

The self-care behaviors of college students with diabetes are in need of improvement in all areas. Students with diabetes do not differ markedly from students without diabetes in meeting food, rest, and alcohol use recommendations. In this study, students with diabetes reported a higher frequency in meeting activity recommendations and a lower frequency in meeting recommendations related to tobacco use, drinking and driving, and seat belt use. The predictors of self-care behaviors were found mostly at the intrapersonal level, with grade point average predicting most of the self-care behaviors. Interpersonal level factors were not found to predict any self-care outcomes.

Findings from this study can be used to target interventions by primary care practitioners and campus health providers to meet objectives established in Healthy People 2020 and Healthy Campus 2020. While diabetes is a complex chronic illness, the leading causes of morbidity and mortality of college students with diabetes are preventable. Families and professional caregivers must support this vulnerable population during this potentially stressful time as they transition from family caregivers to independence and from pediatric to adult health services, and adapt to college life in order to prevent diabetes-related health complications, foster academic success, and promote quality of life.

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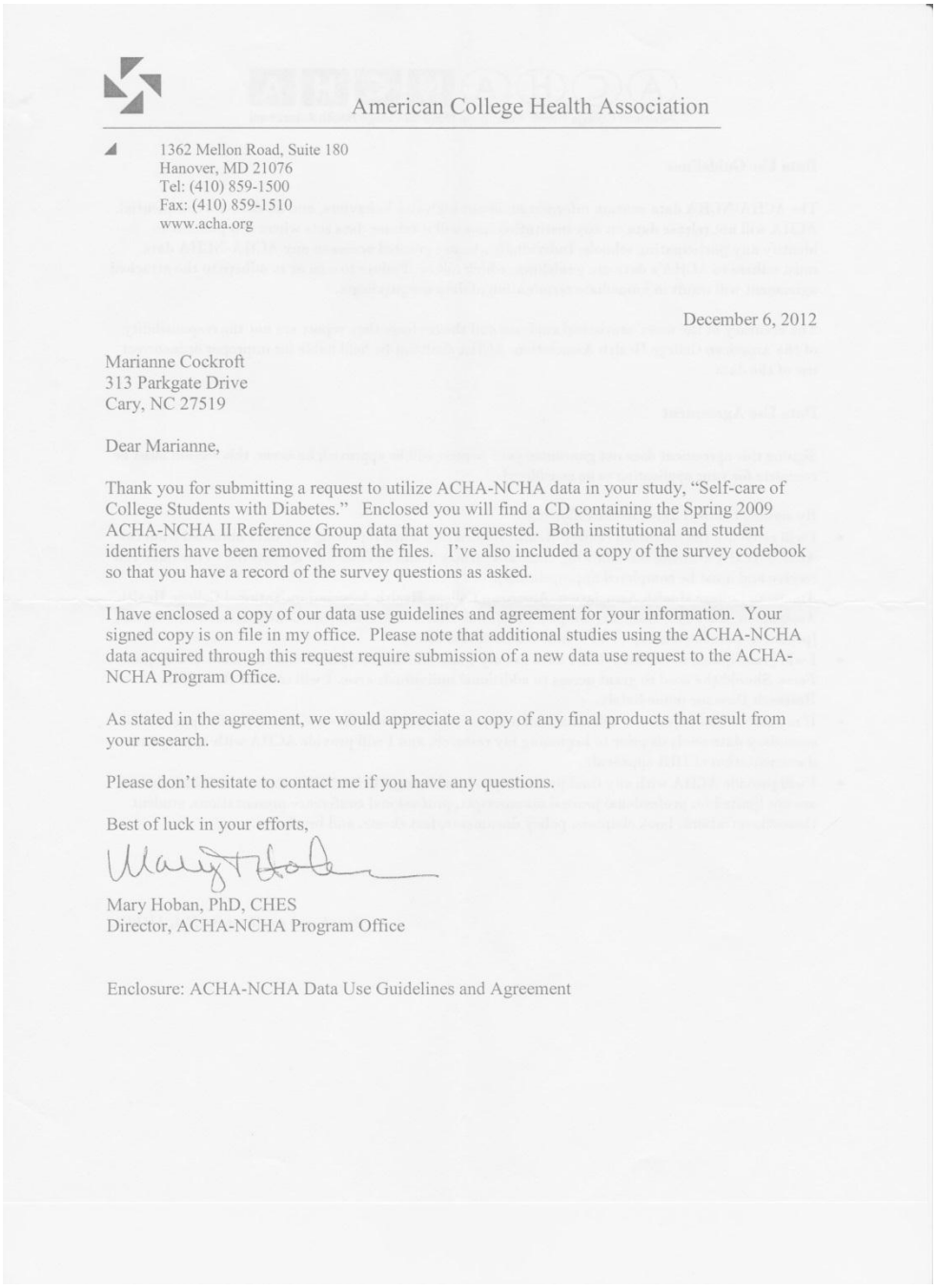
APPENDIX A

PERMISSION TO USE DATA



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December 6, 2012

Marianne Cockroft
313 Parkgate Drive
Cary, NC 27519

Dear Marianne,

Thank you for submitting a request to utilize ACHA-NCHA data in your study, "Self-care of College Students with Diabetes." Enclosed you will find a CD containing the Spring 2009 ACHA-NCHA II Reference Group data that you requested. Both institutional and student identifiers have been removed from the files. I've also included a copy of the survey codebook so that you have a record of the survey questions as asked.

I have enclosed a copy of our data use guidelines and agreement for your information. Your signed copy is on file in my office. Please note that additional studies using the ACHA-NCHA data acquired through this request require submission of a new data use request to the ACHA-NCHA Program Office.

As stated in the agreement, we would appreciate a copy of any final products that result from your research.

Please don't hesitate to contact me if you have any questions.

Best of luck in your efforts,

Mary Hoban, PhD, CHES
Director, ACHA-NCHA Program Office

Enclosure: ACHA-NCHA Data Use Guidelines and Agreement