

**WHICH DEMOGRAPHIC, SOCIAL, AND ENVIRONMENTAL FACTORS ARE
ASSOCIATED WITH THE EATING HABITS AND EXERCISE PATTERNS OF
RACIAL AND ETHNIC MINORITY ADOLESCENTS**

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Research focused on the factors that contribute to the practice of health promoting behaviors by racial and ethnic minority adolescents has been limited and inconclusive. The purpose of this study was to identify a subset of factors, including demographic, social, and environmental factors that are highly correlated with differences in the eating habits and exercise patterns of racial and ethnic minority adolescents. The study is of public health significance as the results may be used to improve the methods and strategies currently in practice to reduce and eliminate the disparities in health for racial and ethnic minorities.

The sample was drawn from the final sample size for the National Longitudinal Survey of Youth 1997 cohort, which numbered 8,984. The study tested the hypothesis that differences in health-promoting behaviors among racial and ethnic minority groups are related to differences in the associations between the influential factors and the health-promoting behavior by racial and ethnic minority group. Body Mass Index was used to measure adolescent health promoting behaviors such as diet and exercise. Multiple imputation and univariate forward stepwise multiple regression analyses found that associations between demographic, social, and environmental factors and the eating

habits and exercise patterns of minority adolescents varied by racial and ethnic minority subpopulation.

Study results suggest that policies, programs, and research intent on reducing and/or eliminating racial and ethnic health disparities must capture, analyze, and evaluate information at the racial and ethnic subpopulation level to capture differences between subpopulations. A small sample size due to the removal of non-respondents, the exclusion of health promoting behavior variables from the study due to high non-response rates, and the exclusion of some racial and ethnic subpopulations due to inadequate numbers all served as limitations of the study. Future research should further study the differential impact of the various factors included in the present study, as well as those not examined here, on the dietary and exercise habits of several racial and ethnic adolescent subpopulations and use the findings to inform research, policy and program efforts to reduce and eliminate racial and ethnic health disparities.

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PREFACE

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I. Introduction and Background

A. RACIAL AND ETHNIC HEALTH DISPARITIES EXIST

Data from government health agencies, individual and institutional health care providers, and research studies all provide evidence for the continued existence and increase in racial and ethnic health disparities. Black Americans have higher death rates from coronary disease, breast cancer, and diabetes than do white Americans; infant mortality rates are higher among both African American and American Indian/Alaska Native populations than white Americans; there is a higher rate of uncontrolled hypertension among Mexican Americans than among white Americans; and Asian/Pacific Islander, African American, and Hispanic populations all have an elevated incidence of tuberculosis when compared to white Americans (Weinick et al, 2000). Racial and ethnic minority adolescents also suffer health disparities. For example, obesity prevalence rates are increasing for children and adolescents, particularly for minority ethnic groups (Troiano et al, 1995; Popkin et al, 1998).

These examples taken from national data indicate the presence of racial and ethnic health disparities, and in cases where national disparities were not found, there were still indications of these disparities in state-level data. For example, the NCHS national data did not reveal any health disparities for Asian Americans and Pacific Islanders, but state-level data contradicted the national data, providing significant evidence of health disparities for Asian Americans and Pacific Islanders (OMH/OPHS, 2000).

Racial and ethnic minorities tend to have the worst health outcomes in the United States. The infant death rate among African Americans is double that of whites, heart disease rates are more than 40 percent higher than whites, and the death rate from

HIV/AIDS is more than seven times that for whites (U.S. Department of Health and Human Services, 2000). Hispanics are almost twice as likely to die from diabetes as whites and have higher rates of high blood pressure and obesity than whites (U.S. Department of Health and Human Services, 2000). American Indians and Alaska Natives have an infant death rate almost double that for whites and a rate of diabetes more than twice that of whites (U.S. Department of Health and Human Services, 2000). Asian and Pacific Islanders have higher new cases of hepatitis and tuberculosis than whites (U.S. Department of Health and Human Services, 2000). From these examples it is clear that the health of racial and ethnic minorities is poor and the disparities between them and their white counterparts are significant.

1. Coronary Disease

Coronary disease is one of the most significant racial and ethnic health disparities. Mortality rates from coronary heart disease (CHD) differ among the major ethnic groups in the United States. African-Americans have the highest rates of CHD mortality, with rates being especially high in middle-aged black men relative to other race/sex groups (Cooper et al, 2000). Native Americans, Asians, and Hispanics also have rates lower than non-Hispanic whites.

An assessment of several disease outcomes by race and ethnicity at state study sites across the United States had similar findings to national data, affirming that cardiovascular disease was the leading cause of death for all racial and ethnic groups (OMH/OPHS, 2000). African-Americans had age-adjusted death rates (AADR) from cardiovascular disease higher than Whites in all state study sites except for Wyoming and Puerto Rico. There were, however, disparities in cardiovascular disease for Native

Americans in Wyoming. As the incidence of CVD for Hispanics and Asian Americans is lower than for whites, the AADR for cardiovascular disease is also generally not as high as that of Whites. However, based on study respondents, the death rate in these populations is increasing. It has been suggested that these increases are due to increases in diets containing high levels of cholesterol (OMH/OPHS, 2000).

There appear to be CVD disparities between racial and ethnic subpopulations as well. Among Asian Americans and Pacific Islanders, heart disease is the leading cause of death for Hawaiian and Filipino men and the second leading cause of death for Japanese and Chinese men (Hoyert et al, 1997). Immigrant status has also been shown to play a role, as higher rates of coronary artery disease have been found in South Asians who have migrated to other countries, relative to those who did not immigrate (Dhawan, 1996).

2. Cancer

A disparity in cancer by race and ethnicity is another area of concern. Racial and ethnic groups have lower survival rates than whites for most cancers (OMH HP2010, 2000). A review of national data shows that African-Americans are about 34 percent more likely to die of cancer than are whites and more than two times more likely to die of cancer than are Asian/Pacific Islanders, American Indians, and Hispanics (OMH HP2010, 2000). African-American women are more likely to die of breast cancer and colon cancers than are women of any other racial and ethnic group (OMH HP2010, 2000). African-American men have the highest mortality rates of colon and rectum, lung, and prostate cancers (OMH HP2010, 2000). Cancer incidence is another disparity among a number of racial and ethnic minority groups. Hispanics have higher rates of cervical, esophageal, gallbladder, and stomach cancers (OMH HP2010, 2000). Also, Asian-

American populations have higher rates of stomach and liver cancers than the national average and similarly, Alaska Natives have higher rates of colon and rectum cancers than the national average (OMH HP2010, 2000).

State-level data have revealed similar disparities. The results of the disease outcomes assessment of state study sites found that, at all sites except Puerto Rico, there were cancer mortality disparities between their African-American and White populations, with African-Americans having died from cancer at a rate higher than the White population (OMH/OPHS, 2000). Although the majority of disparities for all cancers and cancer sites as causes of death were found to be reasonably small, examination by type of cancer made the disparities significantly more prominent. For example, in terms of breast cancer, several study sites reported significantly higher mortality rates for their African-American populations than Whites, while Puerto Ricans were less likely to have breast cancer, but more likely to die from it than mainland Whites. Lung and prostate cancer displayed similar trends. National data shows that stomach cancer mortality is substantially higher among Asian-Pacific Islanders, including Native Hawaiians, than other populations (NCI, 2001), and that rates of primary liver cancer are higher for foreign-born Filipino men than American-born Filipino men (11.4% to 6.5%) than for whites (3.4%) (Rosenblatt et al, 1996). Additional disparities were noted in specific cancer sites that are not commonly examined when looking at age-adjusted death rates (OMH/OPHS, 2000). In Ohio, for example, Asians and Pacific Islanders have a much greater mortality rate from liver cancer than White residents.

The National Cancer Institute (NCI) has also provided information on other cancer-related health disparities and the interaction of race and ethnicity and gender

(NCI, 2001). African-American men have a death rate from prostate cancer that is almost twice that of white men, Hispanic women have an incidence of cervical cancer consistently higher at all ages than for other women, and in comparison to all women African-Americans have the highest death rates from cervical cancer. Similarly, when compared to all women, Alaskan Natives have a 30 percent greater chance of dying from cancer.

3. Diabetes

National Center for Health Statistics (NCHS) data from 1996, utilized in an assessment of state infrastructures and capacities to address health disparity issues, found significant differences in diabetes death and incidence rates among racial and ethnic minority subgroups (OMH/OPHS, 2000). Between American Indians/Alaskan Natives and Whites there were disparities in age-adjusted death rates (AADR) for diabetes mellitus. Each study site reported disparities in diabetes-related deaths between their minority populations and the White population (OMH/OPHS, 2000). For example, Puerto Ricans were three times more likely to die from diabetes than U.S. Whites, while African-Americans in every study site were at least twice as likely to die from diabetes than Whites. All minority groups had greater AADRs from diabetes than whites in Utah and Asian/Pacific Islanders and Hispanics were more likely to die from diabetes than Whites in California.

The incidence of diabetes yielded similar findings. For example, the chances of individuals in African-American, Hispanic, and American Indian communities having diabetes was one to five times greater than in white communities (OMH HP2010, 2000). Hispanics had diabetes incidence rates that significantly exceeded those of Whites

(OMH/OPHS, 2000). Native Hawaiians had extremely high rates of diabetes as well, being over five times as likely to experience diabetes between the ages of 19 and 35, and twice as likely between the ages of 36 and 64, as non-Hawaiians (Hawaii Department of Health, 1990). More adolescents are developing type 2 (non-insulin-dependent) diabetes during adolescence, a particular concern for American Indian/Alaska Native youth, who have a prevalence rate more than twice that of the total population (Berglas et al, 1998). Disparities also exist between U.S.-born and foreign-born populations of the same ethnic group. For example, second generation Japanese Americans have an incidence of diabetes at approximately twice the rate of the white population, and four times the rate found in Japan (Daus, 2002).

4. Stroke

Health disparities have been found in the incidence of stroke subtypes. A study by Ayala et al (2001) found that age-standardized mortality rates for three stroke subtypes were higher among African-Americans than Whites. Asians/Pacific Islanders had death rates from intracerebral hemorrhage (a subtype) that were higher than Whites, Blacks and American Indians/Alaska Natives had risk ratios for all three stroke subtypes that were higher than Whites among adults aged 25–44 years, and in aggregate, all minority populations had death rates from subarachnoid hemorrhage (a subtype) that were higher than for Whites (Ayala et al, 2001). National data from 1997 support those findings, with all racial/ethnic minority populations aged 35–64 years experiencing mortality rates for stroke higher than the White population (CDC, 2000).

Further supportive evidence of these disparities was found in the results of the assessment previously discussed (OMH/OPHS, 2000). African-Americans suffered the

highest disparities for strokes at the national level and in the study sites, but a number of other disparities became apparent during the study. Ohio Asian Indian males were three times more likely to suffer strokes than White males in the state. Cambodians in California had four times the rate of stroke as the white population in the state (107 per 100,000 vs. 28) (Dumbauld, 1994).

5. Liver Disease and Cirrhosis

NCHS data from 1996 provides evidence of racial and ethnic health disparity in terms of liver disease and cirrhosis (OMH/OPHS, 2000). Between American Indians/Alaskan Natives and Whites there were disparities in age-adjusted death rates (AADR) for chronic liver disease and cirrhosis. For example, American Indians were found to be almost three times as likely to die from chronic liver disease and cirrhosis as Whites (OMH/OPHS, 2000). Hispanics exceeded that of Whites for incidence of chronic liver disease and cirrhosis.

Disparities among chronic liver disease and cirrhosis AADRs were found in seven of the nine study sites. African-Americans were more likely than Whites to die from chronic liver disease and cirrhosis in Arkansas, Delaware, Ohio, South Carolina, and Utah. Puerto Ricans were nearly three times as likely to die from these conditions than U.S. Whites. Utah was another location for disparity as Native Americans were over six times as likely to die from chronic liver disease and cirrhosis as Whites.

6. Intermediate Determinants

Cardiovascular disease, cancer, and diabetes are the first, second, and seventh leading causes of death respectively, in the United States, accounting for millions of fatalities each year (Berglas et al, 1998). These disease states can often be retrospectively

accounted for in racial and ethnic minorities by examining their experiences with intermediate determinants of disease outcomes such as hypertension, high cholesterol, high blood pressure, obesity, living a sedentary lifestyle, and cigarette smoking. Racial and ethnic minority populations tend to have higher rates of hypertension, high cholesterol, high blood pressure, obesity, sedentary lifestyle, and cigarette smoking (Berglas et al, 1998). The Bogalusa heart Study, for example, noted that African-American boys had higher blood pressure throughout childhood and adolescence, even though their white counterparts had a higher body mass index (Berenson et al, 1996). Thus, examples of disparities in intermediate determinants provide further evidence of racial and ethnic health disparities in the United States.

Obesity

Overweight and body mass index (BMI) have been found to differ across ethnicity (Winkleby et al, 1998; Dundas et al, 2001; Mayberry et al, 2000). Being overweight and obese is more prevalent in Hispanic men than in non-Hispanic white or black men and is higher in both black women and Hispanic women than in non-Hispanic white women (Cooper et al, 2000). Similar prevalences are found in youth, with Mexican-American boys having a higher prevalence of being overweight than African-American or white boys, and Mexican-American and African-American girls having a higher prevalence of being overweight than white girls (Cooper et al, 2000).

High Cholesterol

Asians, Native Americans, and Hispanics were found to have lower total cholesterol levels than non-Hispanic whites (Cooper et al, 2000). Further information was provided in the assessment (OMH/OPHS, 2000). The death rate in Hispanics and Asian

American populations from CVD is increasing and is thought to be due in part to increasingly high levels of cholesterol, a risk factor associated with CVD, in their diets. Evidence from Ohio Asians/Pacific Islanders and Hispanics supports this assumption as these populations were found to have higher cholesterol than their fellow white residents.

High Blood Pressure

Information on high blood pressure was provided in the assessment (OMH/OPHS, 2000). As high blood pressure is another risk factor associated with CVD, findings showing that Ohio Asians/Pacific Islanders and Hispanics had higher blood pressure than whites, serve as further evidence of the existence of racial and ethnic in CVD disparities. Additional support for health disparity in intermediate determinants is found in that the number of existing cases of high blood pressure is nearly 40 percent higher in African-Americans than in whites (an estimated 6.4 million African-Americans have high blood pressure, and its effects are more frequent and severe in the African-American population (OMH HP2010, 2000).

Hypertension

Disparities can also be found in other CHD-related health conditions. Hypertension remains a common condition in the United States, affecting the lives of over 43 million individuals, with Blacks having the highest prevalence (Cooper et al, 2000).

B. EFFORTS TO REDUCE AND ELIMINATE U.S. RACIAL AND ETHNIC HEALTH DISPARITIES

The reduction and subsequent elimination of racial and ethnic health disparities is currently one of the leading priorities in public health. Laws, policies, programs, research, and funding have been developed and implemented to decrease the gaps in health status and in access to, utilization of, and quality of health care between White Americans and American minorities, which have been notably researched for many years.

1. Laws

One law proposed to address the problem of racial and ethnic health disparities was the Minority Health and Health Disparities Research and Education Act of 2000 (P.L. 106-525). This act, signed into law in November of 2000, created a National Center on Minority Health and Health Disparities at the National Institutes of Health (NIH) (NCSL, 2002). The Center provides funding for research and programs with health disparities and minority health as the focus. In addition, the Center supports the training of researchers who are members of populations subject to health disparities. It also provides education loan relief for health professionals who commit themselves to perform health disparities research and coordinate all NIH research efforts in this area. The Act also authorizes actions by two other government agencies (NCSL, 2002). The Agency for Healthcare Research and Quality (AHRQ) is empowered to conduct and support activities and research measuring health disparities and to identifying causes and solutions. Similarly, the Health Resources and Services Administration (HRSA) is

commissioned to support research and demonstration projects that focus on the training of health care professionals to reduce health care disparities.

Another law that is often ignored is the Civil Rights Act of 1964. Section 601 of the Act states that “no person in the United States shall on the grounds of race, color or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving Federal financial assistance” (Code of Federal Regulations, 1998b), which may be thought to include Medicare, Medicaid, and Public Health Service block grants such as Maternal and Child Health grants (Code of Federal Regulations, 1998b). Cultural competency has been the subject of regulations and enforcement activity, however, these efforts have singly been focused on linguistic access to health care, rather than issues such as cultural competency and discrimination. For example, the Office of Civil Rights has determined that health care providers who receive Federal financial assistance must: identify the language needs of patients; provide free, timely, and qualified interpreters; translate materials; and conduct staff cultural sensitivity training (Hayashi, 1998; Perkins et al, 1998), on all literacy issues. Given limited resources, the Office of Civil Rights acts primarily on a compliance-driven basis, even though provider penalties and sanctions for non-compliance are not always clear (Horowitz et al, 2000).

2. Policies

A number of policies have been drafted and executed to help address the problem of racial and ethnic health disparities. A number have been resolutions and initiatives. In February 1998, President Bill Clinton unveiled the Initiative to Eliminate Racial and Ethnic Disparities in Health, which aims to eliminate such disparities by 2010 (Berglas et

al, 1998). In response to President Clinton's initiative, the Department of Health and Human Services (DHHS) developed an initiative to eliminate disparities in six areas of health access and outcomes by the year 2010 (DHHS, 1998). Healthy People 2000 and 2010 have served as additional initiatives, similar to those of President Clinton and DHHS. One of the overarching goals of Healthy People 2000 was to reduce—and finally eliminate—disparities among population groups of Americans (DHHS, 1991). In pursuit of this goal special population targets were established where specific sex, race, ethnic, age, income, or education groups were known to have less favorable rates. In Healthy People 2010 the overarching goal is to “eliminate health disparities among different segments of the population” (DHHS, 2000), with targets similar to those established in Healthy People 2000 (Keppel et al, 2002). The second goal of Healthy People 2010 is to eliminate health disparities among segments of the population, including differences that occur by race or ethnicity (U.S. Department of Health and Human Services, 2000).

A number of policies have been more detailed in nature. The Health Care Financing Agency (HCFA) has also responded to the DHHS initiative with a policy requiring each State peer review organization to target one of six national clinical conditions or access outcomes for elderly and disabled minority Medicare beneficiaries (Horowitz et al, 2000). Another policy is DHHS and the Office of Minority Health (OMH) maintenance of an informal Minority Health Network, which involves state and local agencies for minority health, private partners, recipients of OMH grants and cooperative agreements (OMH, 2000). It links government health systems with individuals and organizations to improve health status of racial and ethnic minorities, and raises issues and needs in the various jurisdictions and disseminates them to partners.

Federal, State, and local governments, health plans and health systems encourage many efforts to eliminate sociocultural disparities in health through requirements, regulations, standards, and enforcement mechanisms. These include funding of research and demonstrations by health agencies and medical centers, regulation and oversight of Medicare, Medicaid, and managed care plans, and investigation and enforcement of civil rights laws (Horowitz et al, 2000). Regulations for managed care plans are addressing how cultural differences affect access to care. For the Medicare Plus Choice program, HCFA requires that “services are provided in a culturally competent manner to all enrollees, including those with limited English proficiency or reading skills, diverse cultural and ethnic backgrounds, and physical or mental disabilities” (Office of the Federal Register, 1998a). Medicaid regulations have been more explicit, directing Medicaid managed care organizations to provide interpreter services “when language barriers exist” (Office of the Federal Register, 1998). Efforts to incorporate an understanding of diverse populations into managed care organization programs have included developing orientation videos that introduce populations to managed care, establishing community advisory boards, and increasing the cultural diversity of suppliers and providers (Henry Ford Health System, 1997).

The American Medical Association (AMA) has adopted policies that encourage, but do not require, medical schools to offer electives in culturally competent health care and educational programs about cultural issues (AMA, 1999). These examples of policies, programs, and research are evidence of elimination of racial and ethnic health disparities being a national priority.

3. Programs

In response to President Clinton's "National Initiative on Race," HHS developed an initiative to eliminate disparities in six areas of health access and outcomes by the year 2010. A major component of this effort is a program administered by the Centers for Disease Control and Prevention (CDC): Racial and Ethnic Approaches to Community Health 2010 (or REACH 2010), aimed at helping communities organize and mobilize resources to reduce disparities in the target areas (Horowitz et al, 2000). REACH 2010 is the cornerstone of CDC's efforts to eliminate racial and ethnic disparities in health. This demonstration program supports 31 community coalitions in designing, carrying out, and evaluating strategies to eliminate health disparities. REACH 2010 investigators in Lowell, Massachusetts, were concerned about the high rates of illness and death from cardiovascular disease and diabetes among Cambodian residents. Gaining access to, and trust from, shut-in Cambodian elders allowed them to document that this population has high rates of known risk factors for the conditions including high-sodium and high-fat diets and smoking (NCCDPHP, 2002).

Efforts to help clinicians better understand and improve the care and health of their increasingly diverse patient populations occur in three general areas: 1) formal clinician training, 2) clinician resources such as published literature and internet websites, and 3) partnerships with interpreters (Horowitz et al, 2000). Associations, organizations, and some Federal and State agencies have independently developed guidelines, programs, or curricula addressing culturally effective care (Like et al, 1996). Several professional organizations including the American Medical Association, the National Medical Association, and the American Academy of Family Physicians, have created programs to

address these gaps by providing cultural competency training to clinicians who have completed their medical education (Horowitz et al, 2000). These programs foster clinician's competency through promoting respect, understanding, and effective communication with patients (Like et al, 1996) and seeking community input in service delivery decisions (Fortier et al, 1999). Such programs are needed to counteract race-based health assumptions and myths based on stereotypes common in the medical school education process (Ricks, 1998).

Several professional organizations and medical specialty groups provide cultural competency training to clinicians who have already completed their medical education, including the AMA and the National Medical Association. Most programs aim to foster clinicians' competency through promoting respect, understanding, and effective communication with patients (Like et al, 1996; Fortier et al, 1999; Smith, 1998). They encourage these organizations to train all levels of health care personnel (Opening Doors, 1998), and introduce a community to staff in positive and informative ways, such as having students visit the community and present information about the community to clinicians, or provide written information on the beliefs, practices, and histories of the population (Cross Cultural Health Care Project, 1995).

Programs often target individual patients and communities to address the differences in cultures, health beliefs, and disease presentations that create conflicts and misunderstandings between medical and patient communities (Horowitz et al, 2000). Programs that target patients or communities have partnered with community members. For example, in the case of the Community Health and Social Services Center in Detroit, community members worked with the local Department of Health and Social Services to

develop a center providing culturally relevant health care and social services to residents in the predominantly Hispanic White section of Detroit, to address the lack of health providers and facilities in the community. They employed bilingual, bicultural staff from the community, decorated the waiting room with images for the Latino culture, and produced bilingual clinic signs, written materials, and educational programs (Guzman, 1999). A common approach to break down cultural barriers in medical care is to make use of community health workers (CHWs), community members who share experiences, language, and a cultural background with the patients they serve, and have a solid understanding of their community and its resources (Putsch, 1985; Annie E. Casey Foundation, 1998; Poss et al, 1995; Faust et al, 1986). For example, in the Community House Calls project at Harborview Medical Center in Seattle, CHWs help Cambodian and East African refugee families negotiate complex and culturally unfamiliar health and social services processes (Opening Doors, 1998). They used hand-held computers to maintain and access records on the spot, and provide information to the health care team about patients' practices, beliefs, living circumstances, and family issues.

While researchers have made significant advances in assessing sociocultural disparities, they have not made such advances in conducting, evaluating, sustaining, and disseminating programs to address them. They have either been unable to improve many aspects of the health care and the health of diverse populations, or unable to demonstrate and communicate the success of many of their efforts (Horowitz et al, 2000). Another difficulty is that patients may not mirror the description of their culture in the literature, and training programs may not be able to adequately prepare clinicians for all patient encounters. Therefore, many advocate that clinicians work closely with other

professionals who understand their patients, such as professional interpreters (Horowitz et al, 2000).

4. Research

Since the 1985 landmark report of the Department of Health and Human Services Secretary's Task Force on Black and Minority Health (United States Task Force on Black and Minority Health, 1985), that focused attention on excess mortality rates among many minority groups, there has been a proliferation of studies and reports on racial and ethnic differences in access to and use of health services (Mayberry et al, 1999). Emphasis, however, has been placed on understanding racial and ethnic health disparities and examining the severity of the problem in all its forms.

The Healthy People 2010 commitment is an example of this, as it makes disparity the focus of study. Two of the National Center for Chronic Disease Prevention and Health Promotion's 10 priority research areas involve health disparities: identifying determinants of health disparities and developing and evaluating interventions to eliminate them (NCCDPHP, 2002).

Research has examined disparities related to federal health programs aimed at meeting the health care needs of many populations. Some studies have found that among the nearly 70 million Americans whose health care services are financed by the federal programs Medicare and Medicaid, there are persistent racial and ethnic disparities in access to care, health care utilization, and health outcomes (Ayanian et al, 1999a; Ayanian et al, 1999b; McBean et al, 1994; Gornick et al, 1996; Mustard et al, 1996; Fielding et al, 1994; Schoendorf et al, 1992; Kotelchuck, 1994). There are also racial differences in utilization within the Veterans Administration health system (Whittle et al,

1993). Other research has demonstrated that disparities in access to care and the use of health care services remain substantial even after controlling for health insurance status, and that health insurance coverage and income explain only a comparatively small proportion of these disparities (Weinick et al, 2000; Zuvekas et al, 1999; Cornelius, 1993; Wood et al, 1990).

Research has found that as some immigrant families, many of whom are Hispanic, assimilate into the United States, their health status sometimes deteriorates over subsequent generations (Hernandez et al, 1998), potentially increasing the magnitude of racial and ethnic disparities in health status (Lew et al, 2000).

The Agency for Healthcare Research and Quality (AHRQ) has supported many research projects designed to address the issue of racial and ethnic health disparities. However, a significant amount of AHRQ-supported research has been seemingly limited on the problem of disparity itself (AHRQ, 2000). One AHRQ-supported study found differences in outcomes, even after adjusting for SES, between Black and white patients treated for diabetes or asthma, and treatments successful in whites were not always transferable to Black patients. AHRQ-supported projects have enhanced the ability to measure quality in different minority populations. AHRQ's Consumer Assessment of Health Plans (CAHPS) survey questionnaire has been translated into Spanish to assist Hispanic Americans with their selection of health plans. In another project, investigators translated into Chinese a health status instrument (SF-36) used to assess various dimensions of health and validated their translation. Another team of AHRQ-supported researchers developed an instrument for assessing the interpersonal processes of care from the perspective of minority patients. One AHRQ-supported project is attempting to

determine whether race and gender influence the rate of performance of selected cardiac tests and procedures. Another project is comparing different support systems to help primary care providers better manage the care of urban African-Americans with non-insulin dependent diabetes mellitus. An investigation of cultural competence will examine how the Massachusetts acute care hospital industry is undertaking structural and process improvements to ensure quality, access, and effectiveness of health care for racial/ethnic minority groups (AHRQ, 2000). One AHRQ-supported project will develop a quality of care measure for hypertension in a population of Hmong refugees in Fresno, California, and conduct a pilot test of the instrument. A second project will evaluate the performance of census-based data as a proxy for socioeconomic indicators and determine the extent to which socioeconomic measures account for disparities in the quality of care provided to Black and Hispanic patients (AHRQ, 2000).

There have been relatively few AHRQ-supported studies that have specifically examined the impact of interventions. In 1999, AHRQ funded a study that will create a partnership with six health providers to evaluate the effectiveness of nurse management compared to “usual care” for congestive heart failure patients in east and central Harlem (AHRQ, 2000). The initial Translating Research Into Practice (TRIP) solicitation aimed to generate new knowledge about approaches that effectively promote the use of rigorously derived evidence in clinical settings and lead to improved health care practice and sustained practitioner behavior change. One study coming under this funding focuses on patients with diabetes who receive care at community health centers—critical sites of primary care for minorities and others who reside in medically underserved areas (AHRQ, 2000). More recently, AHRQ solicited program project grants to analyze causes

of inequalities related to the delivery and practice of health care, and identify and implement strategies to eliminate them. They encourage programs to develop and strengthen the relationship between researchers, community-based organizations, and change agents (Horowitz et al, 2000).

The National Cancer Institute (NCI) has committed to a research program that will address cancer health disparities across the cancer control continuum from prevention to end of life care, consistent with recommendations in the Institute of Medicine's report, *The Unequal Burden of Cancer* and reflected in the Healthy People 2010 goal to eliminate racial and ethnic health disparities. NCI has developed and will pursue a research framework that builds upon the growing evidence that socioeconomic, cultural, health care provider, institutional, and environmental factors contribute substantially to cancer-related health disparities (NCI, 2001). Recognizing the broad relevance of this research to other disease outcomes, NCI collaborates with other Federal agencies in supporting important research initiatives, including co-funded research with the Agency for Healthcare Research and Quality under its initiative, "Understanding and Eliminating Minority Health Disparities. NCI's Office of Special Populations Research's newest initiative is the Special Populations Networks for Cancer Awareness Research and Training, a network of 17 institutions that will create and implement cancer control, prevention, research, and training programs in minority and underserved communities (NCI, 2001).

There have also been research studies to reduce health disparities by addressing the culture of racial and ethnic minority populations. One such example is the National Community Health Advisor Study, which examined the use of community health workers

(CHWs) to break down cultural barriers in medical care to address racial and ethnic health disparities (Annie Casey Foundation et al, 1998).

C. THE NEED FOR CONCERN THAT THE PROBLEM OF RACIAL AND ETHNIC HEALTH DISPARITIES STILL EXISTS

1. Disparities Remain Large and Significant

Despite the knowledge gained from such research, racial and ethnic disparities in health and health care persist (Lew et al, 2000). National data reveal that over the past 50 years, the health of both Black and white persons has improved in the United States as evidenced by increases in life expectancy and declines in infant and adult mortality (National Center for Health Statistics, 1998). However, Black persons continue to have higher rates of morbidity and mortality than white persons for most indicators of physical health. In 1990 the age-adjusted heart disease death rate for Black non-Hispanics (211.8 per 100,000) was 2.7 times the rate for Asian or Pacific Islanders (78.0 per 100,000). In 1998 the rate for Black non-Hispanics (188.0 per 100,000) was 2.8 times the rate for Asian or Pacific Islanders (67.4 per 100,000). The ratios of heart disease death rates for the groups with the highest and lowest rates at the beginning and end of the period were essentially the same. All five groups experienced reductions in heart disease death rates ranging from 8 to 17 percent. Therefore, there was little reduction in the relative differences among racial/ethnic groups (Keppel et al, 2002).

Other research findings provide additional evidence of the continued existence of racial and ethnic health disparities in the United States. A CDC study, published in a January issue of Morbidity and Mortality Weekly Report, found that death rates for

lung/bronchial, colorectal, prostate and breast cancer have declined among most racial and ethnic groups (APHA, 2002). However, the study, which focused on cancer incidence by race and ethnicity from 1990 to 1998, also found that death rates for certain cancers remained high for Blacks and were increasing among American Indians and Alaska Natives. Breast cancer deaths were also found to decrease for white women by 2.5 percent a year and by 1.1 percent a year for Hispanic women, but remained unchanged for other women. Also of note, the incidence of cervical cancer is more than five times greater among Vietnamese women in the United States than among white women (NCSL, 2003). Another statistical example can be found in the Pimas of Arizona, who have the highest known prevalence of diabetes in the world for women (NCSL, 2003).

The fact that such disparities remain large and significant more than 15 years after the initial Task Force report raises troubling questions about ongoing differentials in the access to and use of health care in this country (Lew et al, 2000). Nonetheless, our accumulated research to date has not resulted in measurable declines in most previously observed racial and ethnic disparities in health (Lew et al, 2000). Thus, relatively little progress was made toward the goal of eliminating racial/ethnic disparities among the health status indicators during the last 10 years. Progress toward the goal of eliminating health disparities will require more concerted efforts during the next 10 years (Keppel et al, 2002).

2. Differential Improvements

Despite heightened focus on racial and ethnic health disparities, the problem remains significant, as there have been differential improvements in health outcomes across racial and ethnic groups according to the specific disease. Over the past 30 years,

heart disease mortality rates have been decreasing across all racial and ethnic groups, but the decline has been much greater for white Americans (National Center for Health Statistics, 1998). Black Americans continue to have the highest mortality rates for heart disease—about 50 percent higher than that of white Americans (National Center for Health Statistics, 1998). In general, the heart disease death rate has been consistently higher in males than in females and higher in the African-American population than in the white population. In addition, over the past 30 years the CHD death rate has declined differentially by gender and race. In the 1970s, African-American females experienced the greatest decline in CHD. This steep decline disappeared in the 1980s, when rates of decline for white males and females exceeded those for African-American males and females, and African-American females had the lowest rate of decline (OMH HP2010, 2000). Between 1980 and 1995, the percentage decline was greater in whites than in African-Americans. In 1995, the age-adjusted death rate for heart disease was 42 percent higher in African-American males than in white males, and 65 percent higher in African-American females than in white females (OMH HP2010, 2000).

Although stroke death rates have been decreasing, the decline among African-Americans has not been as substantial as the decline in the total population. Among the racial and gender groups, declines in the stroke death rate are smallest in African-American males (OMH HP2010, 2000). The age-adjusted stroke death rate was substantially higher for Black non-Hispanics compared with the other racial/ethnic groups. Between 1990 and 1998 the rate for American Indian or Alaska Natives increased by 3 percent; however, this difference was not statistically significant. The rates for the other four racial/ethnic groups declined by 7 to 11 percent (Keppel et al, 2002).

New cases of female breast and lung cancers are increasing among Hispanics, who are diagnosed at later stages and have lower survival rates than whites. The recent decrease in deaths from breast cancer in white females is attributed to greater use of breast cancer screening in regular medical care. However, new cases of breast cancer in African-American females continue to increase, and deaths continue to increase as well, in part, because breast cancer is diagnosed at later stages in African-American females (OMH HP2010, 2000). Data on colorectal cancer (CRC) show a decline in new cases and death rates in white males and females, stable new case rates in African-Americans, and a continued rise in death rates in African-American males. Five-year survival rates are 64 percent in whites and 52 percent in African-Americans (1989-94), where early detection and treatment play a key role (OMH HP2010, 2000). Between 1990 and 1998, the age-adjusted female breast cancer death rate for white non-Hispanics declined by 19 percent, the rate for Hispanics declined by 14 percent, and the rate for Black non-Hispanics declined by 4 percent. Despite intervening fluctuations, the rate for Asian or Pacific Islanders was nearly unchanged and the rate for American Indian or Alaska Natives increased by 4 percent. Neither of these changes were statistically significant (Keppel et al, 2002). Despite the fact that there was a special population target for breast cancer death rates among Black females, the rate for non-Hispanic Black females declined by only 4 percent while the rate for the total population declined by 18 percent for 23.0 per 100,000 in 1990 to 18.8 per 100,000 in 1998 (Keppel et al, 2002).

Tuberculosis case rates for Asian or Pacific Islanders declined more slowly than case rates for the other groups. The tuberculosis case rate for Asian or Pacific Islanders declined by 15 percent from 1990 to 1998. The rate for white non-Hispanics, the group

with the lowest rate in 1990, declined by 45 percent. The rates for Black non-Hispanics declined by 46 percent; and the rates for Hispanics and for American Indian or Alaska Natives declined by 37 percent. The statistical significance of changes in tuberculosis case rates was not assessed (Keppel et al, 2002). The tuberculosis case rate for Asian or Pacific Islanders in 1990 was more than 10 times the rate for white non-Hispanics. In 1998 the rate for Asian or Pacific Islanders was more than 15 times that rate for white non-Hispanics. A widening of the gap between the highest and lowest rates is evident (Keppel et al, 2002).

Between 1990 and 1998 all five racial/ethnic groups experienced declines in age-adjusted health disease death rates. Rates declined by 17 percent for Hispanics, by 15 percent for white non-Hispanics, by 14 percent for Asian or Pacific Islanders, by 11 percent for Black non-Hispanics, and by 8 percent for American Indian or Alaska Natives (Keppel et al, 2002).

Despite adolescents having a low prevalence of type 2 diabetes mellitus (Fagot-Campagna et al, 2001), racial and ethnic minorities represent sub-populations having an increase in the number of cases (Fagot-Campagna et al, 2000). Similarly, these sub-populations have shared a greater increase in the prevalence of childhood obesity than the white population (Kimm et al, 2002). The non-Hispanic Black and Mexican-American adolescent populations have had the highest increase in prevalence of overweight, increasing by more than 10 percent between 1988-1994 and 1999-2000, with more than 23 percent of these adolescents being overweight in 1999-2000 (Ogden et al, 2002). Results from the National Longitudinal Survey of Youth found comparable results with 21.5 percent of Black and 21.8 percent of Hispanic 4 to 12 year-olds being overweight in

1998 (Strauss et al, 2001). It is this increase in overweight prevalence, also reflected by BMI level increases over the last 30 years, which establishes this issue as a primary health concern in the United States (Kuczmarski et al, 1997; Wisemandle et al, 1999).

3. Uncertainty of Determinants and Results of Efforts

Partial responsibility as to why the problem still exists must be attributed to uncertainty of the causes of these disparities and uncertainty as to the effectiveness and success of efforts to address the problem. Although the role of medical care as a determinant of health is somewhat limited, medical care can play an important role in health (Bunker et al, 1995), particularly preventive care, early intervention, and the appropriate management of chronic disease. Thus, racial and ethnic differentials in the quantity and quality of care are a likely contributor to racial disparities in health status.

More striking, and disconcerting to many is the large and growing number of studies that find racial differences in the receipt of major therapeutic procedures for a broad range of conditions even after adjustment for insurance status and severity of disease (Harris et al, 1997; Wenneker et al, 1989). Especially surprising to many are the racial disparities in contexts where differences in economic status and insurance coverage are minimized such as the Veterans Health Administration System (Whittle et al, 1993) and the Medicare program (McBean et al, 1994).

An example of uncertainty can also be found in research findings indicating that although physicians' ability to detect the severity of pain does not differ for Hispanic versus non-Hispanic white patients (Todd et al, 1994), Hispanic patients are markedly less likely than non-Hispanic white patients to receive adequate analgesia (Todd et al, 1993; Cleeland et al, 1997). In this case, it is uncertain whether the problem is patient or

physician-related. With few exceptions (Smith, 1998; Geiger, 1996; Council on Ethical and Judicial Affairs, 1990), the literature on racial disparities in medical care is reluctant to admit and address racial bias among providers as a critical causal factor. In contrast, the evidence is abundant and clear that racial discrimination is not the aberrant behavior of a few “bad apples” but a widespread societal problem. It is unlikely that personal discrimination on the part of providers is the sole cause of disparities in health care. In any area of societal evaluation, the causes of racial differences are complex and multi-dimensional, with discrimination being only one of them. Moreover, institutional discrimination is often at least as important as individual discrimination. In the case of racial disparities in medical care, other potential explanations include the geographic maldistribution of medical resources, racial differences in patient preferences, pathophysiology, economic status, insurance coverage, as well as in trust, knowledge, and familiarity with medical procedures (Horner et al, 1995; Smith, 1998).

On the surface, patient preferences would be the alternative explanation that would be most consistent with all of the available evidence. However, recent research indicating that patient preferences do not account for these disparities (Hannan et al, 1999) suggests that discrimination remains as a central plausible explanation. Much contemporary discriminatory behavior is unconscious, unthinking, and unintentional (Allen, 1995; Johnson, 1988; Lawrence, 1987; Oppenheimer, 1993). As noted earlier, biases based on racial stereotypes occur automatically and without conscious awareness even by persons who do not endorse racist beliefs (Devine, 1989). Recent psychological research indicates that persons who do not see themselves as prejudiced will make health care allocation decisions that adversely affect Black persons when other negative

characteristics are also present (Murphy-Berman et al, 1998). Most legislation, intervention programs, and policy regarding discrimination have been ineffective because of their focus on purposeful or intentional discrimination (Allen, 1995).

While the causes of disparities are not fully understood, there are nevertheless many efforts underway to reduce and/or eliminate health disparities. Healthy People 2010, the nation's strategic plan for health, has as one of its goals the elimination of health disparities by 2010. Each of the Institutes and Centers of the National Institutes of Health have produced strategic plans to "reduce and ultimately eliminate health disparities (Daus, 2002)

Horowitz and colleagues discuss the question of do we know the extent to which these programs that seek to address racial and ethnic health disparities have been effective (Lew et al, 2000). Few of the ambitious undertakings to reduce sociocultural disparities have been rigorously evaluated (Horowitz et al, 2000). There is little empirical evidence demonstrating which patient outcomes clinician-targeted programs improve, the magnitude of their impact, or how effective they are in improving health without also providing other patient-related services such as community health workers. Similarly, while cultural competency training courses often employ surveys, or pre- and post-tests of clinicians to assess the course's effects on clinician knowledge and attitudes, we found no published reports evaluating whether the patients of trained clinicians experience different outcomes from those of untrained clinicians.

In terms of patient and community targeted programs, most evaluations of CHWs are anecdotal and focused on processes, though there is some evidence that they also

improve short-term outcomes such as increasing the rate of health screening activities by certain populations (Annie E. Casey Foundation, 1998; Hammad, 1999). In fact, the lack of concrete data on their effectiveness has hampered efforts to advocate for these programs (Annie E. Casey Foundation, 1998). In our review of health systems interventions, we were able to uncover some, but not many rigorous evaluations of these programs, though Federal initiatives underway appear to be incorporating evaluative components. Clearly, more research is needed to assess the effectiveness of widely used interventions to decrease sociocultural disparities in health (Horowitz et al, 2000).

4. Population Size, Future Increase, and Future Impact

The population of racial and ethnic minorities is increasing significantly and according to recent statistics, the population is expected to continue that upward trend and make up a large proportion of the U.S. population in the years ahead. For example, Asian Americans constituted 2.92% of the total population in 1990 and according to projections by the Bureau of the Census, Asian and Pacific Islanders will comprise 10.7% of the U.S. population by the year 2050 (Ryu et al, 2002). In fact, by the middle of the 21st century, the minority population will almost equal the size of the non-Hispanic white population (DeVita et al, 1996). These projections are consistent for adolescents and adults alike. The adolescent population is projected to increase to about 43 million in 2020, and thereafter gradually level off (Ozer et al, 1998). Along with this overall increase in the adolescent population, there is expected to be an increase in racial and ethnic diversity in adolescent populations with some having rapid increases (Ozer et al, 1998), and an increase in the proportion of minority adolescents (Ozer et al, 1998). This increase in racial and ethnic minorities, particularly for adolescents, and the incidence of

racial and ethnic health disparities, contribute in making the case for needed policy, program, and research planning, development, implementation, and evaluation to prevent the foreseeable negative outcome discussed below.

As racial and ethnic minorities comprise a larger percentage of the total population of the Nation, the overall health statistics for the country will increasingly be a reflection of the health status of these groups (Stiffman et al, 1990; Vega et al, 1991; Williams, 1994). A disproportionate burden of these illnesses is borne by racial and ethnic minorities, causing increased mortality rates and impairing quality of life with higher incidences of disability. These chronic conditions not only have devastating physical and emotional consequences for minority families, but also result in striking economic repercussions for our health care system (Berglas et al, 1998). Failure to address the needs of this growing segment of the populations will have far-reaching economic, political, and social ramifications for the country (Berglas et al, 1998).

The current trends previously discussed, suggest that if such health issues are not significantly addressed, the future strength of the United States is in jeopardy. Without an adequate impact on the health of these current segments of the population, more of the country's population will suffer from poor health outcomes. This will in turn weaken the supply of healthy, productive individuals to the nation's workforce, subsequently weakening the foundation of the country: the working class, a significant portion of which is made up of racial and ethnic minorities. The economic impact on the country will be significant and the strength of the United States in the global environment diminished.

D. CURRENT STATE OF THE KNOWLEDGE AND RESEARCH ON RACIAL AND ETHNIC HEALTH DISPARITIES

1. Disparities

Although racial and health disparities are not new to the United States, the focus on decreasing disparities is relatively new (Horowitz et al, 2000). The Office of Minority Health in the DHHS recently published their recommendations for national standards (Office of the Federal Register, 1999b). They are requesting extensive public comment on these recommendations in order to move towards national consensus and broad implementation of standards by providers, policymakers, accrediting agencies and purchasers (Horowitz et al, 2000).

2. Chronic Conditions

It is important to note that in the age group 25-44, chronic conditions start to become a significant cause of death and contribute substantially to excess mortality among Black persons. Although Black persons' deaths from cancer and heart disease combined do not account for as many excess deaths as HIV, their cancer and heart disease mortality rates are substantially higher than white persons (51 percent and 131 percent higher, respectively). And for the age group 45-64, chronic conditions are increasingly prominent causes of death in this older age group (LaVeist et al, 2000).

3. Risk Behaviors

Priority has long been placed on reducing risk behaviors, often present in minority populations, which have a tendency to lead to poor health outcomes. Smoking, alcohol and substance abuse, violence, and risky sexual behavior are among the list of risk behaviors that have been identified. These behaviors are increasingly responsible for the

majority of deaths and disabling conditions through the fourth decade of life, and most of these behaviors are initiated during adolescence (Ozer et al, 1998). As this period of time in an individual's life is indicative of future health, it is likely the best point along the lifetime continuum to significantly impact on an individual's long-term adult health status.

4. Determinants

A series of analyses of scientific journal articles by LaVeist et al (2000) determined that the majority of analytical articles on U.S. populations used race in their analyses. As such, the majority of articles published in these journals failed to offer insights into the causes of health disparities among racial and ethnic groups. That is, the objective of controlling a variable is to set aside its effects to permit a more refined investigation of the independent variables that are of interest to the researcher. Thus, by definition, when race is "controlled" in regression analyses, the objective is not to understand how race contributes to the outcome under study; rather, the objective is to hold race constant to allow for the systematic examination of other variables. Thus, the effects of race are not the subject under study (LaVeist et al, 2000). Understanding the factors operating in the middle years will also help elucidate those factors affecting minority children's health status given that these adults are their parents and grandparents (LaVeist et al, 2000).

5. Adolescence

It is clearly understood that adult health behavior, whether it places one's health at risk or helps to promote one's health, is behavior not newly developed during adulthood. Adults begin to develop and practice their health behaviors during their childhood and

adolescent years, and then continue to practice these health behaviors on through their adulthood. Moreover, in following the development of health behaviors through the life span of an adult, it appears that during adolescence an individual begins to change their health behavior, decreasing their health promoting behaviors and increasing their health-risk behaviors. In relation to racial and ethnic minority adults, the same assumption can be made that adolescence is the period of health behavior change, as well as the establishment of lifelong health behavior. Therefore, efforts that seek to have a significant impact on adult health behaviors must be aimed at the time period when these health behaviors are manifested, developed, and engrained: childhood and adolescence.

6. Minorities

Much of the previously published research on minority health is descriptive or merely takes for granted that non-white persons have a worse health profile compared with white persons. Individuals who are of minority status have poorer health behaviors, such as eating higher fat diets, smoking more, and being less physically active, than non-minority individuals. Women are less physically active than men, and their activity levels decline substantially during adolescence (NHLBI, 2003).

But, as the observations from past research have demonstrated, the pathways to these racial and ethnic differences in morbidity and mortality are complex (LaVeist et al, 2000). For most of the conditions that affect ethnic minority adults, biological and genetic factors play at best a modest role in producing racial and ethnic differences. While cultural differences exist among racial and ethnic minority groups, they are insufficient to produce such large differences in health status. However, there are well-documented differences among racial and ethnic groups in terms of social factors. For

example, differences have been documented in exposures to environmental forces (Bullard, 1983), quality of life (Kutner et al, 1994), and occupational stressors (Robinson, 1985; 1989).

As for the use of race in sample selection, it is obvious that selecting a racially homogeneous sample will not provide information about groups that were not involved in the study. Therefore, the most commonly used techniques of analyzing race provide no information on what is among the most compelling issues facing public health and medical researchers. That is, why do Black persons and other racial minorities live sicker and die younger than white persons (LaVeist et al, 2000)?

7. Health-Promoting Behaviors

Risk behaviors are crucial to closing the gap in health status for racial and ethnic minorities, but they should not be the sole concern for change. Increased emphasis should be placed on behaviors that help promote the health status of these individuals, such as exercise, nutrition, and attending annual physician visits. Poor diet, lack of physical activity, and a variety of sociocultural factors continue to lead to an increased incidence of obesity in minority children; frequently the obesity persists as these children enter adolescence and adulthood (Berglas et al, 1998). The health-promoting behaviors mentioned are critical for maintaining and improving health status, and as such, efforts to increase these health behaviors should be as great a priority as efforts to decrease health-risk behaviors. As during childhood and adolescence a number of factors are likely to have an influence on an individual's health-risk behaviors, so it is important to focus on health-promoting behaviors during this period.

8. Body Mass Index

In the general population, Body Mass Index (BMI) has become a standard indicator for measuring the healthy weight of an individual, ranging from underweight to obesity (Hlaing et al, 2001). It has been found to be associated with physical activity (Coon et al, 2002) and diet (Polley et al, 2005), as well as adverse health outcomes and mortality (Curtis et al, 2005; Calle et al, 1999; Diehr et al, 1998).

As health outcomes in minority adolescents are crucial in examining racial and ethnic health disparities, it is also important to note variables, such as BMI, with evidence-supported connections to these outcomes. As BMI is often used to monitor childhood obesity in general, the concern has been whether or not the same is true for obesity in racial and ethnic minority children and adolescents. Fortunately, more recent studies have shown that BMI has a statistically significant association with overweight or obesity in children in a multiethnic population (Ellis et al, 1999) and health promoting behaviors such as exercise (McMurray et al, 2000). However, efforts to examine variance by race and ethnicity in the factors associated with BMI and health promoting behaviors are needed (Neumark-Sztainer et al, 2002; Lynch et al, 2004).

E. CONTRIBUTION OF AREA OF FOCUS TO THE PROBLEM OF RACIAL AND ETHNIC HEALTH DISPARITIES

To achieve the goals outlined in Healthy People 2010 (DHHS, 2000), i.e. to increase life expectancy, reduce health disparities and barriers to care, a better understanding is needed of the sociocultural factors that form the context for health differentials (LaVeist et al, 2000). Researchers inform providers about the patient beyond

the feel and the sounds of the patient and into the realm of the larger picture that affects the public health of this Nation (Coleman-Miller, 2000). Familiarity with a target population can also uncover important needs or goals the community may have that should be acknowledged (Horowitz et al, 2000). This familiarity includes the factors associated with their health behaviors, and more specifically, their health-promotive behaviors. While classification of persons by racial and ethnic groups is very controversial, programs should understand their target group's size, sociodemographic characteristics, health utilization patterns, cultural beliefs and practices, experiences with racial discrimination, and attitudes toward health care (Krieger et al, 1998; Williams, 1996a; 1996b; Williams et al, 1994; Patcher, 1994). These statements emphasize the importance of understanding a population's demographic, cultural, social, and environmental characteristics in the elimination of racial and ethnic health disparities. This study provides information on racial and ethnic minority populations that can be used to determine factors associated with their participation in health-promoting behaviors.

The impact of improving and maintaining health-promoting behaviors in adolescence would be extraordinary. Researchers agree that it offers a unique opportunity to positively influence the adoption of health promoting behaviors such as healthful eating and physical activity patterns, which could be sustained throughout life (Story et al, 2002). As racial and ethnic minority adults have higher incidences of morbidity and mortality than their white counterparts, such improvements during their adolescence is most important for future improvements in health behaviors and health status for this

population. These changes should then yield overall decreases in racial and ethnic health disparities and possibly provide significant movement towards their elimination.

F. GAPS IN THE KNOWLEDGE OF AREA OF FOCUS

1. Racial and Ethnic Populations

Federal datasets are woefully inadequate for Asian American and Pacific Islander populations (Daus, 2002).

2. Determinants

Why do some racial and ethnic groups live sicker and die younger than others?

The answer to this question has motivated decades of health science research, yet the answer continues to be elusive (LaVeist et al, 2000). Why racial and ethnic health disparities exist is not clearly understood (Daus, 2002). Noting the substantial economic differences between various racial and ethnic groups, income and health insurance coverage are frequently cited as potential explanations for these disparities. However, a growing body of research has demonstrated that these racial and ethnic differences persist even when differences in income and health insurance are held constant (Lew et al, 2000). Given the consistency of these findings regarding income and health insurance coverage, researchers have begun to explore other potential explanations for racial and ethnic disparities in health (Lew et al, 2000).

Just as there are factors that are responsible for individuals taking part in health-risk behaviors, there are factors responsible for individuals taking part in health promoting behaviors. Unfortunately, not much is known about these factors, what they

are and how much influence they have on an individual. Furthermore, it is neither understood whether or not there are differences in the factors that influence different racial and ethnic groups, nor whether or not these factors differ in the amount of influence they have on individuals in these groups.

For example, it is understood that intergenerational discussions of health care can have positive effects on health within families. The choices made by families across this country are often based on the health care they received and the care of their ancestors before them (Coleman-Miller, 2000). Of importance in this study is whether or not the same can be said for their health-promoting behaviors; i.e. what factors (i.e. family, peers, neighborhood, etc.) might be associated with the health-promoting behaviors of minority adolescents.

3. Others

Currently, information on the nutrient content of foods and recipes common in the diets of these minority groups is unavailable (NHLBI, 2003).

G. RECOMMENDATIONS FOR RESEARCH TO FILL IN THE GAPS IN THE KNOWLEDGE OF FOCUS AREA

1. Directly Related to Current Study

With continued health disparities by race and ethnicity, many recommendations for research related to the current study have been suggested. The goal of the report “*Eliminating Racial, Ethnic, and SES Disparities in Health Care: A Research Agenda for the New Millennium*,” was to respond to the challenge to eliminate racial and ethnic

disparities in health care over the next decade by moving beyond simply describing racial and ethnic disparities to discuss: 1) why these racial and ethnic disparities in health exist, 2) what we know about ways to reduce these disparities, and 3) what knowledge and research are still needed in order to eliminate these disparities (Lew et al, 2000).

Investigations of the determinants associated with and those that contribute to racial and ethnic health disparities have been emphasized. More research needs to be done to identify the causes of disparities and understand the interaction of the many factors that influence health (Daus, 2002). Interdisciplinary research that investigates the behavioral and societal factors that contribute to CVD health disparities needs promotion (NHLBI, 2003). Measurement instruments and methods for comparisons (e.g., SES, diet and physical activity, stress and coping behaviors, acculturation, and racial/ethnic discrimination) across multiple racial/ethnic groups need to be developed and validated (NHLBI, 2003).

Prevention is key to addressing the problem. In effectively preventing chronic disease in minorities, it is necessary to determine the contributions of both genetic and environmental factors early in a child's life. Studies that shed light on the causes and effects associated with disease in minority populations can be useful in establishing early preventive measures (Berglas et al, 1998). It is among the social variables that future minority health research must search for the reasons for racial and ethnic health disparities. Such a study would build analytic models that simultaneously examine social/contextual and behavioral factors, while measuring environmental exposures. These studies need to be longitudinal and follow persons over the lifespan (LaVeist et al, 2000). There should, in fact, be more studies of racial differences in health. However,

future studies need to have improved methodology and better execution. There must be a paradigm shift from studies that merely describe race differences in health status to studies that seek to explain them. Though it may remain necessary to describe race differences to track progress, the state of research in this area needs to move beyond mere description. As was stated years ago, future research should clarify the causal pathways that connect race with health, disentangle race from ethnicity, nationality, and SES, and develop measures of race that capture its multidimensional nature (LaVeist, 1994).

Research to determine what interventions have been and might be successful in eliminating the disparities have been proposed as well. Interventions that already exist to improve poor health behaviors such as eating higher fat diets, smoking more, and being less physically active, need further refinement and testing (NHLBI, 2003). Also needed are interventions that address behavioral CVD risk factors, such as obesity, diet, smoking, and sedentary lifestyle. Studies are needed to test interventions to prevent diabetes and CVD in young adults with emphasis on self-management of risk factors (NHLBI, 2003).

The study of racial and ethnic populations has also been recommended. Particular attention should be paid to understanding characteristics of the racial or ethnic group targeted (Horowitz et al, 2000). Research is needed that collects data on subgroups within broad racial and ethnic categories (Orlandi, 1992b).

Research focused on racial and ethnic minority children as opposed to the adult portion of this population, has also been suggested. As the increasing prevalence of overweight in racial and ethnic minority children and adolescents is a significant problem, efforts should focus on determining the reasons for the increases and the

development of interventions that would reduce the prevalence (Ogden et al, 2002). This would include examining the relationship between overweight and dietary intake and physical activity, as well as the influence of social, economic, and physical environments (Ogden et al, 2002). Additionally, the differences between parent and child diet and physical activity, as well as the associations between specific family and childhood environmental factors and obesity in childhood and adulthood should be investigated (Greenlund et al, 1996). In each of these, differences in gender, culture, and SES should be considered in obesity prevention (Greenlund et al, 1996).

2. Others Indirectly Related to Current Study

The current study should be beneficial in informing other research that has been recommended, such as the seven recommendations that follow. First, cost-effective interventions need to be developed that are racially, ethnically, and culturally acceptable and appropriate for practical application in a wide variety of settings (NHLBI, 2003). For this to be successful, there is a need to further understand the factors associated with racial, ethnic, and cultural groups, as is the focus of the current study.

Second, there needs to be a comparison of risk factor profiles of recent immigrants to source populations and to second and third generation U.S. immigrant populations (NHLBI, 2003). Factors in the current study found to be associated with immigrant health promoting behaviors will be useful in research seeking to compare these risk factor profiles.

Third, studies should be conducted to examine the role and influence of minority patients' low-risk health behaviors on minority patients' high-risk behaviors. Included in

this is the need to ascertain what approaches and types of communication are effective in having an impact on behavior (Coleman-Miller, 2000). As the current study will compare the incidence of health-promoting behaviors such as eating habits and exercise to health-risk behaviors such as smoking and alcohol drinking, results from these comparisons should provide a definitive starting point for research on the influence of these behaviors on each other.

Fourth, program models that delineate and link outcomes with processes or activities, and with their underlying principles should be articulated, as they may be able to transform vague notions of success into specific outcomes that can be measured (W.K. Kellogg Foundation, 1998). Thus, improving the capacity to adequately evaluate the effectiveness of interventions. By determining the factors associated with health-promoting behaviors, these program models will be better informed and modified to include these factors in program development.

Fifth, efforts should be supported that assess the utility of widely used, but poorly evaluated programs, such as interpreter services, cultural competency training, and community health worker programs, so that health organizations and policymakers can make informed decisions about resource allocation to work towards eliminating disparities (Horowitz et al, 2000). Information on what factors contribute to health-promoting behaviors among minority adolescents should be beneficial to policymakers and institutional funders of research as they allocate their resources based on an increased knowledge base.

Sixth, research that effectively addresses health care disparities will require comprehensive efforts by multiple sectors of society to address larger inequities in major societal institutions (Williams et al, 2000). There is clearly a need for concerted societal-wide efforts to confront and eliminate discrimination in education, employment, housing, criminal justice, and other areas of society, which will improve the socioeconomic status (SES) of disadvantaged minority populations and indirectly provide them greater access to medical care. The United States also needs to make the moral and political commitment to guarantee access to medical care as a fundamental right of citizenship (Williams et al, 2000). Through social ecological methods, the current study examines multiple influences on health-promoting behaviors. Findings from the study should provide factors of influence, specific to various disciplines, inherently calling for a multidisciplinary approach to addressing the issue.

Finally, there is also a need for research to evaluate the success of intensive and systematic educational campaigns about the problem of racial inequities in health care (Williams et al, 2000). The awareness levels of the public and professional community, especially the medical community, must be raised. Research is needed to identify strategies that are most effective to raise awareness of and increase sensitivity to the issues of race in medical practice. Although education has its limits, it is also instructive to know that educational campaigns can accomplish much. For example, in the case of tobacco there has been a per capita decline in tobacco consumption in the United States over the course of the last century whenever there was a major media campaign on the negative effects of cigarette smoking (Warner, 1985). As the current study seeks to examine the influence of social factors such as parents, peers, and social environment, the

results would be beneficial in the planning and development of population targeting for future educational campaigns.

H. SIGNIFICANCE OF CURRENT STUDY

1. Improvement of current methods

Should progress be made in understanding the factors that influence the health promoting behaviors of racial and ethnic minority adolescents, this information can then be used in improving the methods and strategies currently in practice to reduce and eliminate the disparities in health for racial and ethnic minorities. Such information will inform policy formulated by local, state, and federal government agencies; serve as the conceptual framework for additional research; and be incorporated into programs and interventions aimed at increasing and maintaining health promoting behaviors among racial and ethnic minorities.

A fundamental example of the significance this study has for improving current methods can be seen in the intervention of cultural competency education and training. Cultural competency is the understanding of diverse attitudes, beliefs, behaviors, practices, and communication patterns attributable to a variety of factors (such as race, ethnicity, religion, SES, historical and social context, physical or mental ability, age, gender, sexual orientation, or generational and acculturation status). Lack of cultural competency in health care providers may affect health outcomes, so the development and use of cultural competency skills is important in efforts to eliminate health disparities. There is an increasing need to train physicians to deliver effectively the benefits of

modern medical care to an increasingly multi-cultural population (NHLBI, 2003). With additional information about the factors that influence health behaviors of minority populations, cultural competency programs should be significantly improved and lead to more successful outcomes.

2. Factors are Feasible for Policy, Program, and Research Development, Implementation, Evaluation, and Improvement

Once these associated factors are identified, the implications for policymakers, program developers and administrators, and health researchers are dramatic, specifically due to their feasibility. The factors chosen for analysis include individual factors such as age and gender, social factors such as parental and social relationships, and environmental factors such as neighborhood and community resources, as well as connectedness to surroundings. These factors are more feasible to use in research and to be impacted on with policies and programs than factors such as socioeconomic status or education and employment of parents.

3. Prevention

It is estimated that one in four children in the United States are at risk for being overweight and 11 percent are overweight (Nicklas et al, 2003). This is of major concern as it has been accepted that obese children tend to become obese adults (Webber et al, 1995; Guo et al, 1994; Webber et al, 1986; Himes et al, 1994), which increases adult mortality from cancer, hypertension, diabetes, and heart disease (Must et al, 1992; Mossberg, 1989; Gennuso et al, 1998). Childhood and adolescence offer an important window of opportunity to lay the foundation for healthy behaviors that reduce the likelihood of disease. Culturally-appropriate interventions that provide preventive health

care services, promote healthy and active lifestyles, and screen for prevalent risk factors will improve the health status of minority children. Good health practices early in life will hopefully carry through to adulthood (Berglas et al, 1998). The focus of the current study is the prevention of racial and ethnic health disparities, which is why minority adolescents are the targeted population. With an understanding of the factors associated with their practice of health-promoting behaviors, efforts can be taken that should increase these activities early in life, which should lead to fewer chronic conditions in adulthood, and then a significant reduction of health disparities occurring by race and ethnicity.

II. Theoretical/Conceptual Framework

A. FRAMEWORK FOR THE STUDY

Exclusively, behavior change models and environmental enhancement models are inadequate frameworks for health promotion activities. Behavioral models do not consider the extraneous environmental influences that contribute to an individual's health promoting behavior. Neither are environmental models able to account for the internal influences that just as significantly play a role in the health-promoting behavior of an individual. However, it is the weakness of each of these models that serves as the strength of the social ecological approach. It takes into consideration both intrapersonal and environmental factors that might influence an individual's health promoting behavior. It holds that there are multiple physical, social, and intrapersonal factors that affect an individual's health and emphasizes the importance of identifying these factors, how they

influence an individual independently, and how they influence an individual when they interact.

Thus, the merits of the social ecological approach have provided justification for its selection as a basic component for the current study's theoretical framework. The framework holds that for any given racial or ethnic minority group, there exist several physical, intrapersonal, social, economic, and environmental factors associated with the practice of a number of health behaviors, specifically health-promoting behaviors including adequate exercise and proper nutrition, and that these behaviors contribute to health outcomes in these racial and minority ethnic groups. The primary line of reasoning holds that differences in health-promoting behaviors among racial and ethnic minority groups is related to differences in the associations between the influential factors and the health-promoting behaviors by racial and ethnic minority group.

FRAMEWORK:

Race/Ethnicity → → → → → Factors → → → → → Health Behaviors → → → → → Outcomes

- | | | |
|-----------------|------------|-------|
| - Demographic | - Eating | - BMI |
| - Social | - Exercise | |
| - Environmental | | |

B. DEFINITIONS OF VARIABLES

Health disparities – differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups

in the United States; other adverse health conditions may include differences in access to care and quality of care; specific population groups may be defined by race and ethnicity, gender, education, income, disability, geographic location, and sexual orientation (Daus, 2002).

Social ecology – an overarching framework, or set of theoretical principles, for understanding the interrelations among diverse personal and environmental factors in human health and illness (Stokols, 1996)

Health – complete physical, emotional, and social well-being (WHO, 1984)

Health protection – the avoidance of unhealthful or unsafe environmental conditions (Stokols, 1996)

Personal health behaviors – actions taken by persons that directly affect their own well-being (Stokols, 1996)

Other-directed health behaviors – actions taken by persons and groups that influence others' well-being (Stokols, 1996)

Social validity – the societal value and practical significance of a research or intervention program (Stokols, 1996)

Social ecology – emphasizes more of “the social, institutional, and cultural contexts of people-environment relations than did earlier versions of human ecology” (Green et al, 1996)

Social capital – that membership of a social group confers obligations and benefits on individuals; the central relationship is one of trust and reciprocity; whatever “social health” indicator predicts health status best (Hawe et al, 2000)

Overweight – at or above the 95th percentile of body mass index (BMI); definition based on the 2000 Centers for Disease Control and Prevention growth charts for the United States (Kuczmarski et al, 2002)

At risk for overweight – at or above the 85th percentile, but less than the 95th percentile of BMI for age (Kuczmarski et al, 2002)

Body mass index (BMI) – is measured in kilograms (kg) divided by the square of height in meters (m²) (Malina et al, 1999); used to assess an individual’s general health and weights states including underweight, overweight, or obesity (Hlaing et al, 2001)

C. AIM OF THE STUDY

The purpose of the study is to identify a subset of physical, intrapersonal, social, and environmental factors that are associated with health promoting behaviors and activities of racial and ethnic minority adolescents. Specifically, what are some of the

statistically significant factors that might explain why some racial and ethnic minority adolescents get the minimum daily amount of exercise suggested, intake the minimum daily amount of nutrition suggested, and attend their annual primary health care visits as recommended, and why other racial and ethnic minority adolescents fail to do so. These are the issues the study intends to explore.

As such, the study's findings may provide insight and direction for the design, development, and improvement of health promotion programs targeting minority adolescents.

III. Review of Literature

A. PURPOSE OF LITERATURE REVIEW

The literature review of this study is intended to be representative rather than exhaustive. It will examine the various models and theories that have been used and discussed in past research to account for the factors and processes associated with health behavior. An overview of both strengths and weaknesses will be provided for the alternative models, theories, and frameworks that were evaluated but not chosen, as a basis for the current study. A similar examination and overview will be presented for the models and theories chosen as part of the framework of this study as well. As racial and ethnic minority adolescent health and health promoting behavior are at the nucleus of this study, a review of the literature on these concepts, though limited in scope due to a lack of prior research, will also be included.

B. REVIEW OF COMPETING MODELS AND THEORIES

Story and colleagues compiled a list of the levels of influence on health behavior (Story et al, 2002). These included: 1) individual or intrapersonal (i.e. psychological, biological), 2) social environmental or interpersonal (i.e. family and peers), 3) physical environmental or community settings (i.e. schools, neighborhoods), and 4) macrosystem or societal (i.e. mass media, marketing, social and cultural norms). With these multiple levels it is clear, as Syme argued, that intervening at the individual level will doom public health to small positive effects (Leviton et al, 2000).

1. Environment

Environments are multidimensional, encompassing social and cultural as well as physical components (Stokols, 1996). Although environments have a strong influence on the behavior that occurs within them, individuals often behave differently in different environments (Green et al, 1996). Since the environment functions as a provider of health-promotive resources including information, facilities, and social support (Stokols, 1996), and different environments illicit different behaviors, determining environmental health behavior-influencing factors and their processes of influence might be difficult.

Advantages to environmental health promotion approaches include: 1) providing a more complete understanding of the situational factors that can facilitate or hinder persons' efforts to improve their health practices and well-being and 2) revealing the effects of people's physical and social surroundings on their well-being, which can undermine the benefits of favorable health practices (Stokols, 1996). Unfortunately, there have been several limitations in utilizing this approach (Stokols, 1996). First, environmental interventions typically have focused on single facets of the physical or

social environment rather than examining multiple environmental dimensions and the relationships among them. Second, they give little or no attention to the varying behavioral patterns and sociodemographic characteristics of the people occupying particular places and settings. Third, their health-related value may be diminished for those who continue to engage in unhealthful activities or for those groups who are more vulnerable to the negative health impacts of environmental hazards and stresses because of their restricted income, educational level, and geographic mobility. Fourth, environmental approaches to health promotion tend to neglect individual and group differences in people's response to their sociophysical milieu. And sixth, those that target isolated conditions within a setting often neglect important links between the physical and social aspects of environments and the joint influence of multiple settings on participants' well-being.

Environmental factors are believed to be the cause of the current increase in obesity (Hebebrand et al, 2000; Hill et al, 2000). However, the research studies with these findings were mostly conducted with adults, with little examination of the diet-obesity relationship in children, and few of the adult findings have been replicated with other populations such as adolescents (Nicklas et al, 2003). Until additional studies are done, the amount of influence the environment has relative to other factors is uncertain.

Thus, examining health behavior from the sole vantage point of the environment is likely not enough, as other variables may be found to have lesser, the same, or greater influence. An example of this inherent danger is exemplified in research that has found a greater availability of crack in segregated urban communities (Lillie-Blanton et al, 1993). It was this availability in the environment, which accounted for a greater prevalence of

crack cocaine use among Black persons. This however, does not explain the use by those African-Americans living outside of these environments. Clearly, environment by itself is not adequate to account for health disparities by race and ethnicity.

2. Socioeconomic Status

From the earliest research conducted in the area of public health, SES has been noted as a determinant of health status. The link between standard of living and mortality and morbidity has been observed subsequent to the early 20th Century, (Ogburn et al, 1922; Newsholme, 1910). Ecological studies have demonstrated that there exists a gradient in terms of SES and health status (LaVeist, 1994; Williams, 1999). Additionally, research has also demonstrated that African-Americans and other racial and ethnic minorities have lower SES when compared with whites. Thus, the commonly held belief has been that racial and ethnic differences in health status can be explained by their underlying differences in SES (Navarro, 1990; Stolley, 1999).

Presently, however, there have been findings from supplementary research, challenging this well-documented claim and calling for a revision to the theory that SES is the primary explanation for racial and ethnic health disparities. NCHS data for heart disease death rates among adults age 25-64 from 1979-1989 shows a pattern where Black males have a higher mortality rate than white males at each income category (LaVeist et al, 2000). Meaning that even when there is no difference in income between African-American males and white males, there still remains a disparity in heart disease mortality rates. Although the racial gap is substantially less pronounced among the highest income category, Black males in the middle income category have a heart disease mortality rate that is nearly as high as the rate for white males in the lowest income group. The

significance of this example is clear: even when African-American males are financially well off, they have health outcomes comparable to whites who are poor. This pattern for males is similar for females as African-American females consistently have a higher heart disease mortality rate at all income levels than their white counterparts (LaVeist et al, 2000).

Education, a marker for SES, has been found to have an inverse relationship with obesity among Black women (Croft et al, 1992; Gillum, 1987; Kahn et al, 1991).

However, in the Coronary Artery Risk Development in Young Adults (CARDIA) study, there was a statistically non-significant inverse association between education and BMI for Black women (Greenlund et al, 1996). As an additional component of the CARDIA study, researchers looked at the association between parental educational attainment, and BMI and change in BMI of participants. Results were in agreement with earlier studies finding inverse associations between parent SES and adult offspring obesity (Teasdale et al, 1990; Power et al, 1988; Braddon et al, 1986; Goldblatt et al, 1965; Garn et al, 1981). However, as adult offspring obesity is influenced by lifestyle factors such as diet, physical activity, smoking, and alcohol consumption, and since these factors may be passed on from parents to children, it is not plausible to recognize SES as the sole influence on obesity (Lau et al, 1990).

Research has found that SES is significant in weight-related concerns, but its influence relative to other factors is undetermined as differences arise across ethnicity (Winkleby et al, 1998; Dundas et al, 2001; Mayberry et al, 2000). These differing patterns suggest the additional presence of cultural influences (French et al, 1998;

Cassidy, 1994; Warnecke et al, 1997). Thus, SES should not be considered alone when considering racial and ethnic health disparities.

3. Culture

Cultural differences among racial and ethnic groups have also been thought to contribute to health status differentials. Ethnic and minority populations differ in their patterns of health status, health care use, and mortality from the white population and the underlying belief has been that this is due to each group bringing its own unique set of cultural patterns to impact on differences (Cooper-Patrick et al, 1999).

The part that cultural differences play among racial and ethnic groups in terms of health behavior and outcomes is a highly complex one. Cultures may have specific aspects that are influential in terms of health and illness behavior, but differences in behavior among various racial and ethnic groups might be more indications of the varying experiences these groups have had as they function within the larger American culture (LaVeist et al, 2000). These experiences differ due to social environment, physical environment or perhaps even by the individualized way that the person responds to a situation. For this reason, the theory that culture is responsible for health-related racial and ethnic differences is a limited one.

C. REVIEW OF CHOSEN MODELS AND THEORIES

The review of models and theories in the previous section reveals that the use of these as explanations for health behavior and health outcomes is subject to scrutiny when viewed separately and independently. An individual approach seeking intrapersonal factors, including genetic heritage and personality dispositions, ignores the relevance of

the environmental component, while an environmental approach that focuses on environments, whose physical and social conditions are linked to health behaviors, neglects the importance of intrapersonal factors (Stokols, 1996). What is needed is a multi-leveled approach that considers the significant influence of a myriad of factors on health behavior and health outcomes. Thus, the optimal approach for health promotion efforts would be one giving gravity to all such factors, intrapersonal, social, environmental, and otherwise. The social ecology or social ecological approach is one that accounts for these various types of factors. Social ecological theory emphasizes the importance of identifying various physical and social conditions within environments and the diverse intrapersonal factors that influence human health status and behaviors at both individual and community levels (Stokols, 1996).

There are several principles to the social ecological paradigm. First, environmental settings are characterized as having multiple physical, social, and cultural dimensions that can influence a variety of health outcomes (WHO, 1984). Here the capacity of an environment to promote health is thought of as having a cumulative impact from multiple environmental conditions on physical, emotional, and social well being, over a specified time interval (Stokols, 1992b). Second, biological and environmental determinants of health should not be examined independently, but the interplay between situational and personal factors should be the focus. This is the underpinning of the social ecological assumption that the compatibility between people and their surroundings is a predictor of health status (Michelson, 1976; Caplan, 1993; Kaplan, 1983). Third, environmental conditions within settings are interdependent, multiple settings are interconnected, and the assumption emphasized is that these relationships must be taken

into account in regards to efforts to promote human health. Lastly, it is interdisciplinary in approaching research and program development based on health promotion.

The social ecological approach has several strengths (Stokols, 1996). First, it is able to integrate strategies of behavioral change and environmental enhancement with a broad systems-theoretical framework. Second, it incorporates different levels of analysis such as the individual and the community. Finally, it encompasses a broader focus and allows for identification of concepts that an exclusive focus on either behavioral or environmental factors would not yield.

Despite its advantages, the social ecological approach does suffer from several limitations (Stokols, 1996). Although it is all encompassing, the inclusion of too many factors establishes a complex model with comprehensive detail, but no priorities (Green et al, 1996). This also raises the potential for over-inclusiveness. In addition, with such a plethora of information, utility for research and intervention is substantially reduced. Fortunately, the incorporation of leverage points (Stokols et al, 1996; Stokols, 1996) may be used to address this criticism by focusing attention on those individual, social, and physical characteristics that exert a disproportionate amount of influence on health (Grzywacz et al, 2000).

In the model of this study, adolescent health promoting behavior is conceptualized as a function of individual, social, and environmental influences (Story et al, 2002). Here a limited number of relevant factors and their interactions will be used to explain individual and/or collective health-promotive behavioral patterns among minority adolescents (Glanz et al, 1995), addressing the weakness of the social ecological approach that it encompasses too many factors. Some studies have utilized models

looking at the impact of offering economic and social conditions conducive to health and healthful lifestyles (Green et al, 1996). This study will also investigate the concept of environments, whether social or physical, providing information and life skills to equip individuals to make decisions to engage in behavior that maintains their health.

The ecological perspective has been used in other similar research that only examined understanding factors influencing eating behavior in adults (Story et al, 2002), where behavior is viewed as affecting and being affected by multiple levels of influence. Previous research utilizing ecology theory has drawn attention to dispositions, resources, and characteristics of the individual that influence health (Grzywacz et al, 2000). Hostility has been linked to poorer health through a higher level of physiological reactivity, poorer social relations, and more unhealthy daily habits (Smith, 1992). Self-efficacy has been linked to practicing more health-promoting behavior, fewer risky health behaviors, and better adherence to therapeutic interventions (Dishman et al, 1981; Fuchs, 1996; Rosenstock et al, 1988). Family has been found to be a primary source of health-related attitudes, beliefs, and behaviors during the health/illness cycle (Grzywacz et al, 2000). Research has found that family structure provides a foundation for individual health and offers additional resources for health (Ross et al, 1990; Shumann et al, 1990). In addition, further research suggests that marriage increases the household earnings of both partners (Ross et al, 1990) and may modify intra-household choices and opportunities related to dietary practices, health-seeking behavior, home hygiene and sanitation, and access to healthcare (Berman et al, 1994).

D. REVIEW OF AREA OF FOCUS

1. General Health Promotion

Green and colleagues indicated an evolution in health promotion (Green et al, 1996). Health promotion started out focusing on building health literacy and skills in support of specific programs. From then until now, emphasis was placed on promoting a holistic or ecological educational approach to problems. Another evolution in focus noted by Green and colleagues was that from solely examining the individual to inclusion of various other factors beyond the intrapersonal (Green et al, 1996). Focus on individual behavior change developed into a concern for organizational, economic, and environmental factors conducive to healthful lifestyles, self-reliance, and political action for health promotion.

Throughout their lifetimes, individuals are dependent on the physical and social environment (Hawley, 1986) and a growing consensus from past research indicates that health interventions are most effective when change occurs at multiple levels including individually and on the community level (Green et al, 1999; Stokols, 1996). These domains of individual and community life can provide clues for developing culturally competent treatment regimens and interventions that will become increasingly necessary as the US population becomes increasingly diverse (Pol et al, 1997).

Some research has found that the effects of low education and income can be lessened by an individual's sense of control, consistent with the ecological principle that different personal and environmental factors interact in shaping health outcomes (Lachman et al, 1998). Another example of the ecological approach is the Child and Adolescent Trial for Cardiovascular Health (CATCH) (Grzywacz et al, 2000). It was

designed to provide physical, social, and psychological components of health associated with long-term impacts on cardiovascular disease. Research found it effective in promoting more positive lifestyles for improved health.

The research has found individual influences impacting on health behavior. For example, evidence has been found that powerlessness is an influential factor in enhancing health (Wallerstein, 1992). However, individual influences are not the only significant influences. Research from Lantz and colleagues found that in a nationally representative population of low SES, 4 behavioral factors including cigarette smoking, alcohol drinking, sedentary lifestyle, and relative body weight, contributed about 15% of the variance in increased mortality (Lantz et al, 1998). Although they were significant, these individual risk factors were not sufficient to explain the effect of SES on health, suggesting that some health effects may be explained by other social and environmental factors.

Social influences have also been found to play a significant role in health behaviors. For example, studies show that supportive social environments along with educational support, have proven effective in influencing health behaviors in the long term (Levine et al, 1979; Morisky et al, 1985; Green, 1986). Peers and conformity to group norms have often been considered significant influences, especially during middle adolescence, from ages 14 to 16 (Steinburg, 1996). Research has examined the health-related behaviors of children and adolescents and in the process has yielded crucial evidence of the importance of the peer group in shaping psychological well being and behavior (Grzywacz et al, 2000).

Social networks have also been found to affect health behaviors (Berkman et al, 1999). For example, research on lay health workers has revealed that their influence has increased the participation of disadvantaged urban populations in health promotion activities where traditional health education has not had such success (Andrulis, 1995; CDC, 1998). In fact, evidence has been found that those with more supportive social networks are more likely to adopt health promoting behaviors than those with limited social networks (Berkman, 1995).

Family has been found to be a significant influential factor in health for adolescents. Evidence from research designs reveal that family-related transitions frequently result in changes in health-related behaviors (Horowitz et al, 1991; Backett et al, 1995; Temple et al, 1991). Family process or family interactions are frequently involved in such activities as supporting or modeling lifestyle choices (Peyrot et al, 1999; Sallis et al, 1992; Lau et al, 1990). Family-level collective beliefs about the world (family paradigms) are particularly important in shaping health-related beliefs and behaviors that have lasting health implications (Grzywacz et al, 2000).

Social environment has also been found to play a significant role in health status and health promoting behaviors. Several recent population studies found that living in a poor neighborhood, distinct from individual indicators of SES, is associated with poorer individual health (Grzywacz et al, 2000). Furthermore, several population studies report that neighborhood SES (e.g. percentage of households in geographic area receiving public assistance) is associated with poorer self-rated health, more functional limitations, and poorer health-related behaviors (Yen et al, 1998). Also, the school environment has

been shown to have strong influence on the health of adolescents, with respect to social and psychological aspects (Grzywacz et al, 2000).

Additionally, environment is significant in adapting and sustaining health-promoting behaviors. The perception of danger in one's neighborhood keeps residents off the streets and out of the parks, preventing individuals from walking in their neighborhoods, increasing stress levels (Wandersman et al, 1998). Another example of other influences the environment has on health promoting behaviors is community influence. For example, a study of the Midwestern Prevention Project found that the intervention substantially reduced the use of tobacco and other drugs by children and adolescents in cities such as Indianapolis and Kansas City through coordinated citywide efforts (Pentz et al, 1989).

2. Adolescent Nutrition and Eating Habits

Dietary patterns are adopted and appear to be maintained during adolescence and young adulthood (Perry et al, 2002). In 2001, almost 80 percent of school children in the United States did not consume the recommended 5 or more servings of fruit and vegetables per day (Grunbaum et al, 2002), with boys more likely to have consumed the recommended number of servings than girls, particularly among Black students (Ogden et al, 2002). The literature reveals that interventions aimed at improving the eating habits of adolescents have had outcomes with mixed success, which may be partly the result of an inadequate understanding of the factors associated with adolescent eating behaviors (CDC, 1996; Story et al, 1999). Without adequate identification of factors associated with adolescent eating behaviors and sufficient supportive evidence that these factors actually influence adolescent eating behaviors and an understanding of the process of influence,

success in increasing nutrition and good eating habits among the country's adolescent population will continue to be limited. Past research and their findings provide the foundation for adequate identification and comprehension of these factors.

Minority sub-populations have been found to have a range of eating habits. The diet of African-Americans has been thought of as high in fat and salt and low in fiber, fruits, vegetables, and calcium (Greenberg et al, 1998). Research findings from a study examining youth cardiovascular health behaviors concluded that individuals who were younger, of a higher SES, and White or Hispanic were more likely to have healthier eating habits (Lee et al, 2002), and more specifically, being Black was associated with less healthy dietary habits. Of equal interest should be the fact that while Hispanic ethnicity was associated with healthier eating behavior, SES made differences between Whites and Hispanics increase. Other research results support these findings. A study examining the nutrition knowledge, attitudes, and practices related to fruit and vegetable consumption of sub-populations of a sample of high school students in south Louisiana found significant differences, with Whites scoring higher in mean consumption than Blacks, Hispanics, and others, which included those of Asian and Indian lineage (Beech et al, 1999).

One study reviewed health promoting and risk behaviors among a few adult racial and ethnic minorities using national survey data (Myers et al, 1995). In terms of healthy eating behaviors of African Americans, the results did not indicate a higher-than-average percentage of fat in their diets. They were even found to consume more green, leafy vegetables and legumes than their white counterparts. However, they were found to have a lower intake of fiber, tended to consume more high-fat food, and claimed that changing

their diets to more healthy eating lifestyles would be too costly. As differences between African Americans and their white counterparts were found regardless of socioeconomic status, researchers believed that this implicates the influence of cultural factors.

Traditional diets among Asian and Pacific Islander populations are commonly believed to be more healthy than for the white population, although this is believed to be difficult to determine because of food availability and affordability in the U.S., meat cuts with higher fat content in the U.S., and consumption levels that can not be accurately measured as food sources are often mixed and eaten together (Myers et al, 1995). Information was lacking for Latin/Hispanic populations and Native American dietary habits were assumed to be inadequate and unhealthy.

Individual influences

Research has shown that there are various influences on the eating behaviors of adolescents at the individual level. (Story et al, 2002) Several studies have shown that taste has a significant influence on the food choices of adolescents (Barr, 1994; Neumark-Sztainer et al, 1999). One study of adolescent college students found that of the 325 participants, only 26% were motivated by health and weight in making dietary choices (Horacek et al, 1998). Age has also been shown to be a positive predictor of how important adolescents view nutrition, with age becoming increasingly important as individuals age (Glanz et al, 1998). Findings from qualitative research indicate that adolescents may not perceive much urgency to change their eating behavior when the future seems so far away (Neumark-Sztainer et al, 1999; Story et al, 1986). Additionally, one study has provided evidence that there may exist a differential eating behavior based

on age ranges, with younger adolescents aged 12-14 being more likely to eat at home (71%), compared with older teens aged 15-17 (66%) (Channel One Network, 1998).

A variety of studies examining eating behavior have found other factors that prove influential to adolescents at an individual level. Data from a small number of studies suggest that adolescents are also price sensitive (French et al, 1999; Neumark-Sztainer et al, 1999; French et al, 1997; French et al, 1997; French et al, 2001). A 2000 study found that adolescents indicated a number of reasons for not having family meals including parent and teen schedules, teen desire for autonomy, and a dislike of food served at family meals (Neumark-Sztainer et al, 2000). Scientists have researched the impact of SES on diet quality and food intake among adolescents, but the results have been mixed and depend on how the outcome variable is measured. When measured on a nutrient level, data have not indicated a relationship between household income and dietary intakes (Johnson et al, 1994). However, when defined by food grouping, fruit and vegetable consumption has been related to SES, with adolescents coming from lower income household being more likely to consume insufficient fruits and vegetables (Burghardt et al, 1993; Neumark-Sztainer et al, 1996). In an additional study looking at youth eating behavior, researchers found that higher proportions of female-headed households in poverty were associated with poorer dietary habits (Lee et al, 2002). This provides further support for the theory that SES significantly impacts adolescent eating behavior.

Social influences

Social factors are significant influences on the eating patterns of adolescents. Research has identified a number of influences including parental, home/family, peer,

and neighborhood/community social influences, among other influences. Some parental influences are directly related to adolescent eating behavior. One study looking at differences in eating patterns between adolescents of parents who serve healthful foods that adolescents like and adolescents of parents who do not serve such foods, found that adolescents of the parents that served healthful foods had the most healthful eating patterns (Contento et al, 1988). Other parental influences such as single-parent households are more indirectly related to adolescent eating behavior. Two 1998 studies found that adolescents living in single-parent households were more likely to eat fewer meals and more snacks (Siega-Riz et al, 1998). The low educational attainment of a parent or guardian has been associated with less healthy dietary habits as well (Lee et al, 2002). However, in several studies, maternal employment has not been associated with consistency of meal patterns among adolescents or with diet quality (Siega-Riz et al, 1998; Johnson et al, 1992; Johnson et al, 1993).

Home and family influences have been found to impact on adolescent eating habits. Data from the National CSFII indicate that adolescents eat 68% of their meals, eat 78% of their snacks, and obtain 65% of their total energy from home (Lin et al, 1999). Other data show that 70% of eating occasions among teens occur at home (Channel One Network, 1998). Research findings have also been shown to support the notion that adolescents value family meals. In a 1997 national survey of adolescents, 79% of adolescents cited eating dinner at home as one of their top-rated activities that they like to do with their parents (Zollo, 1999). Unfortunately, it is not clear how often adolescents are actually eating meals with their parents. Findings from two recent studies indicated that only about one third of adolescents ate dinner with their family every day (Gillman et

al, 2000; Neumark-Sztainer et al, 2000). Yet, data from the National Longitudinal Study of Adolescent Health indicated that about 74% of youth aged 12-14 had in the previous week eaten five or more evening meals together with a parent (Council of Economic Advisors, 2000). A 2000 study found that dissatisfaction with family relations was a major reason cited by adolescents for not having family meals (Neumark-Sztainer et al, 2000). This is somewhat disturbing as some research has demonstrated the positive impact family meals have had on healthy eating. A national sample of children and adolescents 9-14 found that an increase in the frequency of family dinner was associated with more healthful dietary intake patterns (Gillman et al, 2000). This is not surprising, as family has been shown to influence the food attitudes, preferences, and values of adolescents that affect lifetime eating habits (Story et al, 2002).

Peers have a decidedly influential role in adolescent behavior in general, but in terms of food choices and eating behavior, not much is known. Of the limited research that has been pursued, the results have been inconclusive, as a strong association has not been found (French et al, 1999; Neumark-Sztainer et al, 1999; USDA and DHHS, 1995). A Netherlands study of adolescent eating behavior found similar fat and food intake between adolescents and their parents, but not between adolescents and their peers (USDA and DHHS, 1995). Another study's findings showed that adolescents rated friends as the least important motivation for snack choice, although results from qualitative focus group research have been inconsistent (Neumark-Sztainer et al, 1999; Story et al, 2002; Zollo, 1999). Researchers have stated that the lack of consistency in peer influence on adolescent eating habits might be due to adolescents' belief that their

behavior is not influenced by others or that they are unaware of the social influences on their eating behavior, as peer influence may be indirect (Story et al, 2002).

The neighborhoods or communities in which adolescents live have been associated with eating behaviors. Findings from a study looking at youth cardiovascular health behaviors indicated that youths with healthier dietary habits tended to live in neighborhoods characterized by lower social disorganization, while youths residing in neighborhoods characterized by low education and a high proportion of blue-collar workers were more likely to have poorer dietary habits than were youths living in higher SES neighborhoods, independent of individual socioeconomic status or demographic characteristics (Lee et al, 2002). This research also found that youths residing in neighborhoods with higher levels of mobility (i.e. proportions of residents relocating in the previous five years) had poorer dietary habits (Lee et al, 2002).

Other factors such as school lunch programs have also been associated with adolescent eating behaviors. The School Nutrition Dietary Assessment Study found that those youth who participated in the National School Lunch Program had greater nutrient intakes compared with non-participants (Burghardt et al, 1993). There are those factors associated with adults that although not researched in adolescents, might also influence their eating behaviors. In situations involving greater stress levels, adults may increase their reliance on “fast” food rather than allocating time and energy to shop for groceries and prepare food (LeClere et al, 1998). One study found that nutrient intakes of a sample of Gujarati Asian Indian adult immigrants indicated both inadequacies and excesses of select macro and micronutrients (Jonnalagadda et al, 2002). In the article earlier mentioned that reviewed risk behaviors among adult racial and ethnic minority groups,

the results indicated that since some differences for African Americans occurred regardless of socioeconomic status, this suggests the implied influence of cultural factors (Myers et al, 1995).

Environmental influences

The environment has been found to be a significant influential factor in the eating behavior of adolescents. Its impact includes its influence on the access to and the availability of foods (Story et al, 2002). Research on adolescent eating behaviors has found that one third of all teen eating occasions take place outside the home (Channel One Network, 1998), 52% of out-of-home eating occasions take place at school, followed by fast-food restaurants at 16%, other locations at 16%, and vending machines at 6% (Channel One Network, 1998). In fact, national data show that foods eaten at lunch (from all sources, including a la carte, vending machines, and school lunch) compose 35% to 40% of students' total daily energy intake (Burghardt et al, 1993). In the study looking at youth cardiovascular health behaviors mentioned earlier, the findings showed that youths with healthier dietary habits tended to live in neighborhoods characterized by higher socioeconomic status, while youths residing in neighborhoods characterized by low income, high levels of poverty, and low housing values were more likely to have poorer dietary habits than were youths living in higher socioeconomic neighborhoods, independent of individual socioeconomic status or demographic characteristics (Lee et al, 2002). Individuals living in neighborhoods deemed to be socioeconomically disadvantaged, may have limited dietary choices from food availability and price due to fewer large supermarkets, few nutritious food options, and nutritious food sold at higher costs than less nutritious food (Sooman et al, 1993; Troutt, 1993).

Interacting influences

It has also been determined that individual, social, and environmental factors together have influence on the nutrition practices of adolescents. The physical environment in the community has a large impact on adolescent eating by influencing the access to and availability of foods to individuals (Story et al, 2002). Of additional importance is the fact that the physical environment may provide an overestimation of its impact, as it has an apparent influence on how norms regarding eating behavior are perceived (Story et al, 2002). Individuals may be eating more high-fat foods and fewer fruits and vegetables not particularly because they are following the norms of society, but perhaps due to a larger number of fast food restaurants in their community and the presence of local supermarkets where fruits and vegetables are higher in price than in other communities.

Some of the literature indicates the presence of multiple interacting influences on adolescents' eating behaviors (Story et al, 2002). The relationships between these factors are thought to be complex and multi-directional. One such example is the relationship between the ethnic homogeneity of neighborhoods and social organization, and their influence on dietary norms (Lee et al, 2002). In a Hispanic neighborhood, "American" foods such as hamburgers, hot dogs, French fries, and potato chips may not be part of the dietary norms (Block et al, 1995). Without interest in such foods, they are not in demand by the population and are likely to have limited availability through neighborhood restaurants. More specifically in the Hispanic culture, Mexican diets serve as an example of the impact that culture has on food demand as well as food availability, with Mexican diets influencing the types of foods carried in local stores (Dixon et al, 2000).

3. Adolescent Exercise and Daily Physical Activity

Experts in the area of exercise from government agencies, medical institutions, and scientific organizations have recommended that adolescents regularly participate in physical activity to maintain optimal health (DHHS, 2000; Sallis et al, 1996; Sallis et al, 1994). The current recommendation is that adolescents and youth engage in at least three events of continuous physical activity, either moderate or vigorous, averaging at least 30 minutes of daily moderate level physical activity each week (Sallis et al, 1994). Past research using ADD Health has found that non-Hispanic Blacks was the sub-population least likely to meet these recommendations, despite one third of adolescents in the study also failing to achieve these recommendations (Gordon-Larsen et al, 1999).

Other studies have also shown that vigorous physical activity is lower for minority adolescents (Heath et al, 1994; Andersen et al, 1998) and inactivity higher when compared to non-Hispanic White adolescents (Andersen et al, 1998; Wolf et al, 1993; Sallis et al, 1996). A study looking at the variance in physical activity and inactivity patterns among sub-populations of U.S. adolescents found that except for Asian females, minority adolescents have consistently higher levels of inactivity than non-Hispanic whites (Gordon-Larsen et al, 1999). Findings also indicated that gender impacts behavior as well, as minority males had higher inactivity and physical activity and non-Hispanic Black and Asian females had the lowest physical activity.

Results from additional studies on adolescent exercise were found to be consistent with and supportive of those previously mentioned (Sallis et al, 1996). A study of aerobic activities among United States adolescents found white adolescents were more likely to engage in aerobic activities than Mexican-American or African-American adolescents

(Gottlieb et al, 1985). Desmond and colleagues found no differences between blacks and whites on physical fitness, but physical activity data were not contrasted between groups (Desmond et al, 1990). Wolf and colleagues reported that Latino and Asian-American adolescent girls reported significantly lower levels of physical activity than white and African-American girls; however, African-American girls reported watching more hours of television per day than girls in other ethnic groups (Wolf et al, 1993).

Participation in physical activity among adolescents appears to be influenced by a broad range of factors, including demographic, environmental, social, and psychological variables (Sallis et al, 1992). Age has been noted as one such factor. One article examining risk behaviors among various adult racial and ethnic minority groups, found age to have a significant influence on exercise (Myers et al, 1995). For African-Americans, participation in regular exercise or sports decreased in frequency as age increased. African-American men reported more exercise or sports in the age range 18-29 than Whites, but a reduction in exercise and sports across age ranges was greater in African American men than Whites with fewer participating during ages 45-64, and a further reduction at ages 65 and higher. Women were less likely than Whites to report regular exercise or sports in all age groups. Although information for Asians/Pacific Islanders was not available for almost all groups, results from a paper in 1990 suggests the influence of gender. The paper, which focused on the exercise behavior of Koreans, noted that 14% of Koreans exercise, with twice as many men as women exercising. Unfortunately, no information was available for other Asian/Pacific Islander groups and nothing was provided on Latinos. Information on Native Americans was limited, with

data finding a sedentary lifestyle was reported by about 44-60% of men and 40-65% of women.

Studies have found that adolescent physical activity has differed by race. In a study looking at youth cardiovascular health behaviors researchers found age, gender, and race/ethnicity to be relevant factors as well, as physically active youths tended to be younger, more likely to be male and White than Hispanic or Black (Lee et al, 2002). Compared with their respective reference groups, youths who were older, Hispanic, and of lower SES were less likely to be physically active and male youths were more likely to be physically active. Similar findings were found in another study of sports participation among students. White students were found to be more likely to participate in sports than the Black or Hispanic students (Pate et al, 2000). A study using ADD Health data assessed the environmental and sociodemographic determinants of physical activity and inactivity patterns among subpopulations of U.S. adolescents also found that moderate to vigorous physical activity was lower and inactivity higher for non-Hispanic Black and Hispanic adolescents (Gordon-Larsen et al, 2000).

There has been made the suggestion that there exists a differential experience in activity by age group. In a review of past literature, researchers found that 4-12 year old ethnic minority children were as active as non-Hispanic whites and 13-18 year old non-Hispanic whites being more active than other ethnic groups (Sallis et al, 2000). Such a finding indicates the need for further studies to examine age sub-populations of adolescents within racial and ethnic minority groups.

The belief in SES as the primary determinant of health behavior and outcomes, as mentioned earlier, has been challenged by the research. One study using ADD Health

looked at the environmental and sociodemographic determinants of physical activity and inactivity patterns among subpopulations of U.S. adolescents and found that high family income was associated with increased moderate to vigorous physical activity and decreased inactivity (Gordon-Larsen et al, 2000). The key modifiable factors that had an impact on physical activity did not affect inactivity; thus physical activity and inactivity were associated with very different determinants (activity mostly associated with environmental factors and inactivity mostly associated with sociodemographic factors (Gordon-Larsen et al, 2000). In the literature review on activity previously mentioned, nine variables were confirmed as consistently associated with physical activity of children or adolescents and with significant variables found in all categories of correlates (Butcher, 1986). These results support the interpretation that youth physical activity is a complex behavior determined by many factors. As this has been accepted in examining racial and ethnic minority health, research efforts have been undertaken to identify these numerous influences of physical activity among adolescents.

Individual influences

There are many influences at the individual level. One study found that body image was highest for Blacks, who were also least likely to dislike physical education (Sallis et al, 1996). Several individual variables were confirmed in the literature review on activity as consistently associated with physical activity of children or adolescents including perceived physical competence and intention (Butcher, 1986).

Social influences

Social factors are significant influences on the exercise patterns of adolescents. In a study looking at youth cardiovascular health behaviors researchers found that

physically active youths tended to live in neighborhoods characterized by lower social disorganization and lower racial/ethnic minority concentrations (Lee et al, 2002). A study of exercise in racial and ethnic minority youth found that while Asian/Pacific Islanders and Latinos reported the lowest levels of neighborhood safety, the only difference in social factors was that Asian/Pacific Islanders were most likely to report that they had been forced to exercise (Sallis et al, 1996). The study using ADD Health data to examine the environmental and sociodemographic determinants of physical activity and inactivity patterns among subpopulations of U.S. adolescents found that those non-Hispanic Black and Hispanic adolescents who had lower rates of vigorous physical activity and higher rates of inactivity, participation in school physical education programs was considerably low (Gordon-Larsen et al, 2000). In addition, maternal education was inversely associated with high inactivity patterns. Also, in the literature review of past research on activity, several social variables were confirmed as consistently being associated with physical activity of children or adolescents including barriers, parent support, direct help from parents, support from significant others, opportunities to be active, and time outdoors (Butcher, 1986).

Environmental influences

The environment has been found to be one of the most influential factors in terms of adolescent exercise. In a study looking at youth cardiovascular health behaviors researchers found that physically active youths tended to be younger and more likely to live in neighborhoods characterized by higher SES (Lee et al, 2002). In the literature review on activity, another research study found that Black and Latino students reported fewer convenient facilities for exercise than other groups (Sallis et al, 1996). Barriers

were also confirmed in the review as consistently associated with physical activity of children or adolescents along with program/facility access (Butcher, 1986).

The study using ADD Health data to examine the environmental and sociodemographic determinants of physical activity and inactivity patterns among subpopulations of U.S. adolescents, found that the use of a community recreation center was associated with an increased likelihood of engaging in high level moderate to vigorous physical activity (Gordon-Larsen et al, 2000). An additional finding was that a high neighborhood serious crime level was associated with a decreased likelihood of falling in the highest category of moderate to vigorous physical activity.

Interacting influences

It has also been determined that individual, social, and environmental factors together have influence on the exercise practices of adolescents. In the literature review on activity, several interacting variables were confirmed as consistently associated with physical activity of children or adolescents, which also supports ecological models of behavior that posit behavioral influences from personal (biological, psychological, behavioral), social, and physical environmental factors (Butcher, 1986).

One example from research on Asian Americans found that they are less likely to receive physician counseling about smoking cessation, healthy diet and weight, exercise and mental health (Collins et al, 2002). This suggests that there are other factors that impact on physician counseling (the interaction), which in turn may be associated with physical exercise in the Asian-American population.

E. SUMMARY AND CONCLUSION

This review indicates that there are multiple interacting influences on adolescents' eating behaviors and that the relationships between these factors are complex, as other researchers have concluded (Story et al, 2002). A number of recommendations have come out of past research specific to the literature review (Story et al, 2002). Future research should examine how the multiple levels of the ecological model influence adolescent eating behaviors. The success in the evolution of effective nutrition interventions must rely on the identification of the factors most predictive of adolescent eating behaviors, and the relative strengths of different factors such as individual, social, and environmental influences need to be clarified. This need is exemplified in the observation that most models testing psychosocial correlates of dietary intakes in children, adolescents, and adults account for less than 30% of the variability in dietary behavior (Barr, 1994; Cusatis et al, 1996; Baranowski et al, 1999). Therefore, it can be inferred that there are other explanations for the differentials in racial and ethnic minority dietary practices in adolescents that need to be identified.

IV. Methodology

A. RESEARCH HYPOTHESES

It is evident from the literature that differences in health outcomes for racial and ethnic minorities are linked to their health promoting behaviors. The literature also suggests that a number of factors are associated with these behaviors. However, the degree of influence of these varied factors remains uncertain. This study's conceptual

framework will examine the influence of a number of factors on the health promoting behaviors of adolescents by race and ethnicity. The following hypotheses will be tested:

Hypothesis #1: Demographic, social, and environmental variables, as well as substance use, will be associated with health promoting behaviors (eating breakfast, eating vegetables or fruit, and exercise), evidenced by associations with body mass index (BMI) for the study's sample of adolescents.

Hypothesis #2: The associations between independent variables and BMI will vary by race and ethnicity, as evidenced by interactions between independent variables and race or ethnicity.

B. SOURCE OF DATA

The data used in this study comes from the National Longitudinal Survey of Youth 1997 (NLSY97), one of the National Longitudinal Surveys sponsored by the Bureau of Labor Statistics (BLS). The BLS is an agency of the U.S. Department of Labor responsible for the analysis and publication on employment, living and working conditions, and occupational safety and health, and sponsors the National Longitudinal Surveys (U.S. Dept. of Labor, 2003a). It promotes the development of the U.S. labor force by gathering and disseminating information to policymakers and the public, allowing them to make more informed and efficient choices (U.S. Dept. of Labor, 2003a).

The National Longitudinal Surveys are designed to gather information at multiple points in time on the labor market experiences of six cohorts of adult and young adult

men and women, selected to represent all people living in the United States at the initial interview date and born during a given period (U.S. Dept. of Labor, 2003a). Through this design, conclusions can be drawn about the sampled group that can be generalized to the experiences of the larger population of U.S. residents born during the same period, with sample design procedures ensuring that the labor market experiences of Blacks, Hispanics, youths, women, and the economically disadvantaged can be examined (U.S. Dept. of Labor, 2003a).

The NLSY97 was a study documenting the transition from school to work for a nationally sampled group of young people aged 12 to 16 as of December 31, 1996 (U.S. Dept. of Labor, 2003a). It identifies characteristics defining the transition that youths make from school to the labor market and into adulthood. Data collected include information on their family and community backgrounds, schooling, living and social environments, and the impact of these factors on these youths. Several sections of the NLSY97 were funded by the Department of Justice, by the Office of Juvenile Justice and Delinquency Prevention, and by the National Institute of Child Health and Human Development. The BLS contracts with the National Opinion Research Center (NORC) at the University of Chicago to manage the NLSY97 cohort, contributing to the designing of the survey instrument and the collection of survey data. CHRR was subcontracted to provide questionnaire programming, data dissemination and user services, documentation, variable creation, and contributing to the design of the survey instruments (U.S. Dept. of Labor, 2003a).

C. STUDY POPULATION, SAMPLING PROCEDURE, AND SAMPLE WEIGHTING

1. Study Population

All household residents aged 12 to 16 as of December 31, 1996, were considered eligible for the NLSY97 study (Center for Human Resource Research, 2002a).

Individuals in the sample also included those who usually resided in a household in the sample are but may have been in college, a hospital, a correctional facility, or other type of institution (U.S. Dept. of Labor, 2003b). The round 1 survey was conducted between January and early October in 1997 and between March and May in 1998 (Center for Human Resource Research, 2002c).

2. Sampling Procedure

By means of a 1990 national sample developed by NORC, 147 non-overlapping primary sampling units (PSUs) (defined as a metropolitan area or one or more non-metropolitan counties with a minimum of 2,000 housing units for the cross-sectional sample, and defined as areas containing a minimum of 2,000 housing units created from the merging of counties containing large percentages of minorities for the supplemental sample) were selected (Center for Human Resource Research, 2002c). These PSUs included most of the fifty states and the District of Columbia (Center for Human Resource Research, 2002c). Out of the selected PSUs, 1,748 sample segments (defined as containing one or more adjoining blocks with at least 75 housing units) were chosen (Center for Human Resource Research, 2002c). A subset of 96,512 households (defined as a single room or group of rooms intended as separate living quarters for a family, for a group of unrelated persons living together, or for a person living alone) was chosen from

all housing units in the sample segments as eligible for interview (Center for Human Resource Research, 2002c).

Interviews were then conducted in 75,291 of the eligible households (54,179 for the cross-sectional sample and 21,112 for the supplemental sample) to identify individuals eligible to participate in the NLSY97 (Center for Human Resource Research, 2002c). One member of the household, 18 years of age or older and considered the household informant, was given the initial questionnaire to identify youths within the household eligible for the NLSY97 survey. Eligibility was dependent on the age and in some sample areas, the race or ethnicity of the youth (Center for Human Resource Research, 2002a). Of those interviewed, 9,806 individuals (7,327 for the cross-sectional sample and 2,479 for the supplemental sample) were eligible to participate in the NLSY97 (Center for Human Resource Research, 2002c). In households with eligible youth, information was gathered into a roster, which included biological and parental relationships, and basic demographic information for all household members (Center for Human Resource Research, 2002a).

Of those eligible, 8,984 or 91.6 percent (6,748 or 92.1 percent for the cross-sectional sample and 2,236 or 90.2 percent for the supplemental sample) participated in the round 1 survey and are identified as the NLSY97 cohort members (Center for Human Resource Research, 2002c). The final sample size for the NLSY97 cohort was 8,984 individuals. This includes two independent probability samples. The first was a cross-sectional sample of 6,748 respondents, representative of people living in the United States during the initial survey and born between January 1, 1980 and December 31, 1984 (Center for Human Resource Research, 2002a). The second was a supplemental sample

of 2,236 respondents, an over-sampling of Hispanic and African-Americans living in the United States during the initial survey with the same birth date range as the cross-sectional sample (Center for Human Resource Research, 2002a).

In constructing the cross-sectional sample, if a household included one or more occupants in the eligible age range, the interviewer asked those individuals to participate (Center for Human Resource Research, 2002c). The cross-sectional sample was designed to maximize the statistical efficiency of samples through the several stages of sample selection (counties, enumeration districts, blocks, sample listing units), with selection probabilities based upon total housing units in a geographic area (Center for Human Resource Research, 2002c). In composing the supplemental sample, if a household included a person of the correct age and of Black or Hispanic race/ethnicity, the interviewer asked those individuals to participate (Center for Human Resource Research, 2002c). In terms of the supplemental sample, stratification specifically relevant for Hispanics and Blacks was used. These individuals were chosen with a probability based on size measures for these two groups as opposed to that for the general population (Center for Human Resource Research, 2002c). Thus, it should be possible to equalize the distribution of these targeted groups among the various sampling units more than would be otherwise (Center for Human Resource Research, 2002c).

3. Sample Weighting

The NORC created individual sample weights for comparing the NLSY97 sample to the national population in the same age range, providing an estimate of the number of individuals in the United States represented by each respondent's answers (U.S. Dept. of Labor, 2003b). Initial sampling weights for the NLSY97 sample were constructed to

adjust for the probability of selection associated with the respondents, differential rates of response, correction for certain types of random variation associated with sampling, and for the black and Hispanic over-samples (U.S. Dept. of Labor, 2003b; Center for Human Resource Research, 2002c). NORC also calculated the weights after each survey round to account for non-interviews in that round (U.S. Dept. of Labor, 2003b).

4. Instrumentation

Questionnaires recorded interview dates, responses to topical survey questions, information that assisted NORC in locating the respondent for the next interview round, and interviewer remarks regarding the interview. The interviewer remarks included information such as the race and gender of the respondent, language in which the interview was conducted, and the interviewer's impressions (Center for Human Resource Research, 2002b). Questions ranged in type from close-ended to open-ended, and responses to questionnaires varied between dichotomous, discrete, and continuous answers (Center for Human Resource Research, 2002b).

Several survey instruments were used to collect information on a range of information from and about the cohort. The Screener, Household Roster, and Nonresident Roster Questionnaire, administered during the initial survey round, identified individuals eligible for the NLSY97 cohort and collected demographic information including date of birth information, gender, race, Hispanic ethnicity, and the youth's residences (U.S. Dept. of Labor, 2003b) for all household occupants including eligible youth and immediate family members who were not residents of the household. The household screener provided the demographic information, which was later verified by the youth and responding parent (U.S. Dept. of Labor, 2003b).

The Parent Questionnaire was administered during the initial survey round to one of the respondent youth's parents and collected extensive information on the youth's background, activities, and status, as well as information regarding the responding parent's own life and that of the family as a whole (Center for Human Resource Research, 2002a). Information was also collected about the responding parent, including origin or descent, birth date, place of birth, general health and that of the spouse or partner, and their height and weight as well as that of their spouse or partner. When "parent" is mentioned it generally refers to the respondent's parent or parent-figure and not only to biological parents, unless clearly stated (Center for Human Resource Research, 2002e; 2002f).

The Youth Questionnaire was an hour-long interview administered each round and collected detailed information from youths about their family background, health, attitudes, and behaviors (Center for Human Resource Research, 2002a). Information was collected on environmental variables describing the permanent residence of the youth such as whether they live in an urban or rural area, a Metropolitan Statistical Area (MSA), and in which census region they reside (U.S. Dept. of Labor, 2003b). Household environment information was collected in each round, including family interaction frequency and the frequency of gunshots in the neighborhood (U.S. Dept. of Labor, 2003b).

Youth respondents indicated their attitudes and beliefs about the supportiveness and permissiveness of each parent, the level of autonomy or parental control over their life when it comes to rule-setting, their opinion of each parent, their interactions with their parents, their parents' knowledge of their activities, their parents' relationship with

spouses or significant others and the youth respondent, their expectations for the future, their perceptions about different aspects of society, the activities of their peers, their attitude towards their teachers and their perceptions of the school environment and its impact, the respondent's attitude toward himself or herself, and their beliefs about and attitudes towards the behavior of their peers such as smoking, drinking alcohol, and using drugs (U.S. Dept. of Labor, 2003b; Center for Human Resource Research, 2002e).

Information on a number of behaviors were collected from the youth respondents including health-related behaviors such as smoking, drinking alcohol, using drugs, and sleeping patterns, how they use their time in terms of homework and watching television, as well as who makes the decisions concerning their activities such as television and movie viewing (U.S. Dept. of Labor, 2003b). Health information was collected from youth respondents regarding their general health, height and weight, their mental health, health knowledge, and their practice of health-related behaviors such as seatbelt use, nutrition, and exercise. Responding parents also answered questions about the youth's health during the first survey round as part of the Parent Questionnaire (U.S. Dept. of Labor, 2003b; Center for Human Resource Research, 2002e; 2002g).

5. Interview

The computer-assisted personal interviewing (CAPI) system was the method used in the screening of households for the NLSY97 annual survey (Center for Human Resource Research, 2002c). CAPI automatically guided respondents down certain question paths and loops depending on responses and the youth respondent's age. Checks within the CAPI system lowered the probability of inconsistent data during an interview and over time by preventing interviewers from entering invalid values and warned

interviewers about implausible answers (Center for Human Resource Research, 2002c). The CAPI system used a “screen and go” method for screening the households in 1997. If an eligible youth was identified, the program automatically transferred selected data (i.e. demographic information) into the parent and youth questionnaires for verification during the interview, decreasing the number of visits interviewers had to make to a household (U.S. Dept. of Labor, 2003b). If the respondents were unable to participate at that initial time, the interviewer made an appointment to return and administer the Youth and Parent Questionnaires at a later time (Center for Human Resource Research, 2002c).

Interviewers had the option of a paper screener for identifying eligible respondents in round 1, which collected the same information as the initial CAPI screener, but could be used when the CAPI could not collect screener information due to a number of conditions (i.e. weather, low battery, or dangerous neighborhood) (Center for Human Resource Research, 2002c). When eligible individuals were identified, the information from the paper screener was entered into CAPI. Interviewers administered approximately 28,000 paper screeners. A proxy screener, a paper questionnaire administered to an adult living either next door to or directly across from the selected housing unit, was administered when at least three attempts had been made by the interviewer to administer the initial screener (Center for Human Resource Research, 2002c). It was used to assess household eligibility and determine the best time to establish contact with a household member of the designated household of the eligible respondents. In the event that the proxy informant could not provide eligibility information, the interviewer returned as many times as reasonable and necessary to administer the initial screener and when appropriate, the remaining survey instruments. A

total of 5,175 proxy screeners found no one eligible in the household (Center for Human Resource Research, 2002c). The simple screener was conducted by telephone in a few cases at the conclusion of the field period. Interviewers administered 931 telephone screeners due to inability to contact anyone in or a neighborhood of the designated housing unit after three in-person visits (Center for Human Resource Research, 2002c).

Subsequent to the identification of eligible respondents, eligible youths and one parent were interviewed by means of CAPI. The parent chosen to respond was based on a pre-ordered list, with a biological mother being chosen as the respondent before a biological father and so forth (Center for Human Resource Research, 2002c). In cases where the youth did not live with a parent or lived with a parent not listed, no parent was interviewed (Center for Human Resource Research, 2002c). The majority of interviews during round 1 were conducted between January and early October of 1997. Investigators were concerned about the number of eligible youths found during the initial field period and conducted a refielding between March and May of 1998 utilizing the same instrument as in the initial fielding (Center for Human Resource Research, 2002c). The Parent and Youth Questionnaires were documented as being an hour-long interview, but no specific length of time was indicated for the Screener Questionnaire (Center for Human Resource Research, 2002a).

All questionnaires collected data during the 1997 survey round, with only the Youth Questionnaire and Household Income update administered in later rounds (U.S. Dept. of Labor, 2003b). Information in the parent and youth portions of all rounds of the NLSY97 was gathered using an audio computer-assisted survey interviewing (ACASI) software conducted in English or Spanish at the choice of the respondent, with bilingual

Spanish-speaking interviewers administering the Spanish version (Center for Human Resource Research, 2002c). Respondents had the option to choose to read the questionnaire from the computer screen or use headphones to listen to the questions as they appear on the screen (U.S. Dept. of Labor, 2003a).

The NLSY97 was conducted for round 2 from October 1998 through April 1999, for round 3 from October 1999 through April 2000, and for round 4 from November 2000 through May 2001 (Center for Human Resource Research, 2002c). There was a longer gap between rounds 1 and 2, with most respondents surveyed about 18 months after their first interview (U.S. Dept. of Labor, 2003b). Prior to each subsequent interview, a short “locator letter” was sent by NORC to each respondent to remind them of the upcoming interview and confirming current addresses and phone numbers (Center for Human Resource Research, 2002c). Interviews for rounds 2 through 4 were administered via a CAPI instrument by an interviewer using a laptop computer. Sensitive portions were entered by the respondents directly, using the ACASI software (Center for Human Resource Research, 2002c).

The Household Income Update questionnaire collected basic income information from one of the respondent’s parents. It was brief, self-administered on a paper instrument, and the information gathered was entered by the interviewer into a computer-assisted questionnaire on laptop computers, attaching the information to the records of all youth respondents in the household (Center for Human Resource Research, 2002c). Response rates for parents responding to at least one question from this questionnaire were as follows: 7,601 for round 2, 5,488 for round 3, and 5,225 for round 4 (Center for Human Resource Research, 2002c).

Validation re-interviews were conducted randomly following each round to confirm the administration of interviews and solicit feedback on the conduct of interviewers (Center for Human Resource Research, 2002c). The majority of these were conducted via telephone by NORC, with the remaining conducted via mail or in person. Respondents received \$10 for their participation in rounds 1 through 3, and responding parents received \$10 when they completed the round 1 interview (Center for Human Resource Research, 2002c). Different levels of incentives were offered in round 4 to study the effects of incentive level on respondent participation: \$10, \$15, and \$20. Additionally, at each level, half of the respondents were paid in advance and half were paid upon completion of the interview (Center for Human Resource Research, 2002c).

6. Variable Measurement

The variables for the current study were selected from those used in the NLSY97 study. These variables correspond to the conceptual framework evaluated in this study (*see framework in previous chapter*). Variables were designated as independent or dependent, based on their postulated relationships. The descriptions of variable measures used in the current study's analysis are as follows:

Race/Ethnicity

Information on race and ethnicity was collected in the Screener Questionnaire and completed by the household informant. There were a number of respondents with missing observations for either of these two variables, but no respondent had missing observations for both race and ethnicity. Researchers responded by simplifying the race/ethnicity identification process by creating a combined variable to provide a means of identifying an individual's racial/ethnic background by whichever indicator (race or

ethnicity) the individual chose to respond to. For this created variable there were no missing values as there were no respondents with missing observations for both race and ethnicity. For the purposes of the current study, however, the created variable was ignored and the variables race and ethnicity were utilized. As illustrated in this study's conceptual framework, race and ethnicity will serve as independent variables.

- Race was coded as 1=White and 0=Black or African-American.
- Ethnicity was coded as 0=Non-Hispanic and 1=Hispanic.

Contributing Factors

These are the factors likely to be associated with specific racial and ethnic minority adolescents, as well as their health and health-related behaviors. Contributing factors will be identified as independent variables due to their relationship with health and health-related behaviors, as the outcomes of health will be dependent on the incidence of the aforementioned contributing factors.

Demographic

- Sex was coded as 1=male and 2=female.
- Age was measured in terms of the actual years of age at the time of interview. Years of age ranged from 12 to 18.

Social

- Respondents were asked if their teacher was interested in students. It was coded 1=strongly agree, 2=agree, 3=disagree, and 4=strongly disagree.
- Respondents were asked if their mother was supportive. It was coded 1=very supportive, 2= somewhat supportive, and 3=not very supportive.

- Respondents were asked if their father was supportive. It was coded 1=very supportive, 2= somewhat supportive, and 3=not very supportive.
- Respondents were asked if their mother was permissive or strict. It was coded 0=strict and 1= permissive.
- Respondents were asked if their father was permissive or strict. It was coded 0=strict and 1= permissive.
- The variable Family/Home Risk Index was a variable created to provide an overall assessment of the youth's environment. Several questions about the respondent's home physical environment, neighborhood, enriching activities, religious behavior, school involvement, family routines, parent characteristics, and parenting were used to determine this scale including:
 1. In the past month, has your home usually had electricity and heat when you needed it
 2. How well kept is the interior of the home in which the youth respondent lives
 3. How well kept is the exterior of the housing unit where the youth respondent lives
 4. How well kept are most of the buildings on the street where the adult/youth resident lives
 5. When you went to the respondent's neighborhood/home, did you feel concerned for your safety
 6. In a typical week, how many days from 0 to 7 do you hear gunshots in your neighborhood

7. In the past month, has your home usually had a quiet place to study
8. In the past month, has your home usually had a computer
9. In the past month, has your home usually had a dictionary
10. In the past 12 months, how often have you attended a worship service (like church or synagogue service, or mass)
11. In a typical week, how many days from 0 to 7 do you do something religious as a family such as go to church, pray or read the scriptures together
12. In the last three years have you or your [spouse/partner] attended meetings of the parent-teacher organization at [this youth]'s school
13. In the last three years have you or your [spouse/partner] volunteered to help at the school or in the classroom
14. In a typical week, how many days from 0 to 7 do you eat dinner with your family
15. In a typical week, how many days from 0 to 7 does housework get done when it is supposed to, for example cleaning up after dinner, doing dishes, or taking out the trash
16. In a typical week, how many days from 0 to 7 do you do something fun as a family such as play a game, go to a sporting event, go swimming and so forth
17. In a typical [school week/work week/week], did you spend any time watching TV
18. In that week, on how many weekdays did you spend time watching TV

19. On those weekdays, about how much time did you spend per day watching
TV
20. Did the adult respondent have any physical disabilities that affected
his/her ability to answer any portion of the survey
21. Did the adult respondent have any mental disabilities that affected his/her
ability to answer any portion of the survey
22. Did the adult respondent have any alcohol/drug disabilities that affected
his/her ability to answer any portion of the survey
23. Monitoring scale for youth's residential mother
24. Monitoring scale for youth's residential father
25. Parent-youth relationship scale for residential mother
26. Parent-youth relationship scale for residential father
27. When you think about how she (residential mother) acts toward you, in
general, would you say she is very supportive, somewhat supportive, or
not very supportive
28. In general, would you say that she (residential mother) is permissive or
strict about making sure you did what you were supposed to do
29. When you think about how he (residential father) acts toward you, in
general, would you say he is very supportive, somewhat supportive, or not
very supportive
30. In general, would you say that he (residential father) is permissive or strict
about making sure you did what you were supposed to do

The scale ranged from 0 to 21, with higher scores indicating a higher risk environment.

Environmental

- Respondents were asked if they felt safe at school. It was coded 1=strongly agree, 2=agree, 3=disagree, and 4=strongly disagree.
- Respondents were asked if there were gangs present in their neighborhood or where they go to school. It was coded 0=no and 1= yes.
- The variable Physical Environment Risk Index was a variable created to assess risk factors in the youth's physical environment. Several questions about the respondent's physical environment were used to determine this scale including:
 1. In the past month, has your home usually had electricity and heat when you needed it
 2. How well kept are most of the buildings on the street where the adult/youth respondent lives
 3. How well kept is the interior of the home in which the youth respondent lives
 4. When you went to the respondent's neighborhood/home, did you feel concerned for your safety
 5. In a typical week, how many days from 0 to 7 do you hear gunshots in your neighborhood

It was coded 0=not coded as risk, 1= risk or moderate risk, and 2=high risk.

- The variable Enriching Environment Index was a variable created to identify opportunities for enriching educational activities in the youth's environment. Several

questions about the respondent's enriching resources were used to determine this scale including:

1. In the past month, has your home usually had a computer
2. In the past month, has your home usually had a dictionary
3. In a typical [school week/work week/week], did you spend any time taking extra classes or lessons for example, music, dance, or foreign language lessons

The scale ranged from 0 to 3, with higher scores indicating a more enriching environment.

Health Promoting and Health Risk Behaviors

These are behaviors directly linked to health outcomes. In terms of their relationship with contributing factors, these health behaviors will be identified as dependent variables, as the incidence of these factors will be based on the incidence of a specific contributing factor.

Health Promoting Behaviors

- Respondents were asked to provide the number of days within a school week that they ate breakfast. The number of days ranged from 0 to 5.
- Respondents were asked to provide the number of days within a week that they ate veggies or fruit. The number of days ranged from 0 to 7.
- Respondents were asked to provide the number of days within a week that they exercised for 30 minutes or more. The number of days ranged from 0 to 7.

Health Risk Behaviors

- The variable Substance Use Index was a variable created to provide an additional key marker for individual with relatively increased substance use. Several questions about the respondent's substance use were used to determine this scale including:
 1. Have you ever smoked a cigarette
 2. Have you ever had a drink of an alcoholic beverage (by drink we mean a can or bottle of beer, a glass of wine, a mixed drink, or a shot of liquor; do not include childhood sips that you might have had from an older person's drink
 3. Have you ever used marijuana, for example: grass or pot, in your lifetime

The scale ranged from 0 to 3, with higher scores indicating more instances of substance use.

Health and Health-related Outcomes

These are outcomes that correspond to an individual's health status. As illustrated in this study's conceptual framework, these variables will serve as dependent variables.

BMI

- This variable will be calculated using the height and weight variables captured in the previous study.

D. DATA ANALYSIS PROCEDURES

The purpose of this study was not to determine causality, but rather to identify the associations present between variables. This was accomplished through statistical methods, providing statistical evidence for the existence of relationships between several

independent and dependent variables previously named. Data analysis was carried out using STATA for Windows, Version 8.0.

The study is limited to Non Hispanic Whites (n = 4270), Non Hispanic Blacks (n = 2208), and Hispanic Whites (n = 760), three groups with adequate sample size for statistical analysis. The small number of ethnically Hispanic individuals with Black (n = 54) as their race were removed from the data set, as their numbers were too minimal for adequate data analysis. In addition, respondents who left the questions of either Race or Ethnicity unanswered were removed from the study's data set, as these are key variables in the testing of the study's hypotheses. BMI values were evaluated utilizing Centers for Disease Control and Prevention growth charts for the United States, developed by the National Center for Health Statistics (CDC, 2000). This included charts for stature, weight and BMI for boys and girls with ages 2 to 20 years. Respondents with extreme BMI values at levels well below the 5th percentile or well above the 95th percentile (i.e., a BMI value of below 10 or above 50) based on extreme stature or weight values were removed from the data set, as were those with unknown BMI values. Variables with high non-response rates above 30 percent were removed from the analysis, as any results involving them would be deemed inconclusive. Table 1 displays the non-responses as missing values. Those variables with smaller percentages of missing values were subject to multiple imputation methods, which will be discussed in the next section. Also removed from the data analysis were the index variables created to serve as composite variables for a number of social and environmental variables. As these indexes were created using several identical measures, in an effort to limit redundancy, all indexes were left out of the data analysis of study variables. For analysis purposes, variables with

three or more categories were used to create two-category variables. The variables Teacher Interested in Student and Feel Safe at School with the four categories strongly agree, agree, disagree, and strongly disagree were used to create the variables Teacher Interested in Student and Feel Safe at School with the two categories agree and disagree. The variables Mother is Supportive and Father is Supportive with the three categories very supportive, somewhat supportive, and not very supportive were used to create the variables Mother is Supportive and Father is Supportive with the two categories very supportive and somewhat/not very supportive. The variable Substance Use with four responses 0-3, with higher scores indicating higher instances of substance use, was used to create the variable Substance Use with the two categories lower instances of substance use and higher instances of substance use. Additionally, to address the nonnormality and variability of its distribution, the outcome variable BMI was log transformed to create the dependent variable LogBMI. Finally, in comparing White and Black adolescents with non-Hispanics and in comparing Hispanic and non-Hispanic adolescents among Whites, the variable Wbnwh was created and used in place of Race and Ethnicity.

Table 1. Table of Missing Values for Study Variables of Interest			
Variable	Valid	Missing	Percent Missing
Sex	8984	0	0
Age	8984	0	0
Race	8904	80	0.89047
Ethnicity	8960	24	0.26714
Height in Feet	8790	194	2.15939
Weight	8709	275	3.06100
Teacher Interested in Students	8958	26	0.28940
Feel Safe At School	8959	25	0.27827
Any Gangs in Repondent's Neighborhood	8907	77	0.85708
Mother Supportive	8607	377	4.19635
Mother Permissive	8580	404	4.49688
Father Supportive	6436	2548	28.3615
Father Permissive	6425	2559	28.484
Family/Home Index	4772	4212	46.8833
Physical Environment Index	4722	4262	47.4399
Enriching Environment Index	5373	3611	40.1937
# Days/School Week Respondent Eats Breakfast	1792	7192	80.0534
# Days/Week Respondent Eats Veggies/Fruit	1789	7195	80.0868
# Days/Week Respondent Excercises 30+ Minutes	1790	7194	80.07569
Substance Use	8961	23	0.25601

Regression Analysis

In order to assess the significance of relationships between the independent and dependent variables for various racial and ethnic subpopulations as discussed earlier, multivariate analysis was used to determine the presence of statistically significant associations. This analysis involved the use of regression and step-wise multiple regressions. The purpose of the regression analyses was to 1) determine associations between individual independent variables and BMI, herein referred to as LogBMI according to the transformation discussed in the previous section, 2) identify the best set of predictor variables for the health promoting behaviors under study for the adolescent sample of the study as a whole, 3) determine whether LogBMI differed between Black, White, and Hispanic adolescents, and 4) determine the presence of significant interactions between Race and Ethnicity and the predictor variables included in the model. As in other previous studies, the level of significance was set at ($p < .05$) for all analyses.

Simply removing all of the respondents with missing values for variables of importance from the study sample would significantly reduce the sample size. Instead, multiple imputation methods were undertaken, using the MICE methodology developed for use with STATA as found in Royston (2004). This method goes beyond the approach of merely replacing missing values with means or modes of non-missing values and instead incorporates the randomness and uncertainty essential for making valid statistical inferences (Royston, 2004). After respondents with Races other than Black or White and those missing Race or Ethnicity were removed from the study sample, resulting in n observations, multiple imputation was carried out using the *mvis* command in STATA.

Multiple imputation creates a number of copies of the data replacing missing data with imputed data. The *mvis* command created multiple multivariate imputations, imputing missing values in the study sample m times using switching regression, an iterative process of carrying out multivariate regression (Royston, 2004). A traditionally conservative m of 5 was chosen. Instead of creating 5 separate datasets as in traditional multiple imputation, this procedure stored the copies in one new dataset, with $n \times m$ observations. This method assumes missing observations to be missing at random and its strength is that it injects a preferred degree of randomness into the imputations.

The new dataset containing five imputed datasets was then “unstacked,” creating five separate data sets with imputed predictors. Methods to manipulate and analyze multiply-imputed datasets were undertaken, using the tools and methodology developed for use with STATA as found in Carlin et al (2003). The *miset* command created temporary copies of imputed datasets, allowing these data to be used with additional multiple imputation procedures, including computing multiple imputation point estimates of regression parameters and associated overall variance estimates, as well as testing the hypothesis that specified coefficients are all equal to zero (Carlin et al, 2003). In the first iteration of the univariate forward stepwise multiple regression procedure, *mifit* and *mitestparm* commands were performed on each variable to determine 1) significance of the association with LogBMI and 2) which variable should be included in the model first, based on the most significant p-value. The procedure was repeated for several iterations until there were no variables remaining that were significant. The combination of significant demographic, social, and environmental factors would represent the best model for predicting BMI for the full sample of adolescents. Next, to test for the

importance of race and ethnicity on LogBMI, a variable was created, herein referred to as Wnbnwh, to represent the racial and ethnic subgroups of White non-Hispanic, Black non-Hispanic and White Hispanic, and added to the final model to determine whether race and ethnicity were significant. Following the testing with this variable, if Wnbnwh was found to be significant, testing for its interaction with the independent variables of the final model would be conducted to determine whether race and ethnicity have different associations between the predictor variables of the final model and LogBMI. Again, it is important to note here prior to the results section that the number of Hispanic Black respondents in the study's data set was 54. Due to such a small number, efforts using and comparing data for this racial/ethnic subpopulation were abandoned, as any conclusions drawn from the results to be applied to this subpopulation would be greatly disputable.

V. Results

The intent of this study was to show that although a number of various demographic, social, and environmental factors are associated with participation in health promoting behaviors such as good eating habits and exercise among a nationally representative sample of adolescents in general, these factors have varying associations with participation in health promoting behaviors relative to racial/ethnic subgroups of adolescents. Unfortunately, there were statistical limitations to examining the significance of these associations due to excessive missing values for respondents. The large number of non-responses for questions pertaining to health promoting behaviors in this sample of adolescents did not allow for the direct examination of associations between the study's selected factors and the health promoting behavior variables in the

NLYS97 sample. However, as previous studies have shown BMI to be correlated with health behaviors (Coon et al, 2002; Storey et al, 2003; Polley et al, 2005), BMI was chosen as the outcome variable to measure adolescent participation in health promoting behaviors such as dietary habits and exercise patterns.

As the imputation methods used in this study do not fill in missing values with single values, but instead with multiple values to account for variability of data, the following sample description will provide a preliminary analysis of the final sample data including missing values. The flow chart in Figure 1 illustrates the methodology for obtaining the final sample, referred to previously. Also, the removal of variables from the final data analysis due to excessive missing values is mentioned here to provide additional context for describing the final sample as derived in the flow chart.

Tables 2, 3, and 4 display descriptive statistics for the current study's sample. The final sample size for the study was 7,238 youth, 32 percent between the ages of 12 and 13, 62 percent between the ages of 14 and 16, and 6 percent between 17 and 18. Fifty-nine percent were White and 31 percent Black, with 10 percent being Hispanic. Race and ethnicity were used to categorize the sample into three subgroups: Hispanic Whites (HW) (n=760), non-Hispanic Blacks (NHB) (n=2208), and non-Hispanic Whites (NHW) (n=4270). Males made up 52 percent of the study sample and females 48 percent. Ninety-four percent of the sample was at least five feet tall, with 6 percent under 5 feet. Table 5 provides descriptive statistics for the three racial/ethnic subpopulations under study. Distributions of racial and ethnic subgroups among age ranges, genders, and height were very similar. NHBs and HWs had distributions with 51 percent male and 49 percent

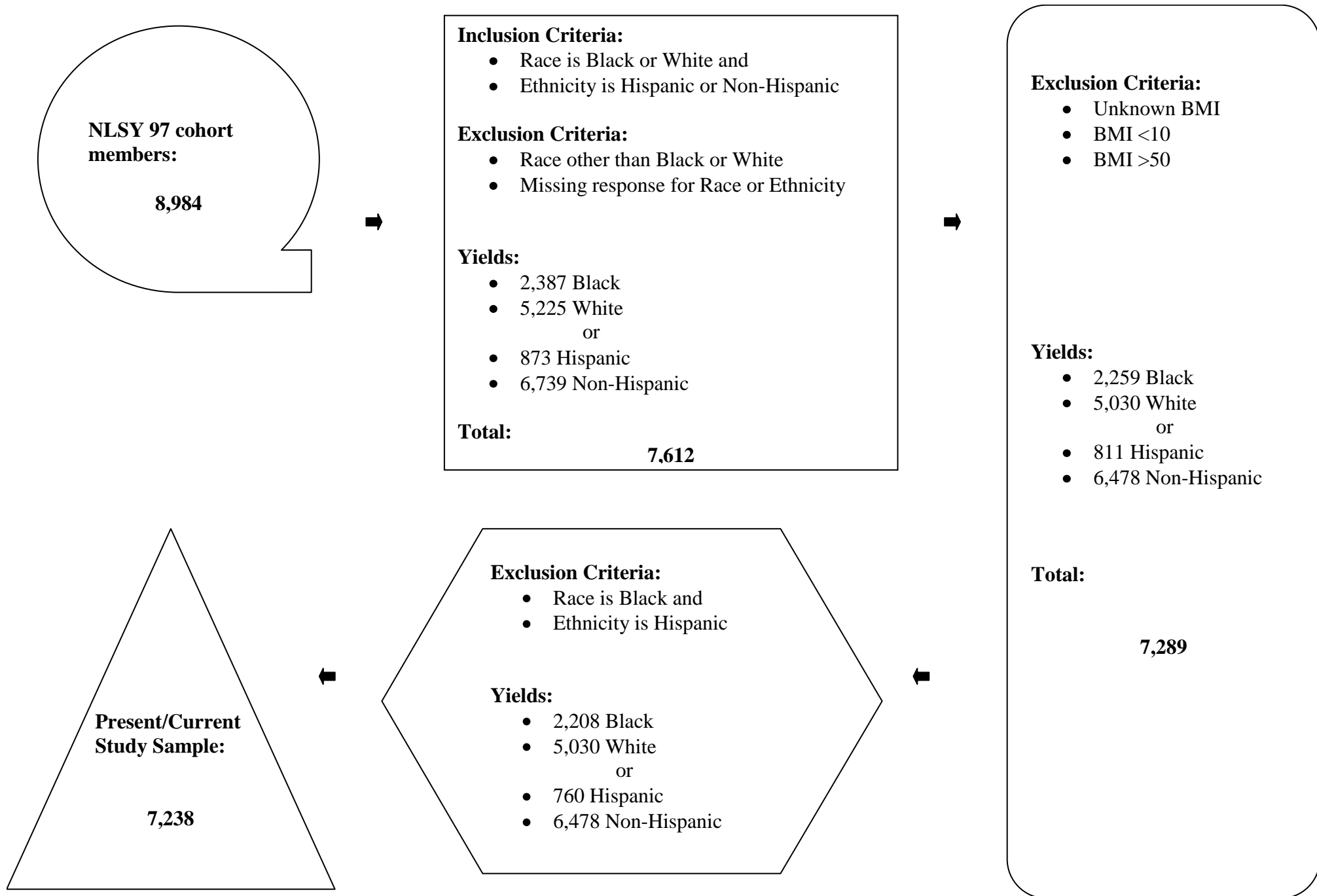


Figure 1. Flow Chart of Sample Selection

Table 2. Descriptive Statistics For Final Sample Size of 7,238 youth

Variable	Response	Percent
Age	Between ages 12 and 13	32
	Between ages 14 and 16	62
	Between ages 17 and 18	6
Race/Ethnicity	Non-Hispanic White	59
	Non-Hispanic Black	31
	Hispanic White	10
Gender	Male	52
	Female	48
Height	At least 5 feet tall	94
	Under 5 feet	6
Weight	Less than 100 pounds	12
	100 to 175 pounds	78
	176 to 200 pounds	6
	Above 201 pounds	4
Body Mass Index (BMI)	Underweight	18
	Healthy weight	63
	Overweight	13
	Obese	6
Teacher interested in students	Agree or strongly agree	84
	Disagree or strongly disagree	15
	Missing responses	1
Feel safe at school	Agree or strongly agree	85
	Disagree or strongly disagree	14
	Missing responses	1
Gangs in neighborhood	Yes	43
	No	56
	Missing responses	1
Supportiveness of mother	Very supportive	74
	Somewhat supportive	20
	Not very supportive	2
	Missing responses	4

Table 3. Descriptive Statistics For Final Sample Size of 7,238 youth (continued)		
Variable	Response	Percent
Supportiveness of father	Very supportive	48
	Somewhat supportive	20
	Not very supportive	3
	Missing responses	29
Permissiveness of mother	Permissive	43
	Strict	52
	Missing responses	5
Permissiveness of father	Permissive	29
	Strict	42
	Missing responses	29
Substance Use Index	Fewer instances	67
	Higher instances	32
	Missing responses	1

Table 4. Descriptive Statistics of Body Mass Index (BMI) by Age for Final Sample Size of 7,238 youth				
Age	BODY MASS INDEX (BMI)			
	Mean	25th Percentile	50th Percentile	75th Percentile
Between ages 12 and 13	20.8	18.02	19.91	22.52
Between ages 14 and 16	22.39	19.57	21.46	24.1
Between ages 17 and 18	23.07	20.22	22.15	24.89

Table 5.		Descriptive Statistics of Racial/Ethnic Subpopulations by Percentage for Final Sample Size of 7,238 youth		
Variable	Response	NHW	NHB	HW
Age	Between ages 12 and 13	32	31	35
	Between ages 14 and 16	62	62	59
	Between ages 17 and 18	6	7	6
Gender	Male	53	51	51
	Female	47	49	49
Body Mass Index (BMI)	Underweight	21	15	16
	Overweight or Obese	14	24	24
Feel safe at school	Disagree or strongly disagree	10	22	12
Gangs in neighborhood	Yes	37	50	60
Substance Use Index	Higher instances	37	26	28

female, while NHWs had a distribution of 53 percent male and 47 percent female. Age distributions were nearly identical for NHBs, HWs, and NHW, with 31 percent, 35 percent, and 32 percent respectively for those aged 12-13; with 62 percent, 59 percent, and 62 percent respectively for those aged 14-16; and with 7 percent, 6 percent, and 6 percent respectively for those aged 17-18.

In examining the weight in pounds of the study sample, the results in Table 2 indicate that the majority of respondents had their weight in the range of 100 to 175 pounds, while 12% weighed less than 100 pounds, 6% weighed between 176 and 200 pounds, and approximately 4% weighed above 201 pounds. However, body mass index (BMI) indicates that some disparities are present. Sixty-three percent of the study sample had BMIs indicating healthy weight, with 18 percent underweight, 13 percent overweight, and 6 percent obese. Table 5 shows that underweight respondents made up

21 percent of NHW and 16 and 15 percent for HW and NHB respondents respectively. This is of note as NHW made up 59 percent of the sample, while HW and NHB made up 10 and 31 percent of the sample respectively. Healthy weight was similar for each subgroup, but the disparities are more prominent in the case of individuals being above a healthy weight.

For individuals being over a healthy weight, falling into the categories of either over weight or obese, this was true for 24 percent of HW, 24 percent of NHB, and 14 percent of NHW. The significance of these results are due to NHW making up 59 percent of the sample, but that being above a healthy weight was a more likely outcome for the racial and ethnic minority subgroups of HW and NHB. Further evidence of BMI disparity can be seen by examining those respondents falling into only the obese category. Eight percent of HW and nine percent of NHB were obese, compared to only three percent for NHW. Again, the disparity is clear as NHW made up 59 percent of the sample, but had a five to six percent difference in the occurrence of obesity below the racial and ethnic minority subgroups.

Health promoting behaviors such as days respondents ate breakfast, ate vegetables and fruit, and exercised 30+ minutes were not possible to determine due to high levels of missing responses. Eighty percent of the sample did not respond to the three questions regarding these health promoting behaviors. Differences in missing data between subgroups was minimal, ranging from 0 to 3 percent for any question, indicating no clear disparities between groups on these health promoting behaviors.

Eighty-four percent of respondents agreed or strongly agreed that teachers were interested in their students, with 15 percent in disagreement and 1 percent missing

responses. There were no differences found between subgroups for teacher interest in students. In terms of the overall school environment, 85 percent of respondents either agreed or strongly agreed that they felt safe at school, with 14 percent in some level of disagreement and 1 percent missing responses. Of note here is that for those in disagreement, either disagreeing or strongly disagreeing that they felt safe at school, 12 percent and 22 percent of HW and NHB respectively were in disagreement, compared with 10 percent of NHW. This is important as NHW made up 59 percent of the sample, compared to 10 percent for HW and 31 percent for NHB. Also related to safety is the presence of gangs in the neighborhoods of respondents. Forty-three percent responded that there were gangs present in their neighborhood with 1 percent missing data. It is important to note racial and ethnic disparity on this variable, as 60 and 50 percent of HW and NHB respectively indicated gangs in their neighborhoods, compared to 37 percent of NHW.

The supportiveness and permissiveness of parents did not vary between racial and ethnic subgroups. Seventy-four percent of respondents found mothers very supportive and 48 percent found fathers very supportive, with 20 percent somewhat supportive for both mothers and fathers. In terms of permissiveness, 43 percent found mothers permissive and 29 percent found fathers permissive, with 52 percent strict for mothers and 42 percent strict for fathers. An important difference found between responses for mothers and fathers was that of missing responses. Mother supportiveness and mother permissiveness had 4 percent and 5 percent missing responses respectively, compared to 29 percent missing responses for both father supportiveness and father permissiveness.

Scores ranged from 0 to 3 on the Substance Use Index and higher scores indicated more instances of substance use. Sixty-seven percent had scores from 0 to 1 and 32 percent had scores from 2 to 3, with 1 percent missing responses. It is clear that substance use was less likely to occur among the sample, but NHW appeared to have more instances of substance use than the racial and ethnic minority subgroups, as 37 percent of NHW and 28 percent and 26 percent of HW and NHB respectively had scores of 2 to 3. Unfortunately, due to high percentages of missing data, preliminary analysis of data on the remaining created risk indexes Family/Home (46 percent missing), Enriching Environment (40 percent missing), and Physical Environment (46 percent missing) could not be done.

The following results will be presented relative to the research hypotheses derived from the prediction of the conceptual model of the study.

Hypothesis #1: Demographic, social, and environmental variables, as well as substance use, will be associated with participation in health promoting behaviors (eating breakfast, eating vegetables or fruit, and exercise), evidenced by associations with body mass index (BMI) for the study's sample of adolescents.

Research hypothesis 1 predicts that a number of independent variables will be predictors of BMI for the study's sample of adolescents. Regression and univariate forward stepwise multiple regression analyses were used to determine which variables were predictors by their statistical significance ($p < 0.05$). Regression was first carried

out to determine associations between individual independent variables and BMI. This was followed by univariate forward stepwise multiple regression to determine the combination of demographic, social, and environmental factors making up the best model for predicting BMI for the sample of adolescents.

In reference to hypothesis 1, the results in the following tables show that several independent variables were found to be predictors of BMI. Table 6 includes the results of regressions examining associations between individual independent variables and BMI. It indicates that the variables Gender, Age, Mother Permissive/Strict, Gangs in Neighborhood, Teacher Interested in Students, Feel Safe at School, Father Supportive, and Substance Use were individually associated with BMI. Table 7 displays results from the univariate forward stepwise multiple regression procedure. The results indicate that the variables Gender, Age, Gangs in Neighborhood, and Feel Safe At School were found to be the combination of demographic, social, and environmental factors making up the best model for predicting BMI for the study's sample of adolescents.

Table 6. Variables Associated with Body Mass Index (BMI) for All Adolescents by Using Regression Analyses				
Variable	Unstandardized Coefficient	Standard Error	t	p-Value
Gender	0.00515	0.00186	2.77	0.006
Age	0.01232	0.00062	20.03	< .001
Mother Permissive/ Strict	0.00421	0.00189	2.23	0.026
Gangs in Neighborhood	0.00949	0.00188	5.05	< .001
Teacher Interest	-0.01054	0.00259	-4.07	< .001
Feel Safe At School	-0.01065	0.00267	-3.99	< .001
Father Supportive	-0.00565	0.00200	-2.82	0.005
Substance Use	-0.0148	0.00197	-7.52	< .001

Table 7. Final Model of Variables for Predicting Body Mass Index (BMI) for All Adolescents by Using Univariate Forward Stepwise Multiple Regression Analysis				
Variable	Unstandardized Coefficient	Standard Error	t	p-Value
Gender	0.00578	0.00181	3.19	0.001
Age	0.0122	0.00061	19.85	< .001
Gangs in Neighborhood	0.00654	0.00185	3.35	< .001
Feel Safe At School	-0.00835	0.00263	-3.17	0.001

Hypothesis #2: The associations between independent variables and BMI will vary by race and ethnicity, as evidenced by interactions between independent variables and race or ethnicity.

Research hypothesis 2 predicts that independent variables will vary in predicting participation in health promoting behaviors, indicated by associations with BMI, by racial/ethnic subpopulation. In essence this means that race and ethnicity will be predictors of BMI for the study's sample of adolescents and that the influence of other variables will vary by race and ethnicity. The variable Wnbnwh was added to the model and multiple regression analysis was conducted to determine if race and ethnicity were significant. If the variable Wnbnwh was found to be significant, it would mean that adolescents with different racial and ethnic backgrounds were likely to have different BMIs.

The results from the multiple regression analysis adding the created race and ethnicity variable Wnbnwh to the model can be seen in Table 8. When the variable Wnbnwh was added to the model, it was found to be significant. These results were found to be in support of the hypothesis, demonstrating that race and ethnicity are associated with BMI and that BMI varies according to the racial/ethnic subpopulation. In other words, as Hispanic Whites, Non-Hispanic Blacks, and Non-Hispanic Whites were found to have different BMIs and as BMI was used to measure health promoting behaviors in this study, it can then be assumed that health promoting behaviors differ among these racial and ethnic subpopulations. Thus, given that the health promoting behaviors differ and the factors are the same for the various racial and ethnic

Table 8. Final Model of Variables for Predicting Body Mass Index (BMI) with added Race and Ethnicity Variable for All Adolescents Using Multiple Regression Analysis				
Variable	Unstandardized Coefficient	Standard Error	t	p-Value
Gender	0.00603	0.0018	3.36	0.001
Age	0.01225	0.00061	20.07	< .001
Gangs in Neighborhood	0.00367	0.00186	1.97	0.049
Feel Safe At School	-0.00668	0.00262	-2.55	0.011
Race and Ethnicity	0.01388	0.00921	125.07	< .001

subpopulations, it can then be assumed that the factors that contribute to health promoting behaviors may differ by racial and ethnic subpopulation.

As research hypothesis 2 predicts that independent variables will vary in their associations with BMI by racial/ethnic subpopulation, it was also necessary to test for interactions between the race and ethnicity variable and the other independent variables in the final model to determine whether or not the racial and ethnic subpopulations have different associations between the predictor independent variables and LogBMI. An interaction variable was created for each pairing of a predictor variable (i.e., Age, Gender, etc.) and the race and ethnicity variable Wbnwh. The created interaction variables were then individually added to the final model and multiple regression analysis was conducted to determine if there was a statistically significant interaction between Wbnwh and each predictor variable. If the interaction between a predictor variable and Wbnwh were found to be significant, it would mean that there was an interrelationship

between the variables existed and that one of the two independent variables were found to influence the other.

The results from the testing for interactions between the predictor variables and the created race and ethnicity variable Wnbnwh by adding the created interaction variables individually to the final model can be seen in Table 9. Significant interactions were found to be present between race and ethnicity and two of the four predictor variables, gender and feeling safe at school. In interactions, the effect of one predictor variable on the response variable depends on the levels of the other predictor variables. However, the direction of the influence is undetermined. For the variables BMI, gender, and race and ethnicity, there was an interrelationship between race and ethnicity and gender, where at least for some cases, either the effect of gender on BMI was dependent on the race/ethnicity of an adolescent or the effect of race/ethnicity on BMI was dependent on the gender of an adolescent. Table 10 further illustrates the interaction. The Non-Hispanic White and Hispanic White males had higher mean BMIs than their female counterparts, while the Non-Hispanic Black males had lower mean BMIs than the Non-Hispanic females. This means that the difference in BMIs for different racial/ethnic subpopulations may be due to the impact of being male or female, or that the difference in BMIs between males and females may be due to the impact of belonging to one of the racial/ethnic subpopulations.

The same is true for the variables BMI, feeling safe at school, and race and ethnicity. There was an interrelationship between race and ethnicity and feeling safe at school, where at least for some cases, either the effect of feeling safe at school on BMI was dependent on the race/ethnicity of an adolescent or the effect of race/ethnicity on

BMI was dependent on whether or not an adolescent felt safe at school. Table 11 shows the interaction, as the Non-Hispanic White and Hispanic White adolescents that felt safe at school had lower mean BMIs than those that did not feel safe, while the Non-Hispanic Black adolescents that felt safe at school had higher mean BMIs than those that did not feel safe. This means that the difference in BMIs for different racial/ethnic subpopulations may be due to the impact of feeling safe or not feeling safe at school, or that the difference in BMIs between adolescents that did or did not feel safe at school may be due to the impact of belonging to one of the racial/ethnic subpopulations. As BMI was a measure of adolescent health promoting behaviors in this study, it can then be assumed, for example, that health promoting behaviors will vary in association with the race and ethnicity of adolescents as these adolescents differ on gender or how safe they feel at school. These results were found to be in further support of hypothesis 2, demonstrating that associations between the independent predictor variables and BMI varied according to the racial/ethnic subpopulation.

Table 9. Testing for Interactions Between Final Model of Predictor Variables and Created Race and Ethnicity Variable for Predicting Body Mass Index (BMI) for All Adolescents Using Multiple Regression Analysis		
Variable	F	p-Value
Gender and Race and Ethnicity	16.91	< .001
Age and Race and Ethnicity	2.00	0.136
Gangs in Neighborhood and Race and Ethnicity	2.26	0.105
Feel Safe At School and Race and Ethnicity	7.43	< .001

Table 10.		Descriptive Statistics of Body Mass Index (BMI) by Race and Ethnicity and by Gender for Final Sample of 7,238 youth							
Race and Ethnicity		Body Mass Index (BMI)							
		Mean		25th Percentile		50th Percentile		75th Percentile	
		Male	Female	Male	Female	Male	Female	Male	Female
Non-Hispanic White		21.72	21.03	19.06	18.6	20.98	20.36	23.63	22.64
Non-Hispanic Black		22.47	23.04	19.46	19.58	21.48	21.97	24.41	25.06
Hispanic White		22.63	22.28	19.59	19.39	21.64	21.5	24.8	24.6

Table 11.		Descriptive Statistics of Body Mass Index (BMI) by Race and Ethnicity and by Feeling Safe at School for Final Sample of 7,238 youth							
Race and Ethnicity		Body Mass Index (BMI)							
		Mean		25th Percentile		50th Percentile		75th Percentile	
		Safe	Not Safe	Safe	Not Safe	Safe	Not Safe	Safe	Not Safe
Non-Hispanic White		21.29	22.32	18.83	19.14	20.6	21.14	23.01	24.8
Non-Hispanic Black		22.81	22.54	19.49	19.57	21.79	21.61	24.95	24.56
Hispanic White		22.45	22.52	19.47	19.97	21.62	21.92	24.84	24.21

VI. Discussion

A. CURRENT STATE OF RESEARCH

Research of racial and ethnic health disparities has sought to draw conclusions as to the causes of these health disparities, examined the health behaviors of minority adults, and studied health status differences between racial and ethnic subpopulations. The causes of these health disparities that have been examined for these subpopulations have ranged from environmental forces (Dubowitz et al, 2008; Chaloupka et al, 2007), to social and cultural factors, to socioeconomic status and quality of life factors (Glymour et al, 2008; Xie et al, 2008; Chu et al, 2007; Kolb et al, 2006). Findings from some research studies have documented the existence of differences among racial and ethnic adult groups in terms of associated causes. Behaviors related to their health status such as smoking, alcohol and substance abuse, risky sexual behavior, poor diet, and lack of physical activity have been associated with poor health outcomes in research.

Additionally, when compared to the White population, racial and ethnic minority adults have often been found to have higher prevalence of chronic diseases and higher death rates from these diseases. For example, national data from 2003-2004 indicate that minority groups had a higher combined prevalence of obesity than non-Hispanic Whites by almost 10 percentage points (Wang et al, 2007). Differences in prevalence estimates of childhood obesity have been found to be similar to adults for minority children (Ogden et al, 2006). Research continues to test for the factors that account for these obesity differentials. Socioeconomic status has been found to be related to disparities in adolescent obesity (Miech et al, 2006), as have other sociocultural factors (Singh et al, 2008; Berglas et al, 1998).

B. LIMITATIONS OF THE RESEARCH UP TO THE PRESENT

Despite past efforts, there remains much in the area of racial and ethnic health disparity research that needs to be addressed. Research focused on racial and ethnic minority children as opposed to the adult portion of this population has been lacking. The determinants of racial and ethnic health disparities still are not clearly understood (LaVeist et al, 2000) (Daus, 2002) and the variance of social and behavioral influences on obesity as related to race and ethnicity, as well as factors such as age, gender, and SES still have not been examined thoroughly (Miech et al, 2006; Gordon-Larsen et al, 2003). For example, SES continues to be highly associated with race/ethnicity. For this reason, much research has sought to explain differences in obesity between racial and ethnic groups based on SES. However, research has continued to find that even when controlling for SES, there remains a difference between race and ethnic groups, suggesting that differences in BMI between these groups can not be fully explained by SES (Singh et al, 2008); Wang et al, 2007; Ogden et al, 2006). Given this uncertainty, questions such as what factors are responsible for individual participation in health promoting behaviors (i.e. recommended dietary intake and physical activity) and are there differences in the factors that influence different racial and ethnic groups, still remain.

Other needs remain. Measurement instruments and methods for comparisons (e.g., diet and physical activity) across multiple racial/ethnic groups need to be developed and validated (NHLBI, 2003). Also, race should be disentangled from ethnicity to determine their individual influence when examining the causal pathways related to racial and ethnic health disparities (LaVeist, 1994).

C. ADDING TO THE CURRENT STATE OF RESEARCH

This study has attempted to obtain information useful in understanding the factors that influence the health promoting behaviors of racial and ethnic minorities, towards the outcome of reduction and elimination of racial and ethnic health disparities. The current study contributes information on racial and ethnic minority adolescents, which continues to be limited in research when compared to the vast research around racial and ethnic minority adults. It also looks at the interactions of race and ethnicity, by examining factors associated with health promoting behaviors for three subpopulations, including Hispanic Whites, Non-Hispanic Blacks, and Non-Hispanic Whites.

It was intended that findings from this study would provide additional support as to factors believed to be associated with the health promoting behaviors of minority adolescents and provide new evidence that factors associated with health promoting behaviors of minority adolescents are not general but racially and ethnically specific, meaning that racial and ethnic subpopulations differ on the factors associated with their health promoting behaviors. Factors more feasible for intervention in practice such as teacher interest and parental support were chosen for examination as opposed to factors such as socioeconomic status or education and employment of parents, which have greater barriers to initiating change. Comparatively, these more feasible factors can be readily utilized to inform current and future public health policy through their incorporation into programs and interventions and serve as the basis for the conceptual framework of additional research aimed at increasing and maintaining health promoting behaviors among racial and ethnic minorities.

D. MAJOR STRENGTH OF THIS STUDY

A better understanding is needed of the sociocultural and environmental factors that form the context for health differentials (LaVeist et al, 2000). Furthermore, as research has found large differences in obesity prevalence between racial and ethnic minorities, this is an indication that approaches that seek to decrease the disparities between these groups must have some basis in culture and be sensitive to its social and environmental impact (Wang et al, 2007). Given this importance, the major strength of this study is that it examines the different associations between health promoting behaviors and influential factors by racial and ethnic minority group. Providing additional evidence that different factors are linked to different racial and ethnic group health behavior will significantly contribute to the necessary shifting of research and health promotion efforts from current population based approaches to be more subpopulation based.

E. DECIDING UPON THE FINAL VARIABLES

After further review of the literature and the NLYS97 data set, variables were chosen for the analysis. The variables of Race and Ethnicity were selected for the creation of a single variable, Wnbnwh, with four responses to represent four racial and ethnic subpopulations including Hispanic Blacks, Hispanic Whites, Non-Hispanic Blacks, and Non-Hispanic Whites. However, as the number of Hispanic Blacks was too small to provide any significant information, those adolescent respondents were omitted from the study. In past research, Sex and Age had been found to be influential in health

promoting behaviors and were chosen to provide additional support for these past findings. With the current increase in obesity believed to be caused by environmental factors, based on research studies involving mostly adults, (Hebebrand et al, 2000; Hill et al, 2000), the variables of Feeling Safe At School and Gangs In The Neighborhood were chosen to represent the impact of environmental factors. The variables Mother Supportive, Father Supportive, Mother Permissive/Strict, and Father Permissive/Strict were selected for inclusion in the study based on past studies that have shown supportive social environments influencing health behaviors (Singh et al, 2008; Hill et al, Green, 1986; Morisky et al, 1985; Levine et al, 1979) and that family has been found to be a significant influential factor in health behaviors (Sweeting, 2008; Backett et al, 1995; Peyrot et al, 1999; Grzywacz et al, 2000). Substance use served as a proxy for the various non-health promoting or health risk behaviors available in the NLYS97 data set, as health risk behaviors are believed to be related to BMI. Previous studies have found health promoting behaviors to be predictors of BMI, specifically when examining obesity (Polley et al, 2005; Storey et al, 2003; Coon et al, 2002; Ellis et al, 1999). In the absence of sufficient data on the current sample's health promoting behaviors, the variables of Height and Weight were used in the creation of the outcome variable BMI, consistent with its usage in previous studies examining obesity.

F. RESULTS IN THE LIGHT OF PAST RESEARCH

Examination of the findings from the individual regressions looking at associations between individual independent variables and BMI for the adolescent sample shows virtual agreement with past research findings yielding factors found to be linked to

health promoting behaviors of adolescents. As in previous research, which showed Gender and Age associated with health promoting behaviors and BMI (Wang et al, 2007; Lee et al, 2002; Sallis et al, 2000; Gordon-Larsen et al, 1999), the demographic variables of Gender and Age in the current study were associated with BMI. The association of the social variables Mother Permissive/Strict, Teacher Interested in Students, and Father Supportive with BMI are in agreement with findings from past studies that found significant relationships between social factors such as family and health promoting behaviors (Sweeting, 2008; Story et al, 2002; Grzywacz et al, 2000; Gillman et al, 2000). Also, as previous studies have found evidence suggesting a relationship between environmental factors and health promoting behaviors, the current study found associations between BMI and the environmental factors Gangs in Neighborhood and Feel Safe at School (Singh et al, 2008; Story et al, 2002; Lee et al, 2002; Grzywacz et al, 2000; Gordon-Larsen et al, 2000). In addition, health risk behaviors have been thought to be related to BMI. Similarly in the current study, the Substance Abuse index variable was found to be associated with BMI.

Individually, the previously discussed variables were found to be associated with BMI for the current study. Results from the univariate forward stepwise multiple regression procedure indicate that four of these variables were found to be the combination of demographic, social, and environmental factors making up the best model for predicting BMI for the study's sample of adolescents. This means that the independent variables remaining at the end of the univariate forward stepwise multiple regression process are the set of predictor variables that best explain the dependent variable. Of the variables associated with BMI, the variables Gender, Age, Gangs in

Neighborhood, and Feel Safe at School were the predictor variables that best accounted for the BMI data. These findings are in agreement with past studies, which have found associations between health promoting behaviors and independent factors such as gender, age, family, and environment for adolescents (Sweeting, 2008; Singh et al, 2008; Wang et al, 2007; Story et al, 2002).

For the final model, adding the variable Wbnwh, created using the original Race and Ethnicity independent variables from the original dataset, this tested whether race and ethnicity were among those predictor variables that best explained the dependent variable, BMI. When Wbnwh was added to the final model, all the other variables remained significant. These results are important for two reasons. First, it provides supportive evidence that race and ethnicity are associated with health promoting behaviors of adolescents. Past research has shown BMI to differ across ethnicity (Singh et al, 2008); Wang et al, 2007; Ogden et al, 2006). Inverse associations have been found between parent SES and adult offspring obesity, but as lifestyle factors such as diet and physical activity are passed on from parents to children, it is not plausible to recognize SES as the sole influence on obesity (Lau et al, 1990). Previous research has well covered SES, environment, and social factors for the general population of adolescents.

Conversely, research on racial and ethnic factors has been more limited. For some racial and ethnic groups including for this study, adequate national data has not been available (Wang et al, 2007). This has limited the examination of racial and ethnic subpopulations, resulting in much more study of the general adolescent population. The current study also further supports past findings of the limited research that has been conducted around race, ethnicity and health promoting behaviors, which has found that the impact of race and

ethnicity are significant in health promoting behaviors. For example, culture derived from family has been found to play a significant role in the eating habits of Black adolescents (Myers et al, 1995) and age, social factors, and culture have been associated with BMI for Hispanic Whites in previous studies (Block et al, 1995; Sallis et al, 2000; Dixon et al, 2000).

Second, the results provide supportive evidence that the factors that are associated with health promoting behaviors of adolescents may differ by racial and ethnic subpopulation. Differences in patterns that have been found across ethnicity, despite holding SES constant, suggests the additional presence of influences specific to the racial and ethnic subpopulations in which they are seen (Singh et al, 2008); Wang et al, 2007; Ogden et al, 2006). SES has long been associated with race and ethnicity, with the belief that differences between racial and ethnic groups can be explained simply through SES. However, there have been more recent studies that have found SES to not fully explain racial and ethnic differences in obesity (Wang et al, 2007). One such study found a two-fold difference in obesity prevalence between Black and White racial/ethnic groups within the highest income group (Singh et al, 2008). In the current study, the significance of the addition of the created race and ethnicity variable to the final model of predictor variables demonstrated that race and ethnicity are associated with BMI and that BMI varies according to the racial/ethnic subpopulation. As BMI was a measure of health promoting behaviors in this study and differences in BMI suggests that health promoting behaviors differ among racial and ethnic subpopulations, regardless of the other predictor variables present, it can also be assumed that the factors that contribute to health promoting behaviors may differ by racial and ethnic subpopulation. This is also evident

in the findings of significant interactions between race and ethnicity and two of the final model's predictor variables, gender and feeling safe at school. Similar to the other studies, the significant interrelationships that were found further demonstrate that the factors associated with health promoting behaviors for racial and ethnic minority adolescents may be specific to the racial/ethnic subpopulation. It suggests that research is maturing in the correct direction by not limiting adolescent research to the general adolescent population or examining the differences between the White subpopulation and minority youth, but by drilling down further to the separate subpopulations within the minority adolescent subpopulation.

G. THE RACIAL AND ETHNIC SUBPOPULATIONS OF THIS STUDY, THEIR HEALTH BEHAVIOR, AND THE FACTORS THAT HAVE BEEN FOUND TO BE ASSOCIATED WITH THEM

First, racial and ethnic subpopulations are distinct groups. Often populations are divided into two groups, Non-Hispanic Whites and minorities. The minority population is subjected to policies, programs, and research that dismiss their diverse demographic, social, and cultural backgrounds and expect to impact them similarly. The current study provides evidence that racial and ethnic populations are diverse and the factors that contribute to their health outcomes should not be assumed to be identical. Understanding racial and ethnic subpopulations means initially recognizing them as being independent of each other, examining the factors that affect each of them, and then determining where the similarities are to address them together, instead of aggregating them from the beginning and monitoring how the same strategies may affect them differently.

Second, health behavior such as health promoting behavior can vary between racial and ethnic subpopulations. The significance of the created race and ethnicity variable Wbnwh when added to the best model demonstrated that BMIs differed between the current study's Black non-Hispanic and White adolescents, as well as between the White Hispanic and White adolescents. As BMI was a measure of health promoting behaviors, it can then be assumed that the health promoting behaviors varied between racial and ethnic subpopulations. This is important because it highlights the need to begin all research seeking to understand adolescent health promoting behavior with the examination of those factors that are specific to different racial and ethnic subpopulations.

Lastly, factors associated with racial and ethnic minority adolescent health promoting behaviors may have differential influences between subpopulations. A recent study found that African-American and Hispanic neighborhoods had fewer chain supermarkets when compared with White Non-Hispanic neighborhoods, by about 50 percent and 70 percent, respectively (Powell et al, 2007). Findings were similar in the current study. Significant interactions were found between race and ethnicity and gender, as well as between race and ethnicity and feeling safe at school. Although it is not clear the direction of the influence in these interrelationships, these outcomes not only suggest that the influence of environment may differ between these two subpopulations, but also that the influence on these subpopulations may vary by the type of environment. Unfortunately, the research remains limited on the complex causes of disparities in obesity between population groups (Wang et al, 2007), which provides another direction for future research.

H. POLICY AND PRORAM IMPLICATIONS

The results of this study are informative for tracking the progress of reducing and eliminating health disparities on obesity for adolescents. These results emphasize the importance of measuring progress within racial and ethnic subpopulations, as well as between them. As the different racial and ethnic subpopulations of adolescents included in the study, White Non-Hispanics, Black Non-Hispanics and White Hispanics, were found to have different BMIs and thus, different health promoting behaviors, researchers and policy developers must be prepared for differential outcomes for policies created for and programs that are disseminated to all adolescents, regardless of racial/ethnic background. Data collection tools and analysis strategies must be prepared to capture and analyze information at the racial and ethnic subpopulation level, so that differences between racial and ethnic subpopulations such as Black Non-Hispanics, White Hispanics, and White Non-Hispanics can be captured.

Revealed in the current study is the significance of examining the factors that influence health promoting behavior on a subpopulation-specific level, which will mean improved evaluation of policies and programs aimed at decreasing the health disparity divide regarding obesity. Black Non-Hispanic, White Non-Hispanics and White Hispanic adolescents in the study were found to have different BMIs and thus, different health promoting behaviors. Furthermore, as the variables gender and feeling safe at school were each found to have significant interactions with race and ethnicity, this indicated differing influential factors between the Black Non-Hispanic, White Non-Hispanic and White Hispanic adolescents. From the results it is clear that the policies and programs to decrease and eliminate health disparities on obesity should be based on the scientifically

researched associations between influential social and environmental factors and the health promoting behaviors of individual racial and ethnic subpopulations. Policy makers and program developers must ensure that the development and evaluation of their policies and programs vary by subpopulation, when appropriate, in light of these and other research findings that show different associations between subpopulations health behaviors and related influential factors.

Additionally, the study results provide supportive evidence for the inclusion and collaboration of various participants in the development and implementation of policies and programs seeking to reduce health disparities on obesity for adolescents. Not only do federal, state, and local government agencies and academic institutions need to be involved, but religious and community-based organizations should also be in collaboration to effect change. Often based in racial and ethnic minority locales, these organizations tend to be more familiar with the racial and ethnic subpopulations they serve and as a result have the cultural competency needed to speak to subpopulation-specific factors and are positioned to have the closest contact with these subpopulations. Collaboration between community and government entities is likely to result in better articulated messages to adolescents, greater involvement and input from racial and ethnic minority subpopulations in the planning and implementation of policies and programs, and a reiteration of the importance of reducing and eliminating obesity disparities signified by the number and the range of participating entities.

The findings of the current study provide program developers additional information about the types of approaches that are likely to be successful in reducing obesity disparities. As the variables Age, Gender, Gangs in Neighborhood, and Feel Safe

at School were found to be the combination of demographic, social, and environmental factors making up the best model for predicting BMI and thus, predicting health promoting behaviors, program developers need to base their approaches on these results. Programs need to be developed around different age ranges and some should be targeted specifically at male or female adolescents, as the current and previous studies have found that BMI differs between ages and gender (Wang et al, 2007). Developers need to be conscious of the environments in which they are implementing these programs, as the current study demonstrates that safety in the neighborhood and at school plays a role in adolescent health promoting behavior. Furthermore, approaches should be increasingly racially and ethnically subpopulation-based. In the current study, the created race and ethnicity variable Wnbnwh was significant when added to the final model of predictor variables. This provides additional evidence that for programs to be successful in impacting obesity disparities, program developers must consider racial and ethnic differences in program designs and create programs that are culturally appropriate to the racial and ethnic subpopulation being targeted.

Increased funding should be made available in the development of policy and programs that impact factors aligned with specific subpopulations. For example, healthy eating among the adolescents of this study, evidenced by BMI, was associated with feeling safe at school and race and ethnicity in the current study, which agrees with results from past research regarding the significance of environment (Ogden et al, 2002). When students do not feel safe, they may refrain from outdoor activities and become more sedentary, spending more time eating in the lunchroom conversing with their classmates, for example. In response to the current study, school-based programs could

be initiated in districts with predominantly Hispanic adolescents that create and foster a safe environment with additional security around as well as on the playgrounds and athletic fields. This would foster an environment where students could feel comfortable walking and running around the playground, being more physically active and participating less in sedentary activities.

Also, results from this study provide additional evidence for targeting adolescents for interventions to decrease current and future racial and ethnic health disparities. As previously stated, adolescence offers an important window of opportunity to establish and maintain healthy behaviors that reduce the likelihood of disease in future adults. Policies and interventions based on the current study that provide preventive health care services, promote healthy and active lifestyles, and screen for prevalent risk factors will improve the health status of minority adolescents. This should lead to improved health practices early in life and hopefully carry through to adulthood, as has been suggested by other researchers (Berglas et al, 1998), resulting in significant reduction of health disparities occurring by race and ethnicity.

I. LIMITATIONS

The sample size of the current study is a limitation of the study. Due to non-responses by adolescents in the NLYS97 data set, it was necessary to remove respondents with one or more non-responses to any of the variables examined in the current study. Despite the decreased sample size, there were still enough respondents from the White Non-Hispanic, Black Non-Hispanic, and White Hispanic racial/ethnic subpopulation of adolescents for the findings to be significant. Also, as the majority of study results were

found to be in alignment with those from past research, this further supports the significance of this study.

The amount of missing values in the data set is of concern. Due to a number of non-responses for study subjects on several variables of interest, a portion of the data was imputed. There exists the possibility that the values imputed may not be the exact responses the sample subjects with non-responses would have provided. It is also accurate that simply replacing the missing values with the average or mode of the values that were provided, as in imputation methods of the past, would have been inadequate (Royston et al, 2004). However, the multiple imputation method used here injects the correct degree of randomness into the imputations necessary for valid statistical inference, which supports its use in the data analysis portion of this study (Royston et al, 2004). Furthermore, due to limited previous research on the racial and ethnic minority adolescents and the factors associated with their health behavior, results must be treated as new information and serve as the basis for further investigation to be undertaken.

The absence of specific health promoting behaviors in this study is another limitation. Although the NLYS97 data set contains health promoting behavior variables such as eating breakfast, eating vegetables and fruits, and daily exercise, those variables contained approximately 80 percent non-responses. Consequently, these variables were left out of the current study and BMI was used to measure these health promoting behaviors. As health promoting behaviors have been predictors of BMI in past research, the use of BMI as the outcome variable is reasonable. Coupled with the amount of consistency between the results and past research findings, it is not certain just how much of an impact this limitation has had on the study results, if any.

The current study did not examine geographic differences in BMI, neither for the general adolescent sample nor for the racial/ethnic subpopulations. Regional differences have been found for adults in terms of obesity prevalence, with higher rates being seen in southern and eastern regions than on the West Coast, in the Midwest, and on the northeast coast (Wang et al, 2007). Conversely, research examining regional differences in obesity prevalence for adolescents has been limited. One study examining rural urban differences found prevalence rates to be fairly comparable with not much variation (Wang et al, 2007). Examining state-specific information would have allowed for geographic differences to be studied, adding to the current state of the knowledge regarding obesity prevalence for adolescents and by racial/ethnic subpopulation.

An additional potential limitation is the exclusion of racial and ethnic subpopulations when examining results for the adolescent population as a whole. As was stated previously in an earlier section, subpopulations such as Asian/Pacific Islanders and American Indians were excluded from the study sample due to low numbers available in the NLYS97 data set. In the analysis of the overall adolescent sample, differences between previous research findings and those of the current study for the overall population of adolescents might be the result of the exclusion of these subpopulations. However, it is also important to note that the study results show a virtual agreement with past research on the factors linked to health promoting behaviors of adolescents. Thus, the impact on the analysis of adolescents by the missing racial and ethnic subpopulations is considered to be minimal.

The current study also did not consider the impact of immigrant status or acculturation. Although obesity differences have been seen in Asian adults born in the

United States and those who have immigrated (Lauderdale et al, 2000), other research has found similar outcomes for youth (Gordan-Larsen et al, 2003). Examining immigrant status and acculturation for racial/ethnic subpopulations might provide additional insight into health disparities between racial and ethnic subpopulations.

J. DIRECTIONS FOR FUTURE RESEARCH

There are a number of directions that future research can take given the results from the current study. First, the differential impact of various factors not examined here on the dietary and exercise habits of several racial and ethnic adolescent subpopulations deserves further study. As there are other racial and ethnic subpopulations that were not included in this study, so there are other factors that must be examined in relation to their health promoting behaviors to determine the presence of statistically significant associations. This would include immigrant status, acculturation, and peer influence. Second, further study of the impact of the influential factors included in the current study on the dietary and exercise habits of several racial and ethnic adolescent subpopulations. Current study results indicate that different environments might have varying influence between racial and ethnic adolescent subpopulations. Future research should examine the relationships between different physical, social, and socioeconomic environments and different racial/ethnic subpopulations to determine whether there are differential environmental influences on health promoting behaviors and obesity between these groups.

Third, study of the direction of influence and the impact of the interaction of influential factors on the dietary and exercise habits of several racial and ethnic

adolescent subpopulations is needed. As different predictor factors have varying interrelationships with race and ethnicity to influence health promoting behaviors as is evident from the current study, it is important to examine the interactions between some variables and the directions of influence, as they may have differing effects for different racial and ethnic subpopulations in terms of their health promoting behaviors of healthy eating and exercise. For example, the variables gender and feeling safe at school may interact differently between the various subpopulations in regards to health promoting behaviors. Such study would further inform policy makers and program developers and administrators as to what conceptual frameworks should provide the theoretical foundation for their policies and programs. Fourth, research should examine geographic differences in obesity prevalence and health promoting behaviors by racial/ethnic subpopulation. As geographic differences were not investigated in the current study, different racial and ethnic adolescent subpopulations may vary in their health promoting behaviors in association with some aspect of their geographic location. Such differences would be useful in pilot testing of new strategies and interventions aimed at improving adolescent health promoting behaviors to improve obesity prevalence rates and reduce obesity disparities.

Fifth, further research should pursue the association between BMI and obesity for several racial and ethnic adolescent subpopulations for further evidence that the relationship between the two outcome indicators is the same for these subpopulations as for the entire adolescent population. Sixth, more research should be conducted that examines race and ethnicity separately to look for differences in outcomes and possible interactions between the two variables. The current study joined the two variables to

create three subpopulations, White Non-Hispanics, Black Non-Hispanics, and White Hispanics. There were not enough Black Hispanic adolescents for inclusion in this study, which would have allowed for further comparison between the variables race and ethnicity and useful in developing and modifying programs to specific adolescent subpopulations. Lastly, in examining distinctive racial and subpopulations in future adolescent health promotion research, data collection must be sure to require individuals to include their country of origin. For example, Latinos vary significantly on their country of origin (Elder et al, 2009) and country of origin has been found to be a predictor of reproductive and sexual risks for Hispanic adolescents (McDonald et al, 2009). Country of origin reveals further distinctions between racial and ethnic subpopulations and as this study has demonstrated the importance of comparing adolescent health promoting behavior by racial and ethnic subpopulation, this necessitates the further study of the influence of country of origin for racial and ethnic minority adolescents and their parents.

Obesity is one of the leading causes of illness and death in the United States and is likely to continue to increase and become the leading cause if interventions and prevention efforts are not successful. Researchers suggest that if trends continue to follow the same patterns, by 2015 the majority of US adults and nearly a quarter of US children and adolescents are expected to be overweight or obese (Wang et al, 2007). Policies and programs must be developed and successfully implemented to stem this growing public health crisis. However, these responses must be based on scientific evidence from research aimed at determining the factors that influence adolescent health behaviors, as childhood and adolescence are critical times when lifelong health behavior is formed

adopted. The presence of obesity health disparities between racial and ethnic segments of the US population demonstrates that it is also critical to research how health behaviors of different racial/ethnic subpopulations are associated with different factors and base the development of policies and programs on those findings. Only when these differences are addressed can policies and programs be better designed and thus, truly successful in their goal to reduce and virtually eliminate health disparities throughout the United States.

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