Title
Eating and exercise behaviors in preadolescents

Author
Norton, Deborah,

Publication Date
2003

Peer reviewed|Thesis/dissertation

Eating and Exercise Behaviors in Preadolescents: Parental Influence?

by

Deborah E. Norton

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Nursing

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Date University Librarian

Degree Conferred: June 6, 2003

Dedication and Acknowledgements Page

First, I want to convey my deepest appreciation to the chair of my dissertation committee, Catherine M. Waters. Catherine's guidance, support and referral for help from others as needed, helped me to complete this dissertation. Her gentle nudging, fine sense of humor and willingness to answers all of my many questions about "why" aided me in dealing with the complexities of completing a dissertation at the fine institution of UCSF.

I also want to acknowledge the guidance and support of my other committee members, Drs. Virginia "Ginger" Carrieri-Kohlman and Erika Froelicher. Ginger has taught me so much about concept analysis and helped me streamline this work with her straightforward style and concise editing. I also learned valuable lessons on how to teach graduate students by watching your style. Thanks, Ginger!

Dr. Erika Froelicher, Erika, chaired my qualifying committee and gave me insight into how to organize a large project. Through color-coding, editing and rereading materials we made this a workable project. We also made sure that the analysis answered the original research questions. Erika encouraged me to launch the publication of the first article in this dissertation.

I could not have accomplished any of this without my family's support and encouragement. My husband Ron, who listened to my frustrations, gave me feedback, picked up packages, copied papers when I needed, and most of all told me he loved me throughout this process. To my children, Eli and Kate who are my world and the most important reason that I became interested in promoting health in children. They proofread the student questionnaires and tested them for understanding and readability. They

listened to my early versions of talks, and reviewed posters and printed materials for the students. Kate labeled and stapled while Eli collated. I could not have completed this work without their help. They sometimes had to wait or miss an occasion important to them because I was just too busy. Kate and Eli are now beautiful young people who have learned to manage independently and think about their health choices, and most especially their eating and exercise behaviors. I feel blessed.

There are many other people who have helped me complete this work. The students and parents who completed the questionnaire. The school district, principals, teachers and physical education teachers that believed that learning how to help children develop positive health habits was important. Angela Gillis, whose work inspired me to explore positive health development and Susan Kools who guided my theoretical exploration with adolescents. My dear friends Enid and Christine, who listened, encouraged and lent me their houses when I needed a quiet place to work..

I would like to acknowledge funding from the following sources: National Institutes of Health, National Institute for Nursing Research (F31NRO7466, Deborah E. Norton, RN, NP, MS, PhD, Principal Investigator)

In closing, George Washington Carver said, "Education, in the broadest and truest sense, will make an individual seek to help all people, regardless of race, regardless of color, regardless of condition." This terminal degree in nursing education has been guided by the pursuit of knowledge and new ways to help people learn about health and my many years of working in public health.

EATING AND EXERCISE BEHAVIOR IN PREADOLESCENTS:

PARENTAL INFLUENCE?

Deborah E. Norton, R.N., Ph.D.

University of California, San Francisco, 2003

The dissertation included three papers: Models in Primary Prevention, (published in the European Journal of Cardiovascular Nursing, December, 2003), Determinants of Eating and Exercise Behavior in Preadolescents, and Eating and Exercise in Preadolescent: Parental Influence.

The first paper is a summary of the literature relevant to school-based, cardiovascular disease prevention programs for school-aged children, which indicate children's lifestyle health beliefs and exercise and healthy eating behaviors are influenced significantly by positive parental modeling and involvement; parental influence on children's behavior lasts beyond adolescence; parents are effective teachers of health habits at home when prompted by health educators; and parental influences vary by ethnicity/race, socioeconomics, and gender.

The results of a descriptive, cross-sectional study of the determinants of eating and exercise behavior in a sample of 153 fourth and fifth grade students are presented in the second paper. The determinants were perceived health status, definition of health, dietary knowledge, intention and usual food choice, support for eating and exercise, diet and exercise self-efficacy, and television viewing. The students were relatively healthy and active, knowledgeable about healthy eating and confident about eating healthier foods and exercising, but were not eating the minimum recommended servings of fruits, vegetables, or milk. The determinants accounted for a moderate proportion of the

variance in preadolescents' eating (22%) and exercise (25%) behaviors. Children's confidence about eating healthier foods [Odds ratio (OR) and 95% confidence intervals (CI) OR = 1.13 (1.01, 1.26)] and participating in adequate exercise [OR = 1.15 (1.04, 1.27)] were statistically significant independent predictors of meeting the public health recommendations for eating behavior. Children's eating behavior [OR = 1.16 (1.00, 1.35)] independently predicted their meeting the public health recommendations for exercise behavior.

The purpose of paper three was to describe and compare eating and exercise correlates and behaviors between 100 parent and preadolescent pairs on perceived health, definition of health, knowledge of healthy eating, diet and exercise self-efficacy, television viewing, and eating and exercise behaviors. Parents differed significantly from their preadolescents on dietary knowledge, diet self-efficacy, exercise self-efficacy, eating behavior, and exercise behavior. In comparison to their parents, preadolescents knew more about healthy eating, reported more confidence about eating healthy foods and engaging in exercise, consumed more servings per day of fruits, vegetables and milk, and participated in exercise on more days per week.

Catherine M. Waters

Catherine M. Waters, R.N., Ph.D.
Chairperson, Doctoral Dissertation Committee

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter I

Introduction

Significance of the Problem

The National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health reported that unhealthy lifestyle behaviors, such as physical inactivity and unhealthy food choices are learned, initiated and established in childhood and adolescence (Allenworth, 1994; Kahn, 1996; Morbidity & Mortality Weekly Report [MMWR], 1996). We know that 50% of premature illnesses and deaths in adults are related directly to unhealthy lifestyle behaviors, increasing one's risk for developing obesity, heart disease, hypertension, hypercholesterolemia, Type 2 diabetes, certain cancers, and other potentially preventable chronic conditions (McGinnis & Foege, 1993). Sedentary behavior and overeating and resultant obesity accounted for 5% to 9.4% of the total medical care costs and represented 24 to 70 billion dollars in direct costs to businesses in the United States (US) during the 1990s (Colditz, 1999; Thompson, Edelsberg, Kinsey, & Oster, 1998).

In the last two decades, a sedentary lifestyle and a diet that is high in fat, high in refined white flour and sugar and low in fiber have led to a dramatic increase in obesity, hypercholesterolemia, and Type 2 diabetes among children (De Vito et al. 1999; Flagel, 1994; Troiano et al., 1995). Current research suggests eating and exercise habits consolidate before age 10 (Francis et al., 1999; McGuire et al., 2002; Taylor et al., 1999; Vanhala et al., 1998; Woodward et al., 1996). Since positive lifestyle changes in childhood can potentially prevent or reduce disease and death rates in adulthood, designing and implementing innovative interventions to improve the health of children

that will continue throughout their lives is essential (Harsha, 1995). Although inconclusive, researchers posit that there is a positive relationship between parents' healthy lifestyle behaviors and children's incorporation of healthful lifestyle behaviors (Loveland-Cherry, 1997), which are learned through observation, imitation and practice of other people's behaviors—their friends, peers, teachers and parents (Pittman & Hayman, 1997).

Purpose of the Study

The purposes of this descriptive, cross-sectional study are to (a) describe the eating and exercise behaviors of preadolescents, (b) compare the eating and exercise behaviors of preadolescents with the eating and exercise behaviors of their parents, (c) describe the determinants of eating and exercise behaviors in preadolescents, (d) compare the determinants of eating and exercise behaviors between preadolescents and their parents, (e) investigate the influence of eating and exercise determinants on preadolescents' eating and exercise behaviors, taking into consideration demographic characteristics, (f) investigate the influence of parents' eating and exercise behaviors and determinants on preadolescents' eating and exercise behaviors, and (b), determine whether preadolescents are meeting the public health recommendations for eating and exercise behaviors. The determinants examined are perceived health, definition of health, dietary knowledge, intention and usual food choice, self-efficacy, social support, and hours of television (TV) viewing within the context of social cognitive theory.

Definition of Terms

The following definitions of terms are essential to the purpose of the study and are a reflection of epistemological and ontological links.

Preadolescence is defined theoretically as the developmental period between 9 and 11 years old (Carnegie Council on Adolescent Development, 1995) and is defined operationally by the inclusion of children in the fourth and fifth grades.

Parent is defined theoretically as a mother, father, guardian or caretaker of a preadolescent and is defined operationally by the inclusion of at least one biological, adoptive, or guardian primary caretaker of the preadolescent.

Behavior is defined theoretically as any action or series of actions that can be observed objectively by others (Bandura, 1997). Eating, exercise and TV viewing behaviors are operationalized using the Youth Risk Behavior Questionnaire (Centers for Disease Control and Prevention, 2001).

Definition of health is defined theoretically as one's personal meaning of health and is operationalized using Laffrey's Health Conception Scale (Laffrey, 1986).

Perceived health status is defined theoretically as one's perception of his or her health and is operationalized using the self-rated health subscale index of the Multilevel Assessment Instrument (Lawton, Moss, Fulcomer, & Kleban, 1982).

Self-efficacy is defined theoretically as one's confidence that he or she has the behavioral capability to perform a particular behavior, such as eating healthy foods and engaging in exercise (Bandura, 1997). Eating and exercise self-efficacy are operationalized using the Health Behavior Questionnaire (Parcel et al., 1995) and the Adult Diet and Exercise Self-Efficacy Scale (Vega et al., 1987).

Social support is defined theoretically as specific actions provided by individuals toward assisting one in bolstering or improving their exercise and eating habits and is operationalized using the Health Behavior Questionnaire (Parcel et al., 1995).

Knowledge is defined theoretically as the awareness or understanding gained through experience or study about eating and exercise and is operationalized using the Health Behavior Questionnaire (Parcel et al., 1995) and the Adult Health Behavior Knowledge Scale (Vega et al., 1987).

Assumptions of the Study

The following assumptions underlie the purpose, significance and design of the study.

1. All behavior has meaning;
2. Behavior is complex and is preceded by antecedents;
3. Knowledge affects behavior;
4. Fourth and fifth grade preadolescents are able to understand and respond accurately to self-report questionnaires;
5. Parents will respond individually and their responses will reflect their actual beliefs, knowledge, and behaviors;
6. Parents model passively and actively the eating and exercise behaviors of preadolescents, providing a standard for imitation and comparison; and
7. Parents' eating and exercise behaviors influence directly and indirectly the eating and exercise behaviors of preadolescents.

Content of the Dissertation

Chapter II provides a description of two theoretical frameworks that are used to guide the study, including the investigator's conceptualization of the relationship between parents' eating and exercise behaviors and determinants and preadolescents' eating and exercise behaviors and determinants. Chapters III to V consist of three papers that

address the purposes of the study. The first paper (Chapter III) is a review of the literature related to models of primary prevention of cardiovascular disease in school-aged children, particularly models focusing on parental influence. This paper is "in press" with the *European Journal of Cardiovascular Nursing* (Norton, Froelicher, Waters, & Carrieri-Kohlman, in press). Paper two (Chapter IV) presents the findings of 153 fourth and fifth grade preadolescents' eating and exercise behaviors and determinants—perceived health, definition of health, social support, self-efficacy, TV viewing, and dietary knowledge, intention and usual food choice. In the third and final paper (Chapter V), the 153 fourth and fifth grade preadolescents are paired with their parents, yielding a sample size of 100 preadolescent-parent pairs. Preadolescents and their parents are compared on eating and exercise behaviors and determinants. In addition, the influence of parents' eating and exercise behaviors and determinants in explaining preadolescents' eating and exercise behaviors is explored. Chapter VI concludes the dissertation with a summary of significant study findings, implications for nursing, health and policy, and recommendations for future research.

References

Allenworth, D. (1994).The research base for innovative practices in school health education at the secondary level. *Journal of School Health 64*, 180-87.

Bandura, A. (1997). *Self-Efficacy: The exercise of control*. New York: W.H. Freeman & Co.

Centers for Disease Control and Prevention (2002). Youth risk behavior surveillance—United States, 2001. *Morbidity & Mortality Weekly Report*, 51, 1-64.

Carnegie Council on Adolescent Development (1995). *Great transitions: preparing adolescents for a new century*. Woodlawn, MD: Graphtec, Inc.

Colditz GA. (1999). Economic costs of obesity and inactivity. *Medical Science Sports Exercise 31*(11 Suppl): S663-7.

De Vito, E., La Torre, G., Langiano, E., Berardi, D., Ricciardi, G. (1999). Overweight and obesity among secondary school children in central Italy. *European Journal of Epidemiology, 15* (7), 649-54.

Flegal, K.M. (1993). Defining obesity in children and adolescents: Epidemiologic approaches. *Critical Rev Food Science Nutrition, 33*, 307- 12.

Francis, C.C., Bope, A.A., MaWhinney, S., Czajka-Narins, D. et al. (1999). Body composition, dietary intake, and energy expenditure in nonobese, prepubertal children of obese and nonobese biological mothers. *Journal of the American Dietetic Association 99*(1), 58-65.

Harsha, D. W. (1995).The benefits of physical activity in childhood. *American Journal of Medical Sciences 1*, S109-S113.

Kahn, L., Warren, C., Harris, W., Collins, J., Williams, B., Ross, J., & Kolbe, L.(1996). Youth risk behavior surveillance: United States, 1995. *MMWR, CDC Surveillance Summaries,45* (4): 1-84.

Laffrey, S.L. (1986). Development of a health conception scale. *Research in Nursing and Health, 9*, 107-113.

Lawton, M. P., Moss, M., Fulconer, M., & Kleban, M. H. (1982). A research and service-oriented multilevel assessment instrument. *Journal of Gerontology, 371* (1), 91-99.

Loveland-Cherry, CJ. (1997). Promoting healthy lifestyles in adolescents: Family and school interventions to decrease adolescent alcohol, tobacco, marijuana and inhalant use. *Quality Nursing 3*, 463-469.

McGinnis, J. M., & Foege, W. H. (1993). Actual causes of death in the United States. *Journal of the American Medical Association 270*: 2207-2211.

McGuire, M.T., Hannan, M., Neumark-Sztainer, D., Cossrow, N. H., & Story, M. (2002). Parental correlates of physical activity in a racially/ethnically diverse adolescent sample. *Journal of Adolescent Health 30,* 253-261.

Morbidity and Mortality Weekly Report. (1996). Guidelines for school health programs to promote lifelong healthy eating. *Centers for Disease Control and Prevention 45* (RR-9), 1-41.

Norton, D. E., Froelicher, E. S., Waters, C. M., & Carrieri-Kohlman, V. (in press). Parental influence on models of primary prevention of cardiovascular disease in children. *European Journal of Cardiovascular Nursing*.

Parcel, G. S., Edmundson, C. L., Perry, C. L., Feldman, H. A., O'Hara-Tompkins, N., Nader, P. R., Johnson, C. C., & Stone, E. J. (1995). Measurement of self-efficacy for diet-related behaviors among elementary school children. *Journal of School Health, 65,* (1), 23-27.

Pittman, K.P. & Hayman, L.L. (1997). Determinants of risk for cardiovascular disease during school-age/adolescent transition. *Prevention 12* (4): 12-22.

Taylor, W.C., Blair, S.N., Cummings, S.S., et al. (1999). Childhood and adolescent physical activity patterns and adult physical activity. *Medical Science Sports Exercise 21,* 118-23.

Thompson D, Edelsberg J, Kinsey KL, Oster G. (1998). Estimated economic costs of obesity to U.S. business. *American Journal of Health Promotion 13* (2): 120-7.

Troiano, R.P., Flegal, K.M., Kuczmarski, R.J., Campbell, S.M., Johnson, C.L. (1995). Overweight prevalence and trends for children and adolescents: the National Health Examination Surveys, 1963–1991. *Archives Pediatric Adolescent Medicine,149*, 1085–91.

Vanhala, M., Vanhala, P., Kumpusalo, E. Halonen, P., Takala, J. Relation between obesity from childhood to adulthood and the metabolic syndrome: population based study. *British Medical Journal* 1998; 317: 319.

Vega WA, Sallis JF, Patterson T, Rupp J, Atkins C, Nader PR. Assessing knowledge of cardiovascular health-related diet and exercise behaviors in Anglo- and Mexican-Americans. *Preventive Medicine*. 1987;16(5):696-709.

Woodward, D.R., Boon, J.A., Cummings, F.J., Ball, P.J., Williams, H.M., & Hornsby, H. Adolescents' reported usage of selected foods in relation to their perceptions and social norms for those foods. *Appetite* 1996; 27: 109-117.

Chapter II

Framework

Two theoretical frameworks that can advance our understanding of lifestyle health promotion behaviors in preadolescents and parental influence are presented in this chapter: (a) Piaget's Developmental Theory, and (b) Bandura's Social Cognitive Theory. In addition, a conceptualization of the relationship between parents' and preadolescents' eating and exercise behaviors and determinants is illustrated.

Piaget's Developmental Theory

Piaget's (1970) model of child development and learning is based on the principle that children build cognitive structures for understanding and responding to experiences within their environment and that children's cognitive structures increase in sophistication with development, moving from a few innate reflexes to highly complex mental activities. If the experience is a repeated one, the experience is assimilated into the child's cognitive structure so that he or she maintains equilibrium. If the experience is different or new, the child loses equilibrium, and alters his or her cognitive structure to accommodate the new conditions. This way, children erect increasingly complex and more advanced cognitive structures. Piaget's theory identifies four developmental stages and the processes by which children progress through them. The four stages are sensorimotor, preoperational, concrete, and formal.

Sensorimotor stage (birth - 2 years old). In this stage, children through interaction with his or her environment build a set of concepts about reality and how it works. This is the stage where children do not know that physical objects remain in existence even when out of sight (object permanence).

Preoperational stage (2 to 7 years old). In this stage children are not yet able to conceptualize abstractly and needs concrete physical situations.

Concrete operations (7 to 11 years old). As experiences accumulate, children begin to conceptualize, creating logical structures that explain his or her experiences. Abstract problem solving is also possible at this stage.

Formal operations (beginning at ages 11 to 15 years old). By this stage, children's cognitive structures are like those of an adult and include conceptual reasoning.

According to Piaget's developmental theory, children in the fourth and fifth grades are in the concrete operational stage of development, where their thinking is tied to the immediate problems of their world as they experience it. This stage of development is ideal for the purposes of this research because preadolescents have reached a developmental stage where they are capable of logical thought processes with concrete subject matter, such as self-report questionnaires and are likely to report concretely their current eating and exercise behaviors. This is the stage in which peers become important to preadolescents and they are no longer extensions of their parents (Murray, 2000).

Bandura's Social Cognitive Theory

According to social cognitive theory, modeling through observational learning and vicarious reinforcement affects significantly new behavior (Bandura, 1997). Individuals are viewed as self-organizing, proactive, self-reflecting and self-regulating rather than as reactive organisms shaped by environmental forces or driven by concealed inner impulses. From this theoretical perspective, human functioning is viewed as the

product of a dynamic interplay of personal, behavioral, and environmental influences that result in triadic reciprocality.

Personal influences—cognition, affect and biological events—include characteristics and thinking of the individual that increase or decrease the likelihood of engaging in a particular behavior. Individual characteristics and thinking include one's knowledge, values, attitudes, beliefs, and self-efficacy. Environmental influences include social or physical aspects of the environment that support or discourage a particular behavior. These supports include role models, normative social support, and the availability of resources and facilities. Social cognitive theory posits that environmental or social factors such as socioeconomic, educational and familial structures do not affect directly behavior, but instead, they affect by influencing one's aspirations, self-efficacy beliefs, personal standards, emotional states, and other self-regulatory influences. Behavioral influences include current behavior patterns and capabilities of the individual.

At the core of social cognitive theory are self-efficacy beliefs—one's judgment of his or her capability to perform action required to attain a particular goal. According to Bandura (1997), self-efficacy beliefs provide the foundation for human motivation, well-being, personal accomplishment, and self-regulation. Unless people believe their actions can produce the outcomes they desire, they have little incentive to act. Much empirical evidence supports Bandura's contention that self-efficacy beliefs determine how well one motivates himself or herself, one's vulnerability to stress, and the life choices they make.

Within the context of social cognitive theory, a preadolescent is hypothesized to acquire and perform new behaviors, such as healthy eating and regular exercise, through learning or knowledge, observation of others' behaviors, positive reinforcement in the

form of social support, and self-efficacy beliefs (see Figure 1). Children learn from their parents, peers, teachers and community the health habits that they bring into adulthood.

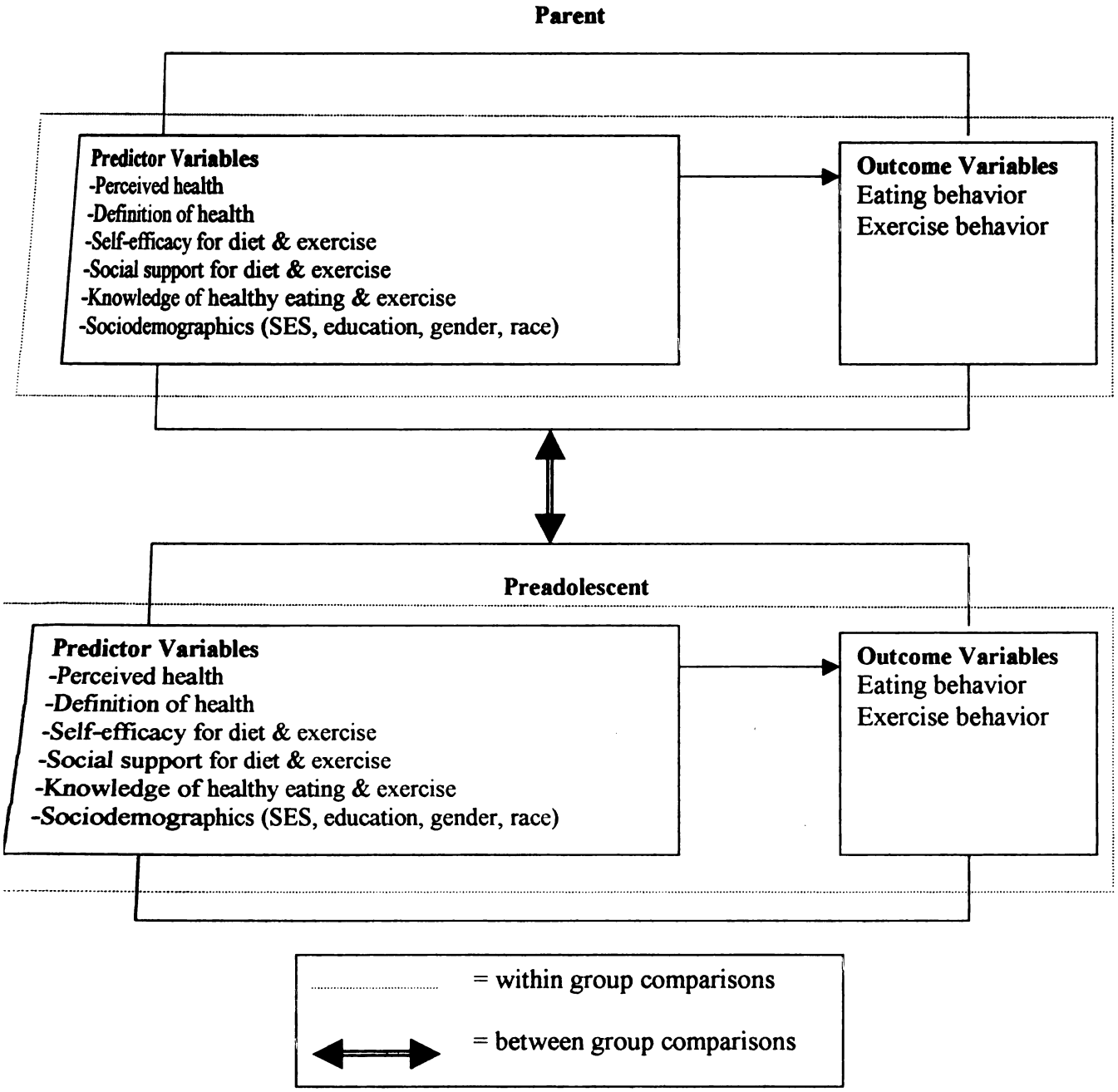


Figure 1. Conceptualization of the relationship between parents' eating and exercise behaviors and determinants and preadolescents' eating and exercise behaviors and determinants.

References

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman & Co.

Murray, J. S. (2000). Conducting psychosocial research with children and adolescents: A developmental perspective. *Applied Nursing Research, 13* (3), 151-156.

Piaget J. (1970). Piaget's theory. In P.H. Mussen (Ed.), *Carmichail's manual of child psychology* (Vol.1, pp. 703-732). New York: Wiley.

Chapter III

Parental Influence on Models of Primary Prevention of Cardiovascular Disease in Children

Abstract

BACKGROUND: Lifestyle behaviors such as overeating and physical inactivity contribute significantly to CVD, the leading cause of morbidity and mortality among adults globally. CVD risk factors that begin in children often track into adulthood. Parents are believed to influence the health behaviors of their children.

OBJECTIVE: To review the literature on parental influence on children's health beliefs and behaviors, particularly eating and exercise behaviors as indicators of CV health, school-based CVD risk reduction programs, and racial/ethnic, gender, and socioeconomic considerations for models of primary prevention of CVD in children.

METHODS: Thirteen studies that included parents as either a source of information, change agent or participant in a CVD risk reduction intervention were identified searching the Medline, CINAHL and PsycINFO databases from 1980 through 2002.

RESULTS: Children's lifestyle health beliefs and behaviors are significantly influenced by positive parental modeling and involvement in exercise and healthy eating; parental influence on children's behavior lasts beyond adolescence; parents are effective teachers of health habits at home when prompted by health educators; and parental influences vary by ethnicity/race, socioeconomics, and gender.

CONCLUSIONS: A broader base of knowledge that is socioculturally sensitive must be developed about what parents and children believe is healthy, how parents model beliefs and behaviors for their children, and how to build self-efficacy for positive health behaviors.

Key Words: children, eating, diet, physical activity, exercise, CVD, heart disease, parents, parental influence, race/ethnicity, school

Note. From "Parental Influence on Models of Primary Prevention of Cardiovascular Disease in Children," by D. E. Norton, E. S. Froelicher, C. M. Waters and V. Carrieri-Kohlman, in press, *European Journal of Cardiovascular Nursing*. Reprinted with permission.

Introduction

Cardiovascular disease (CVD) is a major cause of premature mortality, morbidity and disability in most countries. Globally, CVD accounts for 7 million deaths each year and it has been estimated that CVD and stroke will be the first and second leading causes of death and disability by the year 2020, respectively (World Health Organization (WHO), 1999). According to the 1999 WHO *World Report*, an estimated 43% of all disability-adjusted life years (DALY) globally in 1998 were attributed to non-communicable diseases, mainly CVD, cancer and diabetes, and this proportion is expected to increase to 73% by 2020. Furthermore, CVD accounted for 14% of the DALY globally, 10% in developing countries and 18% in developed countries.

In the United States (US), heart disease accounts for 34% of the morbidity and mortality (MMWR, 1996). One in every three Americans will suffer from CVD in their lifetime. Consumption of a more energy-dense, nutrient-poor diet, overeating and physical inactivity are some of the modifiable lifestyle behaviors that lead to CVD (Allenworth, 1994; Kahn, 1996; Morbidity & Mortality Weekly Report (MMWR), 1996; WHO, 1999, National Center for Chronic Disease Prevention & Health Promotion, Division of Adolescent & School Health). Even more alarming is that CVD risk factors in children are similar to those in adults. The number of children and adolescents considered overweight, a body mass index (BMI) equal to or greater than the 95th percentile, doubled between 1980 and 1994 and of those overweight children, 60% of them had at least one CVD risk factor and 20% of them had two or more CVD risk factors (Dietz & Gortmaker, 2001).

Empirical data indicate positive lifestyle changes in childhood can reduce CVD rates for adults (Berenson & Srinivasan, 2001; Niklas, von Duvillard & Berenson, 2002; Perry et al., 1990; Rexrode, Mansen, & Hennekus, 1996; Sinaiko, Donahue, Jacobs, & Prineas, 1999). Current research suggests eating and exercise habits consolidate before age 10 (Francis et al., 1999; McGuire et al., 2002; Taylor et al., 1999; Vanhala et al., 1998; Woodward et al., 1996). Developmentally, children are solidifying their health habits learned in early childhood during preadolescence and adolescence.

Information about CVD risk factors in adults from the Framingham study and children from the Bogalusa children's study provided the impetus for the development of primary prevention and risk reduction programs for school-aged children (Allen & Blumenthal, 1998; Harlan, 1989; Hubert, Feinleib, McNamara, & Castelli, 1983; Nicklas, von Duvillard, Berenson, 2002; Oliveria et al., 1992). These longitudinal, epidemiological studies showed that risk factors track from childhood into adulthood, and subsequently, stimulated interest in youth health promotion. Yet, most CV research still focuses on secondary and tertiary risk reduction and prevention, which aims to reduce the chance of a second heart attack after the first one has already occurred.

In this paper, models of primary prevention of CVD in school-aged children, particularly models focusing on parental influence are reviewed. The purpose is to review past research in order to provide a scientific basis for the study of positive lifestyle health behavior development in school-aged children, as part of the health promotion and disease prevention goals of Healthy People 2010 in the US (Harsha, 1995; Levine et al., 2000; Pate et al., 2002; Pender et al., 2002) and WHO *World Health Report* 2002 goals to reduce risk and promote health. This review includes children from elementary school

through high school (4th through 12 grades). In addition, the influence of parental social support on children's eating and exercise behaviors as an indication of CV health is examined.

Thirteen studies were found searching the Medline, CINAHL and PsycINFO databases, years 1980 through 2002, using the following search terms: children/adolescents, eating/nutrition, physical activity/exercise, CVD/heart disease, and family/parents/school/community. Articles were included if parents served as either a source of information, change agent or participant in a CVD risk reduction intervention. The literature reviewed is divided into three sections: (a) parental influence on children's health beliefs and behaviors, particularly eating and exercise behaviors as indicators of CV health, (b) school-based CVD risk reduction programs, and (c) racial/ethnic, gender, and socioeconomic considerations.

Parental Influence on Children's Health Beliefs and Behaviors

Behavior is learned through observation of others' behavior and its consequences (Bandura, 1963). Health values, beliefs and behaviors are learned at home through observation, imitation and practice (Pittman & Hayman, 1997). Modeling is defined as "providing a standard for imitation or comparison" (Webster, 1997 p. 425) and reflects the potential relationship between parental involvement and children's acquisition of positive health behaviors (Loveland-Cherrry, 1997). Researchers have begun to look at the relationship between parents' health beliefs and lifestyle health behaviors and their children's development and maintenance of healthy eating and exercise behaviors.

In 1989, Cohen, Felix, and Brownell studied the differences between parents and children's perceptions of selected positive and negative health behaviors through a survey

of 1,051 households with children in 5th through 8th grades. Parents and children were asked about their perceptions of each other's health habits. Parents and children completed surveys that included questions about eating and exercise health habits and family interactions about health issues. Significant findings included modest correlations between parents and children's answers on exercise, diet, and the consumption of fast foods (r = .30, .29, .21, respectively) and small agreement (r = .13) on family interaction. The children reported less interaction, information and support than did parents. The researchers concluded that parents need factual information about risk reduction and behavior development in order to increase their participation in modeling healthier behaviors, and that families need opportunities for family interaction that supports positive health behaviors, such as interactive homework, shopping for food and meal preparation, as well as exercise.

Parental influence on health beliefs and behaviors was studied in 947 college freshmen enrolled in a private, east coast university in the US (Lau, Quadrel & Hartman, 1990). Parental survey respondents included 80% mothers, fathers, and 1% other relatives from mostly white, middle-class, two-parent families. The purpose of the study was to explore the sources of influence in adolescents' health behaviors during their first three years of college using structural equation modeling to test two models of relationships: the enduring family socialization model and the lifelong openness model. The enduring family socialization model attributes parental influences from early childhood as the most potent socializing agent for late adolescent's health behavior. The lifelong openness model suggests that adolescents are influenced by many different sources and that after

they reach adolescence and leave home that the parent's influence would not be any stronger than peers or media influence.

The student/parent pairs completed surveys three times: at baseline before freshman year, during sophomore year, and again during the junior year. Parental (either mother or father) modeling significantly influenced eating behavior (r =.31), parent's training of active exercise habits (r =.38), and father's exercise behavior tended to influence the exercise behavior of their sons, as they left for college. Father's influence on the exercise behavior of their sons did not reach significance because of a lack of matched pairs of son and father respondents. Even at year three of the study, parental influence approximated that of peers for both eating (parents: r = .31, peers: r = .27) and exercise (parents: r = .27, peers: r = .32) behaviors.

The enduring family socialization model showed consistent parental influence into the adolescent's early college life. The enduring family socialization model was highly significant, indicating that a strong association exists between the eating and exercise behaviors of parents and adolescents, at baseline, when the adolescent is about to leave home and into the early college years. This study further supports parental modeling and shows that parental influence has a lasting effect on adolescent's health behavior. Most significantly, this study showed that parent's influence equaled that of peers with respect to eating and exercise behaviors into late adolescence. This is important information for development of health promotion interventions.

The understanding of eating and exercise behaviors in school-aged children was explored in a study of the determinants of health promoting behavior in rural adolescent girls (Gillis, 1994). Gillis studied the relationship between parents and adolescent girls

eating and exercise attitudes, beliefs and behaviors, using the Health Promoting Lifestyle Profile (HPLP). The HPLP (Walker, Sechrist, & Pender, 1987) measures six dimensions of wellness in individuals: self-actualization, health responsibility, exercise, nutrition, interpersonal support and stress management. The dimensions of the HPLP are totaled for a sum score. The sample of 184 seventh through twelfth grade adolescent girls came from two county schools in Nova Scotia. There was a significant moderate correlation between mother's and daughter's scores ($r = .28$, $p < .01$) and a somewhat weaker correlation between fathers and daughters ($r = .16$, $p < .05$), particularly with self-efficacy for performing healthy lifestyle behaviors.

Dielman and colleagues (1995) showed parental modeling was a potent moderator of children's alcohol use in a survey of 542 fourth graders and their parents. Essential parental behaviors that were significantly associated with children's alcohol use were quantity and quality of parental involvement (mother, $r = .18$), clear family norms and consistent enforcement (mother, $r = .14$; father, $r = .24$), and nurturance (mother, $r = .22$). Family closeness, family support, and open communication were not associated significantly with children's alcohol use. Loveland-Cherry's (1996) study provided some evidence that parental influence is associated with children's lifestyle health behaviors, particularly alcohol use. Other health behavior specific studies that focus on CVD risk factors need to be initiated to further our understanding in designing age-appropriate interventions for CV health promotion and CVD risk reduction and prevention.

There is consistent evidence in the literature that positive parental influence has a critical impact on the development and acquisition of positive health behaviors in

children and adolescents. Rossow and Rise (1994) studied the effect of parental health behaviors on middle to late adolescent children (16 to 20 years old) in a sample of 337 Norwegian, two-parent families. Moderate significant correlations between parent and child, independent of age, included eating (fat intake: mother-child, $r = .47$; father-child, $r = .42$), and small but significant correlations with exercise behavior (mother-child, $r = .16$, father-child, $r = .18$). The probability of an adolescent having low fat intake was twice as high if both parents ate a diet low in fat. The frequency of the father's exercise significantly affected the adolescent's exercise. Thus, if parents ate fatty foods and did not exercise, their adolescent was more likely to report similar behaviors.

Stucky-Ropp and DiLorenzo (1993) found that mothers significantly influenced the physical activity of their children by modeling, reinforcing, and providing opportunities (or barriers) to such behaviors. Interviews of 242 mother-child pairs from the 5th and 6th grade classes in a Midwestern elementary school in the US revealed a child's own enjoyment of physical activity accounted for most of the variability (24%) in his or her physical activity behavior, regardless of gender. Family support accounted for 18%, mothers perceived barriers to exercise accounted for 17%, and parental modeling of physical activity accounted for 16% of the variance in a child's physical activity behavior. In Phase II of this study, 111 students of the original cohort were interviewed 3 years later as 8th and 9th grade students (DiLorenzo et al., 1998).

Statistically significant changes occurred among three variables in Phase II of the study. Both girls ($\Delta R^2 = .10$) and boys ($\Delta R^2 = .13$) knowledge of exercise increased as did their perception of both family and friend support (girls $\Delta R^2 = .04$ and boys $\Delta R^2 = .05$). However, mothers' self-efficacy for exercise (girls $\Delta R^2 = .11$ and boys $\Delta R^2 = .11$)

and parental modeling (girls $\Delta R^2 = .04$ and boys $\Delta R^2 = .05$) decreased. This result could account for the decrease in physical activity in girls. For boys, their own enjoyment of physical activity accounted for considerable variance in both phases of the study, 24% in Phase I and 40% in Phase II. The findings of this study are consistent with previous research (Sallis et al., 1989) and build on the base of knowledge that parents influence their child's ability to participate in physical activity. It also indicates that boys may build on early success with sports or exercise, which may lead to their continuing levels of exercise; whereas in girls, who appear more dependent on parental modeling, exercise levels decreased over the 3 years of the study. Parents can be either important motivators or can have a limiting influence on their child's physical activity, depending the child's gender.

Parents may be unaware of the influence of their health behaviors on their children, and therefore, need to be educated about how their health behaviors and support influence the health behaviors of their children. We have learned from the obesity literature that parents as moderators or agents of change significantly improve the weight outcomes of their children. Epstein et al, (1990) found in a 10-year randomized study of 76 obese, 6 to 12 year old children that weight loss was significantly greater and stayed off for a longer period of time when the intervention included the obese child and at least one obese parent in comparison to intervening with the obese child alone or a control child. At 5- and 10-year follow-up visits, the children in the child/parent group showed significantly greater decreases in weight, while children in the child only and control group showed increases in weight. Both parent and child received monetary reinforcement. Parents were taught contracting strategies and positive reinforcement,

using money as a reward. Self-monitoring logs were maintained to help both parents and their child lose weight. These strategies produced significant and prolonged changes in weight loss for the children, but not in the parents.

Golan et al. (1998) also found improved results when parents were enlisted as the agent of change. Using a family systems approach, the researchers compared weight reduction in two groups of grade school students: the experimental group, where the parents were enlisted as agents of change and the control group, where the child was the agent of change. Of the 160 eligible grade school students who were identified as being obese (20% above the recommended weight for age, height and gender), 60 agreed to participate and were randomly assigned to either the experimental or the control group. In the experimental group, parents met for 14, hour-long support and education sessions, led by a dietitian, over 1 year. In addition, five 15-minute sessions were set up with each family to measure the height and weight of every family member in order not to single out the obese child. In the control group, the obese child was prescribed a diet and also received 30, hour-long, group-counseling sessions with a dietitian over 1 year. Anthropometric measurements and diet logs were recorded at baseline, 6, 12 and 18 months.

Children in the experimental ($p < 0.001$) and control ($p < 0.01$) groups lost weight. The intervention resulted in 35% of the children in the experimental group achieving non-obese status compared to 14% of the control group ($p < 0.03$). Six months after the intervention, the experimental group had maintained 85% of their weight loss compared to 40% in the control group ($p < 0.05$). At the 12-month visit, the proportion of participants lost to follow-up was much greater in the control group (30% compared

to 3% for the experimental group, $p < 0.02$). The experimental group had a lower drop out rate, statistically greater weight loss, improved maintenance of weight loss, and weight loss in participating parents.

This weight reduction program emphasized increased family physical activity and parental modeling and participation. This program was similar to the family approach that Epstein et al. (1990) used for weight reduction where both parent and child were agents of change for themselves. However, Golan's et al study (1998) differed in that the parents in the intervention group were educated on weight management strategies and practiced modeling behavior, which proved successful for the child, and consequently, the parent and helped maintain the group. When children alone were prescribed a weight loss plan (the control group), more dropped out and they were not able to maintain the weight loss over time. The authors posited that the change agent role helped the parents help themselves and the children lose weight. This study adds further support to our knowledge about how parents' health behavior influences the health behavior of their children.

A review of studies regarding parental influence reveals that children's lifestyle health behaviors are significantly influenced by positive parental modeling and involvement in exercise and healthy eating (Cohen, Felix, & Brownell, 1989; Deilman, 1995; DiLorenzo, 1998; Gillis, 1994; Golan, 1998; Lau et al., 1990; Rossow & Rise, 1994; Stucky-Ropp & DiLorenzo, 1993; & Epstein, 1990); family standards for health behaviors with consistent reinforcement and nurturance (Deilman, 1995 & Stucky-Ropp & DiLorenzo, 1993); support from family (Epstein, 1990, Golan, 1998); and parents support of opportunities for healthy activities (Stucky-Ropp & DiLorenzo, 1993,

DiLorenzo, 1998 & Epstein, 1990). Furthermore, parents' and children's perceptions are similar regarding what they eat and how much they exercise (Cohen, Felix, & and Brownell, 1989); parental influence on children's behavior lasts beyond adolescence into the college years (Lau et al., 1990); and knowing the parent's or adolescent's definition of health may influence or predict health promoting behaviors (Gillis, 1994). These studies provide clear indication of parental influence on children's lifestyle behaviors. A broader base of knowledge must be developed about what parents believe is healthy, how parents model beliefs and behaviors for their children, and how to build self-efficacy for positive health behaviors, particularly eating and exercising.

School-Based Cardiovascular Disease Risk Reduction Programs

Four major studies have contributed to our knowledge about school-based CVD risk reduction programs that involve parents: the San Diego Family Health Project; Children and Adolescent Trial for Cardiovascular Health (CATCH I); CATCH II; and the Minnesota Home Team. These studies evaluate parental involvement through such activities as program participation, family-centered homework, shopping for food, meal preparation, and exercise programs.

San Diego Family Health Project

The San Diego Family Health Project, a randomized-controlled trial, consisted of 206 Mexican-American and Anglo families, which included 300 adults and 323 children in the 5th and 6th grades (Nader et al., 1989, Nader, 1990). Families were randomly assigned to four groups: Anglo intervention, Anglo control, Mexican-American intervention, and Mexican-American control. The self-efficacy concepts and techniques of Bandura's social cognitive theory (SCT) were used to increase exercise behavior and

decrease family intake of foods high in salt and fat. These techniques included skill modeling of healthy food choice and preparation, self-monitoring of eating and exercise behavior, goal setting, and behavior rehearsal exercises.

The intensive 12-week intervention included education, exercise and support classes, followed by six maintenance sessions over a nine-month period and follow-up at one year. The program promoted intra- and inter-familial support and interaction. Bilingual leaders facilitated the Mexican-American groups. Separate parent and child education sessions offered appropriate information and learning strategies. Family was operationally defined as a unit with "one or more target children and one or more adults cohabiting in the same household and sharing family functions, such as food preparation and child supervision" (Nader et al., 1989, p. 231). Outcome variables included measures of food frequency and physical activity recall, physiological measures (urinary sodium and potassium, blood pressure, heart rate, cholesterol and lipoprotein, and sub-maximal exercise test levels) and anthropometry (body mass index). Measurements were obtained at baseline and 3, 6, 12, and 24 months.

Significant positive health changes occurred with dietary salt intake and systolic blood pressure (SBP) in the adults of both Anglo (A) (salt: -32mg; SBP: -3.01 mmHg) and Mexican American (M-A) (salt: -17.8mg; SBP: -2.2 mmHg). However, both A (.24) and M-A (.24) adults had increased dietary fat intake. Both A and MA children showed significant increase in health knowledge (A: .29; MA: .12), total dietary fat intake (A: 0.12gm; MA: 0.14gm), and diastolic BP blood pressure (A: -2.81 mmHg; MA: -3.07 mmHg). Using a study specific family score (Nader et al., 1989, p. 239), similarities

across groups were found in family eating and exercise habits, blood pressure and cholesterol levels, body type and fat distribution.

Follow-up, 1 year after the intervention, indicated Anglo families had maintained statistically significant ($p \leq .05$) food choice behavior changes. The researchers were unable to specify the less significant behavior changes that occurred in Mexican-American families. Their supposition is that Mexican American families may have retained less significant changes due to a more stressed, less financially secure lifestyle that may have contributed to less participation (58% completed the education sessions in comparison to 71% of Anglo families). Also, the length of the project could have influenced the outcomes due to attrition and temporal changes.

This study provided valuable information about similarities in CVD risk reduction behaviors among ethnic/racial families and strategies to improve parental involvement and retention in children's health behavior research. The intervention was offered to families in groups of six for the full intervention and separated into Anglo and Mexican American family groups. The researchers did this in order to promote familiarity, support and social interaction. Phone, mail, and rewards for completed activities helped to maintain cohort participation. The overall retention rate was high (89%) at the 24-month follow-up.

Children and Adolescent Trial for Cardiovascular Health I (CATCH I)

CATCH I was a large multi-site CVD risk reduction program to decrease dietary fat intake and increase physical activity in children, ages 8 to 11 years (Perry et al., 1990). The four national sites were California, Louisiana, Minnesota, and Texas. The racially diverse group of 5,106 children in the 3rd grade were randomly assigned to one of three

groups: (a) school-based intervention, (b) school plus home intervention, or (c) a control group. The sample consisted of 69% Caucasians, 13% African-Americans, 14% Hispanics, and 4% others. Children and their parents were followed for two years (3rd through 5th grades). The school-based curriculum included family homework as a measure of parental reinforcement and modeling.

The control group received the usual physical education, health teaching and food service program provided by the school. The school-based intervention consisted of school food service revisions to decrease salt and fat in the offered foods and physical education program modifications along with the CATCH curricula that addressed eating habits, physical activity and smoking. The school-based plus home intervention consisted of the school-based intervention with the addition of skill building family activities that complemented the school-based component. Classroom teachers implemented the CATCH curriculum.

Behavioral outcomes included a 24-hour diet recall that was evaluated for dietary intake of sodium and percent of calories from total and saturated fat, self-reported physical activity, and knowledge and attitudes about health as measured by the 1993 version of the Health Behavior Questionnaire. Physiologic and anthropometric outcomes included serum cholesterol and lipoprotein; blood pressure readings; triceps and sub-scapular skin fold measurements; height, weight, and body mass index; and a 9-minute aerobic fitness test (Leupker et al., 1996). Measurements were collected at baseline (3rd grade) and each spring through to the 5th grade.

There was no significant difference in parental influence on dietary fat intake between the school only and the school plus home intervention. The researchers compared

the changes in the intake of nutrients between intervention, gender, and ethnic/racial groups and the four study sites. The authors concluded that the school plus home intervention component was too "weak" to produce a statistically significant, positive effect.

Children and Adolescent Trial for Cardiovascular Health II (CATCH II)

In 1996, Nader et al. reported on the second phase of the CATCH intervention study to assess the effect of a "dose response" of parental involvement on the knowledge, attitudes, self-reported behaviors, and physiologic outcomes of 1,631 Caucasian, Hispanic and African American children who had participated in the CATCH I school plus home family intervention during 3 years of the study. The school plus home family intervention included family activity packets that contained a story to be read, followed by learning activities. Students who returned to school with cards that indicated that the family had completed the learning activities were given incentives, such as pencils, memo pads and certificates.

The findings showed that the level of adult participation was related to increased knowledge, beliefs and behavior. The "dose" of the family home component was calculated by the number of activity cards that the child returned. The parental participation dose ranged from 0 to 15. As parental participation increased, minutes of moderate to vigorous physical activity, physical activity self-efficacy and dietary self-efficacy increased significantly. Vigorous physical activity increased by 10 minutes, from a mean of 48 minutes to a mean of 58 minutes as the parental participation dose level reached a range between 7 and 9 ($p = .02$). For all subjects, physical activity self-efficacy improved significantly as the parental participation dose increased ($p = .04$). Dietary self-

efficacy also increased significantly ($M = +1.4$, $p = .03$) as the dose of parental participation increased to 10 to 12 activities. The school plus home family intervention significantly affected healthier food choices, especially for boys ($p = .05$), but not for dietary intake of cholesterol, sodium or fat.

CATCH II study findings add valuable information about the role parents play in their children's acquisition of positive health behaviors, especially those health behaviors that reduce the risk for CVD. The findings indicate that parental involvement significantly improves the eating and exercise behaviors of 8 to 11 year old children. However, unverified self-report was the only measure of completed "family homework." Uneven compliance, program consistency, and quality control issues among sites limit the findings of the CATCH studies.

Minnesota Home Team (MHT)

The MHT program compared the efficacy of a school-based CVD risk reduction intervention with an equivalent home-based intervention in 2,250 third grade students in 31 urban Minnesota schools (Perry et al., 1988, 1989). Most study participants were Caucasian and middle class. This study, based on the SCT behavioral change concepts, modified personal, environmental and behavioral factors. The intervention emphasized food selection and preparation skills, and modeling and goal setting with parental reinforcement. The 31 schools were randomly assigned to one of four study groups: a) school-based program, b) home-based program, c) school-based then home-based program, or d) control group.

The CVD risk reduction curriculum was designed to increase knowledge of healthy eating in order to decrease dietary intake of fat and sodium. Classroom teachers,

coached by university personnel, taught the 15-session, 5-week school-based intervention. The home team received five weekly packets that included a family game and follow-up activities to practice new food selection and preparation activities. The university coaches visited the classroom for 10 to 15 minutes weekly to encourage the home team participants, collect "participation points" scorecards, and answer questions. The outcomes were measured by psychosocial and behavioral assessments pre- and 1-year post-intervention. In a subset of the home-based intervention students, data were collected on 24-hour dietary recall, food shelf inventory, and 24-hour urinary sodium.

Students in the school-based intervention group demonstrated increased knowledge post intervention in comparison to home-based intervention group participants. However, students in the home-based intervention group showed more positive behavior changes in dietary patterns. By the end of the 5-week intervention, the home-based intervention students consumed significantly fewer calories from saturated fat (-2%, $p = .04$) and sugar (-0.7%, $p = .04$) and more from complex carbohydrates (4.8%, $p = .03$) than the children in the school-based intervention group. A food-shelf inventory done after the intervention revealed an increase in "recommended" foods on the shelves of homes of families who participated in the home-based intervention group.

While the results of this study demonstrate the effectiveness of parental participation and modeling of healthy behavior for their children, these findings are limited to a white, middle class, mid-western population in the US. The recall and self-report methods are problematic due to recall bias and a possible desire to please the interviewer. However, the use of three measurements to assess changes in dietary intake behavior strengthens the study findings. The study findings provide valuable information

about the structure and measurement of a home-based, parent-led intervention and its effect on the diet and exercise patterns of children.

The San Diego Family Health Project, Child and Adolescent Trial for Cardiovascular Health I and II, and the Minnesota Home Team provide us with models of how to include parents into CVD prevention programs for children. These studies showed us that by increasing health knowledge and rehearsing healthy behaviors with children they retain significant changes in behavior for at least one year (Nader et al., 1989 & Perry, 1990); as parent participation increases, diet and exercise self-efficacy and exercise behavior increase with elementary school children (Nader et al., 1996); and parents are effective teachers of health habits at home when prompted by health educators (Perry et al., 1989 & Nader et al., 1996).

Racial/Ethnic, Gender, and Socioeconomic Considerations

In addition to family structure, race/ethnicity, gender, and socioeconomic status (SES) affect youth's academic performance, psychosocial stability, physical health, family function, and peer relations (Dawson, 1991; Guthrie et al. 1995). Patterson, Kupersmidt, and Vaden (1990), in a study of 868 African American and Caucasian elementary school children, found that income and gender predict school competence and peer relations, and that income and ethnicity may predict academic achievement. Boys from lower income families were more likely to have lower academic and psychosocial competence and they were at greatest risk for school failure and social and emotional problems, independent of race/ethnicity (African American or Caucasian). In contrast, girls who were from lower income families tended to have other religious or extended

family role models that mitigated the negative academic and psychosocial affects associated with lower SES children.

Simons-Morton et al. (1997) found that SES was an important predictor of academic and psychosocial competence in a sample of 2,410 children from four regions of the US. Higher SES was linked to better health outcomes, however, this advantage was limited mainly to Caucasian children. Lowry et al. (2002) reported in a sample of 15,349 US high school students, watching television (TV) over two hours per day (43%, n = 6,600) was associated with being overweight in White (OR: 2.20; CI: 1.49-3.24; $p < .05$) and Hispanic females (OR: 2.45; CI: 1.13-5.34; $p < .05$) and White males (OR: 1.76; CI: 1.17-2.65; $p < .05$) but not Hispanic or Black males. In fact, Black males who watched the most TV were more physically active than White or Hispanic males. Adolescents who participated in sedentary activities were less likely to participate in moderate to vigorous physical activity. These findings suggest that interventions to promote physical activity need to address sociocultural differences.

A study of the environmental and sociodemographic determinants of physical activity in 17,766 adolescents in the US (Gordon-Larsen, McMurray & Popkin, 2000) found that Blacks and Hispanics were more likely to be sedentary (52% and 40%, respectively) and they were more likely to live in areas with a high incidence of crime (7,170 to –16,855 incidents of serious crime per 100,000). Participation in daily school physical education (PE) was low in all ethnic groups (14.6%) and most students did not participate in PE at all (78.7%). Only a small proportion of adolescents (19.6%) had access to a neighborhood community recreation center though Blacks (23.6%) were more likely to use community centers (adjusted OR: 1.75; CI: 1.56-1.96; $p \leq .00001$). Mother's

education level, which was lowest for Hispanics (45% had less than high school education) and highest for Asians (11.1% had graduate degrees), was significantly associated with increased likelihood of having high levels of moderate to vigorous physical activity (adjusted OR: 1.27; CI: 1.01-1.60; $P \leq .045$). Although physical activity was most influenced by environmental factors, inactivity was much more influenced by sociodemographic factors. Higher SES measured by maternal education and family income had a substantial impact on likelihood of engaging in inactivity. Advanced education and high income were associated with lower levels of inactivity.

Studies in this part of the review indicate that interventions to promote physical activity and improve dietary habits of all ethnic groups need to be socioculturally sensitive (Lowry et al., 2002); account for the SES and address environmental concerns of the population served (Simons-Morton, 1997 & Lowry, 2002), and include support sources other than parents (Patterson et al., 1990). Over the years, there have been vigorous federal, state and local efforts to promote healthy lifestyles and reduce negative health patterns of underserved, ethnic-minority children and their families (Bush et al., 1989; Nader et al., 1989; Perry, 1990; Resnicow et al., 1992; Reynolds et al., 1990). While the trend of health promotion is vibrant and there is little indication that it will reverse, the movement affects mostly well educated, healthy and economically advantaged young and middle-aged Caucasians, while those with the greatest need go without its benefits. Intervention efforts should progress beyond income and education and focus on other factors, such as environmental, contextual, biological, and sociocultural factors.

Summary and Conclusions

Fifty percent of the variance in the leading causes of death, particularly CVD, is attributed to unhealthy lifestyle behaviors, such as physical inactivity and overeating (McGinnis, 1993). There is a growing trend of adult onset (Type 2) diabetes mellitus in children and earlier onset of CVD in adults (Niklas, von Duvillard, & Berenson, 2002), primarily related to being overweight/obese and physically inactive (Dietz & Gortmaker, 2001). We know that CVD risk factors track from childhood to adulthood (Lau et al., 1990). This review of the literature related to primary prevention models of CVD in children reveals children are as likely to adopt unhealthy behaviors, as they are healthy ones modeled by peers and parents (Kelder et al., 1994; Pittman & Hayman, 1997). Children as early as the 4th grade reflect the health behaviors of their family, peers, and social environment (Mcguire et al., 2002; Francis et al., 1999; Taylor et al., 1999; Vanhala et al., 1998; Woodward et al., 1996). See Table 1 for a summary of the literature review related to parental influence and models of primary prevention of CVD in children.

The role of parental influence on children's health behavior is an important consideration (Dielman et al., 1995). This literature review reveals that parents influence the health behavior of their children (Golan et al., 1998; Stucky-Ropp & DiLorenzo, 1993); parents have accurate perceptions about the eating and exercise behaviors of their children (Cohen, Felix, & and Brownell, 1989); parent's influence their children's behavior beyond adolescence (Lau et al., 1990; Rossow & Rise, 1994); and a parent's or adolescent's definition of health may influence or predict their health-promoting behavior, especially for girls (Gillis, 1994). Parents are one of the influences of the social

environment (school, community, and home), according to the principles of social cognitive theory (Bandura, 1997), and must be considered when implementing models of primary prevention to reduce CVD in children.

Given the existing models of primary prevention to reduce CVD in children, these large, national, multi-site randomized controlled trials have shown that (a) similarities exist in child-family eating and exercise habits, blood pressure readings, cholesterol levels, and body type and fat distribution (Nader et al, 1986, 1989); (b) that home/family interventions as compared to school-based interventions result in significant positive and sustained behavior changes, such as fewer calories from dietary intake of saturated fat and sugar, more calories from complex carbohydrates, and healthier foods on the shelves of study families (Nader et al., 1986, 1989; Perry et al., 1988, 1989); (c) as parental participation increases, so does positive health behavior change such as increased physical activity and increased self-efficacy for diet and exercise behavior change (Perry et al., 1990; Nader et al., 1996); (d) there are ethnic/racial differences among Caucasian, Hispanic and African American children and families in terms of parental participation and changes in health behaviors (Nader et al., 1986, 1989, 1996; Perry et al., 1990); and (e) gender differences do exist (Nader et al., 1996).

Models of primary prevention of CVD in children that were successful included parental modeling of healthy behavior and parental involvement that included participation at many different levels: directed family activities, newsletters, media presentations, parent focus groups, and advisory boards. Strategies for effective parent-child interactions which have been tested in other areas of health and may apply to CVD prevention include role-playing (Werch et al., 1991), knowledge enhancement and beliefs

examination (Kimiecik & Horn, 1998), direct participation, modeling and socializing the child's beliefs and attitudes (Baranowski et al., 2002), providing transportation (Hoefer et al., 2001), and effective communication (Backett, 1992).

To completely understand the parental role, the relationship between the health beliefs and behaviors of parents and their preadolescent children needs to be better understood. We need to systematically and comprehensively assess parental, child, and parent/child interactions that affect the development of healthful lifestyle behaviors. The relationship between parents' perceptions, beliefs, and behaviors with their children's incorporation of healthful lifestyle behaviors needs to be tested in order to design optimum interventions. Until then, it is premature to conclude that parents do not contribute to or are not interested in modeling positive health behavior for their preadolescent children (Beal et al., 2001). A broader base of knowledge must be built to include what parents and children believe are healthy behaviors, how parents model beliefs and behaviors for their children, and how to build self-efficacy for positive health behaviors in parents and children. A review of research studies found few that described an assessment of parents' perceptions and beliefs toward health-promoting behaviors or the enhancing and constraining factors to their involvement in school-based health promotion programs.

When these relationships are better understood, the next steps are to design studies with greater methodologic sophistication and design. Then, we can develop models and interventions that are culturally, age and developmentally appropriate and that fit within the social context, family structure and SES of families. These models of positive health behavior development must represent the normative behavior of both

parents and children and interventions must be multifaceted and include all stakeholders, in order to yield sustained health behavior changes within the social context of home, community, and school.

References

Allen JK, Blumenthal RS. (1998). Risk factors in the offspring of women with premature coronary heart disease. *American Heart Journal 135* (3): 428-34.

Allenworth, D. (1994). The research base for innovative practices in school health education at the secondary level. *Journal of School Health,* 64, 180-87.

Backett, K. (1992). The construct of health knowledge in middle-class families. *Health Education Resources* 7: 497-507.

Bandura, A. (1997). *Self-Efficacy: The exercise of control.* New York: W.H. Freeman & Co.

Bandura, A. & Walters, R.H. (1963). *Social Learning and personality development.* New York: Holt, Rinehart & Winston.

Baranowski T, Cullen KW, Nicklas T, Thompson D, Baranowski J. School-based obesity prevention: a blueprint for taming the epidemic. *American Journal Health Behavior,* 2002; 26(6): 486-93.

Beal AC, Ausiello J, Perrin JM. (2001). Social influences on health-risk behaviors among minority middle school students. *Journal of Adolescent Health, 28* (6): 474-80.

Berenson GS, & Srinivasan SR. (2001). Emergence of obesity and cardiovascular risk for coronary artery disease: the Bogalusa Heart Study. *Preventive Cardiology*; 4 (3): 116-121.

Bush, P., Zuckerman, A., Taggart, V., Theiss, P., Peleg, E., & Smith, S. (1989). Cardiovascular risk factor prevention in black school children: The "know your body" evaluation project. *Health Education Quarterly 16*, 215-227.

Cohen, R., Felix, M., & Brownell, K. (1989). The role of parents and older peers in school-based cardiovascular prevention programs: Implications for program development. *Health Education Quarterly, 16,* 245-253.

Dawson, D. A. (1991). Family structure and children's health: United States, 1988. *Vital Health* Statistics, 10, (178): 1-47.

Dielman, T.E., Leech, S.L., Loveland-Cherry, C. (1995). Parents' and children's reports of parent and child alcohol use. *Drugs and Society, 8*, 3-4: 83-101.

Dietz, W. H. (1998). Health consequences of obesity in youth: childhood predictors of adult disease. *Pediatrics*, 101: 518-525.

Dietz WH, Gortmaker SL Preventing obesity in children and adolescents. *Annual Rev Public Health* 2001; 22:337-53.

DiLorenzo, T.M., Stucky-Ropp, R.C., Vander Wal, J.S., Gotham, H.J. Determinants of exercise among children. II. A longitudinal analysis. *Preventive Medicine* 1998; 27 (3): 470-7.

Epstein LH, Valoski A, Wing RR, McCurley J Ten-year follow-up of behavioral, family-based treatment for obese children. *JAMA* 1990; 264 (19): 2519-23.

Francis, C.C., Bope, A.A., MaWhinney, S., Czajka-Narins, D. et al. Body composition, dietary intake, and energy expenditure in nonobese, prepubertal children of obese and nonobese biological mothers. *Journal of the American Dietetic Association* 1999; 99(1): 58-65.

Gillis, A. The determinants of health-promoting lifestyle in adolescent females. *Canadian Journal of Nursing Research* 1994; 26 (2): 13-28.

Golan M, Weizman A, Apter A, Fainaru M. Parents as the exclusive agents of change in the treatment of childhood obesity. *Am J Clin Nutrition* 1998; 67: 1130–5.

Guthrie, B. J., Loveland-Cherry, C. J., Frey, M. A., & Dielman, T. E. A theoretical approach to studying health behaviors in adolescents: An at-risk population. *Journal of Family and Community Health* 1995; 17: 35-48.

Harlan, W. R. A perspective on school-based cardiovascular research. *Health Education Quarterly* 1989; 16: 151-154.

Harsha, D. W. The benefits of physical activity in childhood. *American Journal of Medical Sciences* 1995; 1: S109-S113.

Hoefer WR, McKenzie TL, Sallis JF, Marshall SJ, Conway TL Parental provision of transportation for adolescent physical activity. *Am J Prev Med* 2001; 21(1): 48-51.

Hubert, H. B., Feinleib, M., McNamara, P. M., Castelli, W. P. Obesity as an independent risk factor for cardiovascular disease: 26 year follow-up of participants in the Framingham heart study. *Circulation* 1983; 67: 968-77.

Kahn, L., Warren, C., Harris, W., Collins, J., Williams, B., Ross, J., & Kolbe, L. Youth risk behavior surveillance: United States, 1995. *MMWR, CDC Surveillance Summaries,* 1996; 45 (4): 1-84.

Kelder, S. H., Perry, C. L., Klepp, K. I., & Lytle, LL. Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. *American Journal of Public Health* 1994; 84: 1121-1126.

Kimiecik JC, Horn TS. Parental beliefs and children's moderate-to-vigorous physical activity. *Research Quarterly of Exercise and Sport* 1998; 69 (2): 163-75.

Laffrey, S.L. Development of a health conception scale. *Research in Nursing and Health,* 1986; 9: 107-113.

Lau, R.R.,Quadrel, M.J., & Hartman, K.A. Development and change in young adult's preventive health beliefs and behavior: Influence of parent's and peers. *Journal of Health and Social Behavior* 1990; 31: 240-259.

Luepker RV, Perry CL, McKinlay SM, Nader PR, Parcel GS, Stone EJ, Webber LS, Elder JP, Feldman HA, Johnson CC, et al. Outcomes of a field trial to improve children's dietary patterns and physical activity. The Child and Adolescent Trial for Cardiovascular Health. CATCH collaborative group. *JAMA* 1996; 275 (10): 768-76.

Levine RS, Foster JE, Fullilove RE, Fullilove MT, Briggs NC, Hull PC, Husaini BA, Hennekens CH. Black-white inequalities in mortality and life expectancy, 1933-1999: implications for healthy people 2010. *Public Health Rep* 2001; 116(5): 474-83.

Loveland-Cherry, CJ. Promoting healthy lifestyles in adolescents: Family and school interventions to decrease adolescent alcohol, tobacco, marijuana and inhalant use. *Quality Nursing* 1997; 3: 463-469.

Loveland-Cherry, C. J., Leech, S., Laetz, V. B., & Dielman, T. E. Correlates of alcohol use and misuse in fourth grade children: Psychosocial, peer, parental and family factors. *Health Education Quarterly* 1996; *23:* 497-511.

McBean LD, Miller GD Enhancing the nutrition of America's youth. *J Am College of Nutrition* 1999; 18 (6): 563-71.

McBeath, W. H. Health for all: A public health vision. *American Journal of Public Health* 1991; 81: 1560-1565.

McGinnis, J. M., & Foege, W. H. Actual causes of death in the United States. *Journal of the American Medical Association* 1993; 270: 2207-2211.

McGuire, M.T., Hannan, M., Neumark-Sztainer, D., Cossrow, N. H., & Story, M. Parental correlates of physical activity in a racially/ethnically diverse adolescent sample. *Journal of Adolescent Health* 2002; 30: 253-261.

Morbidity and Mortality Weekly Report Guidelines for school health programs to promote lifelong healthy eating. *Centers for Disease Control and Prevention* 1996; 45 (RR-9): 1-41.

Nader, P. The concept of comprehensiveness in the design and implementation of school health programs. *Journal of School Health* 1990; 60: 133-138.

Nader, P., Sallis, J., Patterson, T., Abramson, I., Rupp, J., Senn, K., Akins, C., Roppe, B., Morris, J., Wallace, J. & Vega, W. A family approach to cardiovascular risk reduction: Results from the San Diego family health project. *Health Education Quarterly* 1989; 16: 229-244.

Nader, P., Sallis, J., Rupp, J., Akin, C., Patterson, T., Abramson, I. San Diego Family Health Project: Reaching families through schools. *Journal of School Health* 1986; 56: 227-231.

Nader PR, Sellers DE, Johnson CC, Perry CL, Stone EJ, Cook KC, Bebchuk J, Luepker RV. The effect of adult participation in a school-based family intervention to improve Children's diet and physical activity: the Child and Adolescent Trial for Cardiovascular Health. *Preventive Medicine* 1996; 25 (4): 455-64.

National Center for Health Statistics. *Health, United States, 1995*, Hyattsville, MD: Public Health Service,1997.

Nicklas TA, von Duvillard SP, Berenson GS. Tracking of serum lipids and lipoproteins from childhood to dyslipidemia in adults: the Bogalusa Heart Study. *Int J Sports Med* 2002; 23,(Suppl 1): S39-43.

Northern California Council for the Community. San Francisco SB 697 community needs assessment executive summary indicator report: Anthology of local studies of community perceptions on health related issues. San Francisco: Northern California Community Services Council, Inc., 1996.

Oliveria SA, Ellison RC, Moore LL, Gillman MW, Garrahie EJ, Singer MR. Parent-child relationships in nutrient intake: the Framingham Children's Study. *Am J Clin Nutr* 1992; 56(3):593-8.

Pate RR, Freedson PS, Sallis JF, Taylor WC, Sirard J, Trost SG, Dowda M. Compliance with physical activity guidelines. Prevalence in a population of children and youth. *Ann Epidemiology* 2002; 12(5), 303-8.

Patterson, C., Kupersmidt, J., & Vaden, N. Income level, gender, ethnicity, and household composition as predictors of children's school-based competence. *Child Development* 1990; 61: 485-494.

Pender NJ, Bar-Or O, Wilk B, Mitchell S. Self-efficacy and perceived exertion of girls during exercise. *Nursing Research* 2002; 51(2):86-91.

Perry, C. L., Luepker, R. V., Murray, D. M., Kurth, C., Mullis, R. Crockett, S., & Jacobs, D. Parent involvement with children's health promotion: The Minnesota home team. *The American Journal of Public Health* 1988; 78: 1156-1160.

Perry, C. L., Luepker, R. V., Murray, D. M., Hearn, M., Halper, A. Dudovitz, B., Maile, M. C., & Smyth, M. Parent involvement with children's health promotion: A one-year follow-up of the Minnesota home team. *Health Education Quarterly* 1989; 16: 171-180.

Perry, C. L., Stone, E. J., Parcel, G., Ellison, R., Nader, P., Webber, L., & Luepker, R. V. School-based cardiovascular health promotion: The child and adolescent trial for cardiovascular health (CATCH). *Journal of School Health* 1990; 60: 406-413.

Pittman, K.P. & Hayman, L.L. Determinants of risk for cardiovascular disease during school-age/adolescent transition. *Prevention* 1997; 12 (4): 12-22.

Resnicow, K., Cohn, L., Reinhardt, J., Cross, D., Futterman, R., Kirschner, E., Wynder, E. L., & Allegrante, J. P. A three-year evaluation of the Know Your Body program in inner-city school children. *Health Education Quarterly* 1992; 19: 463-480.

Rexrode, K. M., Mansen, J. E., & Hennekus, C. H. Obesity and cardiovascular disease. *Current Opinion in Cardiology* 1996; 11: 490-95.

Reynolds, K. D., Killen, J. D., Bryson, S. W., Maron, D. J., Taylor, C. B., Maccoby, N., & Farquhar, J. W. Psychosocial predictors of physical activity in adolescents. *Preventive Medicine* 1990; 19: 541-551.

Rossow, I. & Rise, J. Condordance of parental and adolescent health behaviors. *Social Science Medicine 1994; 38* (9): 1299-1305.

Sallis JF, Patterson TL, Morris JA, Nader PR, Buono MJ. Familial aggregation of aerobic power: the influence of age, physical activity, and body mass index. *Research Quarterly Exercise and Sport* 1989; 60 (4): 318-24.

Schor, E. Adolescent alcohol use: Social determinants and the case for family centered prevention. *New York Academy of Medicine Bulletin* 1996; 73: 335-356.

Simons-Morton, B., McKenzie, T., Stone, E., Mitchell, P., Osganian, V., Strikmiller, P., Ehlinger, S., Cribb, P., & Nader, P. Physical activity in multi ethnic population of third graders in four states. *American Journal of Public Health* 1997; 87 (1): 45-50.

Sinaiko, A. R., Donahue, R. P., Jacobs, D. R., Prineas, R. J. Relationship of weight and rate of increase in weight during childhood and adolescence to body size, blood pressure, fasting insulin and lipids in young adults: the Minneapolis Children's Blood Pressure Study. *Circulation* 1999; 99:1471-14 76.

Stone EJ, Perry CL, Luepker RV. Synthesis of cardiovascular behavioral research for youth health promotion. *Health Education Quarterly* 1989; 16 (2): 155-69.

Stone EJ. School-based health research funded by the National Heart, Lung, and Blood Institute. *J School Health* 1985; 55 (5): 168-74.

Stucky-Ropp RC, DiLorenzo TM. Determinants of exercise in children. *Preventive Medicine* 1993; 22 (6): 880-9.

Taylor, W.C., Blair, S.N., Cummings, S.S., et al. Childhood and adolescent physical activity patterns and adult physical activity. *Med Sci Sports Exercise* 1999; 21: 118-23.

Vanhala, M., Vanhala, P., Kumpusalo, E. Halonen, P., Takala, J. Relation between obesity from childhood to adulthood and the metabolic syndrome: population based study. *British Medical Journal* 1998; 317: 319.

Walker, S., Sechrist, K.R., & Pender, N.J. The health-promoting lifestyle profile: Development and psychometric characteristics. *Nursing Research* 1987; 36 (2): 76-81.

Webster's Concise Dictionary, 2nd edition. Random House: New York, 1997.

Werch, C. D., Young, M., Clark, M., Garrett, C., Hooks, S., & Kersten, C. Effects of a take-home drug prevention program on drug-related communication and beliefs of parents and children. *Journal of School Health* 1991; 61: 346-350.

Woodward, D.R., Boon, J.A., Cummings, F.J., Ball, P.J., Williams, H.M., & Hornsby, H. Adolescents' reported usage of selected foods in relation to their perceptions and social norms for those foods. *Appetite* 1996; 27: 109-117.

World Health Organization Regional Office for Western Pacific Region. *Regional Profile of Cardiovascular Diseases and Diabetes and Associated Risk Factors for Western Pacific Region*, 1999, World Health Organization.

World Health Organization. *Regional Plan for Integrated Prevention and Control of Cardiovascular Diseases and Diabetes for the Western Pacific Region*, 1998-2003, 2002,Available at:
http://www.wpro.who.int/themes_focuses/theme2/focus4/themes2_focus4burden.asp

Table 1

Summary of Literature Review Related to Parental Influence and Models of Primary Prevention of CVD in Children

Author	Sample	Design	Significant Findings	Parental Influence
Dielman et al., 1995	N=542 4th grade students & parents; Midwestern USA.	Descriptive study of parental influence in initiation of alcohol use.	Parental involvement, clear family norms and nurturance were associated with children's lifestyle behaviors.	Quantity and quality of parental involvement clear family norms and enforcement and nurturance significantly affected preadolescent's alcohol use.
Rossow & Rise, 1994	N= 337 Adolescent (16-20 y.o.) & two parent pairs; Norway.	Descriptive study of parental influence on eating and exercise behavior.	Moderate correlation with eating behavior, smaller but significant correlation with exercise behavior.	Parental health behaviors influenced adolescent health behavior through modeling.
Stucky-Ropp & DiLorenzo, 1993 Phase I	N=242 5-6th grade students & mothers; Midwestern USA.	Descriptive study of parental influence on exercise behavior.	Student's own enjoyment of exercise accounted for most of the variance	Family support, mother's perceived barrier to PA and modeling influenced child's PA behavior
DiLorenzo et al., 1998 Phase II	N=111 8-9th grade students & parents: Midwestern USA.	Descriptive study of parental influence on exercise behavior.	Student's knowledge of exercise, perception of friend and family support, and boys' enjoyment of exercise increased. Mothers' SE for exercise decreased and parental modeling decreased at Phase II.	Mothers' support for exercise decreased and daughters' exercise decreased. Boys reported less parental involvement and their level of PA depended on previous level and enjoyment of PA.
Epstein et al., 1990	N = 76 6-12 y.o. students & one obese parent; USA.	RCT Ten year study of family influence on weight loss	Children in the child + parent group showed significantly greater decrease in % overweight at 5 and 10 years than the children in the child only group.	Parental reinforcement influenced weight loss and maintenance of new eating and exercise behaviors over the extended follow-up period.

Author	Sample	Design	Significant Findings	Parental Influence
Golan et al., 1998	N = 60 6-11y.o. children & one obese parent; Israel.	RCT Study of parent as change agent in child weight loss.	35% children in treatment group achieved non-obese status compared to 14% in control group.	Parents taught behavior modification and modeling strategies, which led to increased wt loss in child. Child not treated as "patient."
Cohen, Felix, & Brownell, 1998	N = 1051 households with 5-8th grade student & parent; USA.	Descriptive study of health habits and parent/child perceptions.	Modest correlation between parent and child answers on exercise, diet and fast food consumption.	Researchers concluded that parents need more factual information regarding healthy eating and exercise.
Lau, Quadrel & Hartman, 1990	N = 947 college freshman & parents; Eastern USA.	Descriptive study of parental influence on college freshman's health behaviors	Modeling by either parent influenced eating behavior and parental training influenced active exercise habits. Even by junior year parents influence approximated that of peers.	An enduring family socialization model showed that parental influence continues into early college life.
Gillis, 1994	N = 184 girls, 7-12th grade; rural Nova Scotia.	Descriptive Survey study of girls & their parents' definition of health and health behaviors.	HPLP scores moderately correlated between mothers and daughters. Definition of health predicted HPLP scores.	Mothers' definition of health and dimensions of wellness correlated with daughters' scores.
Nader et al., 1990	N = 206 families Mexican-American (MA) and Anglo (A) families, 300 adults and 323 students in the 5-6th grade; Western USA.	RCT of family-based CVD risk reduction intervention	Decrease in salt intake and systolic blood pressure for both MA & A parents. Children increased their health knowledge and decreased diastolic blood pressure.	Families showed similarities in eating and exercise habits, blood pressure, cholesterol, body type and fat distribution.
Perry et al., 1990	N= 5106 3rd grade multi-ethnic students from four regions of USA.	RCT of school-based CVD risk reduction intervention	No significant difference in parental influence on dietary fat in school only or school + home groups.	Parental influence on diet not significantly different with school only and school plus home interventions.

Author	Sample	Design	Significant Findings	Parental Influence
Nader et al., 1996	N = 1631 3, 4, & 5th grade students; USA.	Secondary analysis of family component to assess parental influence on child eating and exercise knowledge, attitudes and behaviors.	Moderate "dose" of parental involvement effected knowledge and attitudes but not dietary salt or cholesterol change. MVPA and PA SE increased with more family participation.	Increased family participation influenced knowledge, self-efficacy for diet and exercise change and exercise behavior.
Perry et al., 1989	N = 2250 3rd grade students, Midwestern USA.	RCT Study of school, school plus home and home based CVD risk reduction program.	School-based intervention group gained more knowledge and home-based showed more behavior change.	Parent participation and modeling improved behavior change in children.

Note. Abbreviations are as follows: USA = United States of America, y.o. = years old, PA = physical activity, RCT = randomized controlled trial, HPLP = health promoting lifestyle profile, CVD = cardiovascular disease, PE = physical education, MVPA = moderate to vigorous physical activity, and SE = self-efficacy.

Chapter IV

Determinants of Eating and Exercise Behaviors in Children

by D. E. Norton, C. M. Waters, E. S. Froelicher, & V. Carrieri-Kohlman

Abstract

Background: The number of children considered overweight and sedentary has doubled, increasing their risks for developing chronic diseases as these habits track from childhood into adulthood. Research on the determinants of children's health behaviors is in the early stages and is often guided by social cognitive theory.

Objectives: The purposes of this study were to investigate the influence of specific personal and environmental influences on children's eating and exercise behaviors and to determine whether children were meeting the public health standards for eating and exercise behaviors.

Methods: 153 fourth and fifth grade students recruited from elementary schools in Northern California participated in this descriptive, cross-sectional study. Self-report data were collected during physical education class.

Results: Children were relatively healthy, knowledgeable about healthy eating, physically active but were not participating in PE classes, watched little TV, received social support mainly from their parents, and confident about choosing healthier foods and exercising, but were not consuming the recommended servings of fruits, vegetables and milk. These determinants explained 22% of the variance in eating behavior and 25% of the variance in exercise behavior. Children confident about choosing healthier foods and engaged in physical activity were 10% more likely to meet the public health standard of five servings of fruits and vegetables per day and those who ate healthier were 10% more likely to meet the public health standard of at least 30 minutes of physical activity per day.

Conclusions: Children met the public health standard for physical activity, but not for dietary intake of fruits and vegetables. Understanding the determinants of children's eating and exercise behaviors is multifactorial and involves personal and environmental influences.

Key words: diet, eating, exercise, physical activity, social support, self-efficacy, health, health behaviors, television, children, preadolescents

Introduction

The number of children considered overweight and sedentary has doubled since the 1980s (Heini & Weinsier, 1997), increasing their risk of cardiovascular disease (CVD), the leading cause of disability and death among U.S. adults (American Heart Association, 2002). Sixty percent of overweight children have at least one CVD risk factor and 20% of overweight children have two or more CVD risk factors (Dietz & Gortmaker, 2001). Current research indicates that eating and exercise habits consolidate before age 10 and that these habits persist into adulthood (Lindquist, Reynolds & Goran, 1999; Neumark-Sztainer, Story, Resnick, & Blum, 1996). The American Heart Association, the National Institutes of Health, and the Center for Disease Control and Prevention's Healthy People 2010 Initiative have all called for increased primary prevention efforts that begin early in life in order to reduce chronic disease morbidity and mortality rates among adults (Nicklas, von Duvillard, & Berenson, 2002; Berenson & Srinivasan, 2001).

Fifty percent of premature illnesses and deaths in the US are related to unhealthy lifestyle behaviors (McGinnis & Foege, 1993). Healthy eating and regular physical activity have been shown to decrease the risk of developing CVD and other potentially preventable chronic conditions (American Heart Association, 2002). The determinants of eating and exercise behaviors are well-documented in adults (Hovell et al., 1991; Irwin, Ainsworth, & Conway, 2001; Liebman et al., 2003; Sharlin et al., 1992), but the documentation of the determinants of eating and exercise behaviors in children is still in the early stages (Nader et al., 1986; Perry et al., 1985; Perry et al., 1990). Some of the cited reasons for obesity among children are the increased use of computers, video

games, and television (TV) viewing, all of which are sedentary activities (Heini & Weinser, 1997; Lowery et al., 2002).

Health behavior research is often guided by Bandura's (1997) social cognitive theory, which posits that human functioning is viewed as the product of the dynamic and reciprocal interplay of personal (knowledge, beliefs, and self-efficacy), behavioral (actions), and environmental (social support and availability of resources) influences. Self-efficacy and social support have been shown to be powerful predictors of behavioral change in adults, especially for eating and exercise behaviors (Dishman & Buckworth, 1996; McAuley, Courneya, Rudolph, & Lox, 1994; Sallis & Owen, 1999). Knowledge and perceived health have been shown to be modest predictors of eating and exercise behaviors in adults (Dishman & Buckworth, 1996; Sallis & Owen, 1999). These known determinants of eating and exercise behaviors in adults have been studied relatively little in children. Effective interventions must be based on scientifically demonstrated factors or determinants known to influence a particular behavior.

The purposes of this study were to (a) describe the eating and exercise behaviors and determinants of children, (b) explore the influence of eating and exercise determinants on children's eating and exercise behaviors, and (c) determine whether children are meeting the public health recommendations for eating and exercise behaviors, taking into consideration demographic characteristics. Within the context of the personal-behavioral-environmental triad, the selected determinants were perceived health and definition of health (health factors), self-efficacy for eating and exercise (self-efficacy factors), social support for eating and exercise (social support factors), dietary

knowledge, dietary intention, usual food choice and eating behavior (dietary factors), and TV viewing and exercise behavior (physical activity factors).

Method

Design

A descriptive, cross-sectional design was employed for this study.

Sample and Setting

Fourth and fifth grade students were recruited from 12 participating urban and suburban elementary schools in Northern California that were chosen in order to maximize variability in demographic characteristics. The schools are located in a school district with approximately 36,824 students in grades K through 12. Within this school district, 51% of the students are Whites, 22% are Hispanics, 12% are Blacks, 8% are Asians, 4% are Filipinos, 1% are Pacific Islanders, 1% are American Indians, and 1% are multiracial or did not report their race. The median family income is $63,300 and 28% of the students participate in the free or reduced fee lunch program. Children in the fourth and fifth grades were the focus of the study because research suggests that early consolidation of health behaviors implies that interventions should begin prior to sixth grade, before behavioral patterns are resistant to change (Kelder et al., 1994), they have the cognitive ability to complete self-report questionnaires (Perry et al., 1988), and developmentally, they are beginning to establish independence and develop their own style (Murray, 2000).

Recruitment

The University's Committee on Human Research, the school district's research and evaluation department, and each school's principal approved the study materials

before recruitment began. Students were recruited through a 10-minute information session presented during their physical education (PE) class. In addition, a letter was sent home to their parents explaining the purpose and procedures of the study. Parents and their fourth and fifth grade children who agreed to participate in the study mailed signed informed consent and assent forms, respectively, to the research office. Of the 4,500 consents distributed, 175 were returned and 153 students were enrolled in the study.

Measures

Eating and exercise behaviors were measured using the Eating and Exercise Scale from the standardized Youth Risk Behavior Survey (YRBS), distributed by the Centers for Disease Control and Prevention (2001). Adequate reliability of the YRBS has been documented (Brener et al., 2002, Krebs-Smith et al., 1996).

Eating subscale measures how often a youth drinks or eats fruit and fruit juice, vegetables (green salad, potato, not fried, carrots, and other vegetables), and milk in the past 7 days. The seven frequency response options are none, 1-3 times per week, 4-6 times per week, 1 time per day, 2 times per day, 3 times per day, or 4 or more times per day. Scores range from 0 to 12. Higher scores indicate a greater dietary intake of fruits, vegetables, and milk per week.

Exercise subscale measures participation in moderate, vigorous, strengthening and flexibility exercises, and number of physical education classes attended at school, including minutes actually spent exercising or playing sports during physical education class, in the past 7 days. Scores range from 4 to 26. Higher scores indicate participation in more physical activities per week.

TV viewing was measured by asking how many hours per day on school days do you watch TV. Scores range from 0 to 5. A higher score indicates more hours of TV viewing on school days.

Perceived health was measured with the self-rated 4-item health perception subscale (HPS) of the Multilevel Assessment Instrument (Lawton, et al., 1982). The HPS include items about current health, health compared to 3 years ago, impact of health on quality of life, and health compared to most people your age. Scores range from 4 to 13. Lower scores indicate a healthier perception of health. The scale has been used to measure perceived health in adolescents as well as older and ethnic minority populations (Garcia-Maas, 1999; Gillis, 1994). Cronbach's alpha internal consistency reliability scores have ranged from .58 to .76; criterion-related validity was established with independent ratings by a clinical psychologist, yielding correlations of $r = .63$ and $r = .52$; and test-retest reliability was $r = .92$ at a 3-week interval (Gillis, 1994).

Definition of health was measured using the Laffrey Health Conception Scale, which is a 28-item scale designed to assess a person's definition of health (Laffrey, 1986). Likert-type scale response options range from 1 (strongly disagree) to 6 (strongly agree). Scores range from 28 to 168. Higher scores indicate a eudaimonistic health conception, which is defined as exuberant well-being. Cronbach's alpha reliability coefficients for internal consistency have ranged from .87 to .90 (Barnett, 1989; Gillis, 1994). Items include statements such as "being healthy means," "adequately carrying out my daily responsibilities," "living at my top level," and "adapting to things as they really are not as I'd like them."

Dietary knowledge, dietary intention, usual food choice, perceived support for diet and exercise, and self-efficacy for diet and exercise were assessed using subscales of the Health Behavior Questionnaire (HBQ) (Parcel et al., 1995). Based on the social cognitive theory, the HBQ was designed specifically to assess eating and exercise behaviors in elementary school children. A complete description of the HBQ, including its reliability and validity psychometric properties, has been reported (Perry, Mullis & Maile, 1985, Perry, Griffin, & Murray, 1985).

Dietary knowledge (14 items), *dietary intention* (13 items), and *usual food choice* (14 items) subscale consists of dichotomous response options. Each item consists of a picture of a healthy food and an unhealthy food. Respondents are asked to choose which food in the pair is "better for your health" (*dietary knowledge*); which food would you "choose to eat if you had to choose just one" (*dietary intention*); and which "foods do you eat more often" (*usual food choice*). Scores range from 0 to 41. Higher scores indicate more knowledge of healthier foods, more intention to eat healthier foods, and dietary intake of foods that are healthier, respectively. Examples of paired items are "oranges or a piece of cake," "frozen yogurt or ice cream," and "fresh fruit or a candy bar."

Social support for diet subscale consists of 21 items that ask, for example, "who wants you to eat popcorn without salt or butter?" parents, teachers or friends. The dichotomous response options are "yes" or "no." Scores range from 0 to 21. Higher scores indicate greater perceived social support for selecting healthier food choices.

Social support for exercise subscale consists of 18 items that ask, for example, "when I am physically active, one or both of my parents smile and cheer for me." The

dichotomous response options are "yes" or "no." Scores range from 0 to 18. Higher scores indicate greater perceived social support for participation in physical activities.

Self-efficacy for diet subscale consists of 15 items and measures confidence in one's ability to eat in a healthier way. Respondents are asked, for example, "how sure are you that you can ask for a baked potato instead of French fries?" Response options are rated on a 3-point ordinal scale: 0 (not sure), 1 (a little sure), or 2 (very sure). Scores range from 0 to 45. Higher scores indicate more confidence to eat in a healthier way.

Self-efficacy for exercise subscale consists of 5 items and measures confidence in one's ability to engage in exercise. Respondents are asked, for example, "how sure are you that you can exercise and keep moving for most of the time you are in PE class?" Response options are rated on a 3-point ordinal scale: 0 (not sure), 1 (a little sure), or 2 (very sure). Scores range from 0 to 15. Higher scores indicate more confidence to engage in exercise.

Demographic characteristics assessed were gender, age, grade level, ethnicity/race, family's annual income, and parents' educational level.

Procedure

The instruments were administered to students who had returned assent and consent forms. The instruments used in the study have been used with adolescents, though some not with children. Thus, the instruments were pilot-tested with children in fourth and fifth grades; no modifications were required. Students were interviewed in small groups of two to eight students during PE class. Each item on the instrument was read aloud; students were instructed to listen, follow along, answer each question, and try not to read each item themselves. The instruments were sequenced so that items related to

behavior were assessed before items related to knowledge, beliefs, intention, support, and self-efficacy to decrease the potential for students to base their responses on what they thought was healthy for them or what others might think was healthy for them. The interviewer circulated in the room to make certain that the students were keeping apace and stopped to answer questions as needed. Study procedures were completed in approximately 45 minutes.

Data Analysis

Summary descriptive statistics were computed to describe the study variables. Responses were examined for significant floor (percentage of respondents with lowest possible score) and ceiling (percentage of respondents with highest possible score) effects. Depending on the level of data, independent student's *t*-test or chi-square analyses were computed for mean score response differences using Bonferroni correction. Linear regression analyses were used to determine individual and combined relationships for eating and exercise behaviors. Logistic regression analyses were used to estimate the likelihood of the children meeting the public health standards for eating and exercise behaviors. Groups of predictor variables (determinants) were entered concurrently by blocks, which allow an estimate of the unique contribution of each block of determinants to variance in the outcome variable. Demographic characteristics as confounders in the models were not statistically significant, and thus, they are not discussed or included in the regression tables. The alpha level was set at .05, two-tailed, for determining statistical significance. Analyses were computed using SPSS version 11.5.

Results

Sample

The demographic profile of the sample is presented in Table 1. The sample of 153 fourth (48%) and fifth (52%) grade students included more girls (n = 105, 70%) than boys. Sixty-six percent were Caucasian, 15% were Hispanic, 13% were Asian American, 3% were African American, and 3% were multiracial. The students ranged in age from 9 to 12 years (M = 9.8, SD = 0.99; girls: M = 9.9, SD = .69; boys: M = 9.7, SD = 1.5). Twenty-seven percent of the sample came from homes with divorced parents and 17% were from single parent families. Parents, including two custodial grandmothers, ranged in age from 26 to 68 years (mothers: M = 42 years, SD = 5.20; fathers: M = 44 years, SD = 5.76). Most of the children were from middle-income families (M = $73,590, SD = 18,700) and came from homes where parents had at least some college education (81%). There were no statistically significant differences among the demographic variables.

Eating and Exercise Behaviors

Eating behavior included the consumption of fruit and fruit juice, vegetables, and milk (see Table 2). During the last 7 days, 44% of the students reported they ate the U.S. Department of Agriculture (USDA) (2000) minimum recommended three servings of fruit and fruit juice per day; 17% of them ate the USDA minimum recommended four servings of vegetables per day; 26% of them ate the USDA 5-A-Day Program's minimum recommended five servings of fruits and vegetables per day; and 19% of them drank the USDA minimum recommended four servings of milk per day. The mean score for eating behavior and none of the proportions for dietary intake of fruits, vegetables, and milk consumption were statistically significant for gender.

Exercise behavior included participation in moderate, vigorous, strength and flexibility exercises, and PE class, including minutes spent in PE class (see Table 2). Moderate exercise was defined as "exercise for at least 30 minutes that did not make you sweat or breathe hard." Vigorous exercise was defined as "exercise for at least 20 minutes that makes you sweat or breathe hard." Both girls and boys reported a mean of 3 days of moderate exercise, 4 days of vigorous exercise, 3 days of strength and flexibility, and 2 days of participating in PE classes. The mean score for exercise behavior was not statistically significant for gender difference.

During the last 7 days, 7% (n = 9) of the students participated in no moderate exercise, 2% (n = 3) of them participated in no vigorous exercise, 10% (n = 13) of them participated in no strength and flexibility exercise, and 0.8% (n = 1) of them participated in no PE classes. Eighty percent (n = 102) of the students reported they attended at least one PE class per week. A higher percentage of boys (n = 29, 67%) reported spending 30 minutes "actually exercising" or "playing sports" while in PE class than did girls (n = 44, 52%), although this difference was not statistically significant.

"How many hours do you watch TV?" was used as a measure of sedentary behavior (see Table 2). Hours of TV viewing on school days were similar for both boys and girls (M = 1.59, SD = 1.74). Boys (58%, n = 25) viewed TV an average of 1.7 hours (SD = 1.63) per day and girls (34%, n = 29) viewed TV an average of 1.5 hours (SD = 1.80) per day on school days. Forty-one percent of the students (48% of the girls and 26% of the boys) viewed TV less than 1 hour on school days and 42% of them viewed TV between 1 and 3 hours on school days (34% of the girls and 58% of the boys).

Health Determinants

Perceived health status. Most of the students rated their health as "good" (65%, n = 98) or "excellent" (28%, n = 43) and 56% (n = 85) of them rated their health better than it was 3 years ago. The mean score for perceived health status was 6.28, with lower scores indicating a better personal health perception (see Table 2). There was no statistically significant difference between boys and girls.

Definition of health. The definition of health scores ranged from 74 to 168 (see Table 2). The mean definition of health scores for both boys (M = 132.16, SD = 18.02) and girls (M = 129.61, SD = 22.98) were in the mid-high range, indicating a eudaimonistic or comprehensive view of health. There was no statistically significant difference between boys and girls.

Diet Determinants

The scores on dietary knowledge, dietary intention and usual food choice ranged from 7 to 41 (see Table 2). Girls' scores (M = 26.43, SD = 6.12) were statistically similarly to boys' scores (M = 25.25, SD = 5.66). Most students (71%, n = *109*) scored between 22 and 41 on the total subscale. Dietary knowledge scores ranged from 2 to 14, with a mean score of 10.89 (SD = 2.30). Most students (78%, n = 119) scored between 10 and 14, which means that they correctly answered 71% to 100% of the questions. Fourteen students (9.2%) knew all of the correct answers and 57 of them (37%) missed one or two answers. Dietary intention scores ranged from 2 to 13, with a mean score of 7.23 (SD = 2.42), indicating that students chose healthier foods 54% of the time. In response to which foods do they eat most of the time (usual food choice), scores ranged

from 2 to 14 ($M = 7.93$, $SD = 2.68$), indicating both girls and boys ate healthier foods 56% of the time.

Social Support Determinants

Social support for dietary behavior scores ranged from 0 to 21 (see Table 2). The mean score for parent support of healthy eating was 3.97 (SD = 1.66), 2.27 ($SD = 1.94$) for teacher support, and 1.64 ($SD = 1.80$) for friend support. There was no statistically significant gender difference.

Social support for exercise behavior scores ranged from 0 to 17 (see Table 2). The mean score for parent support for exercise was 3.24 (SD = 1.36), 1.80 ($SD = 0.69$) for teacher support, and 4.61 for friend support. There was no statistically significant gender difference.

Self-Efficacy Determinants

Dietary self-efficacy. Scores for dietary self-efficacy ranged from 19 to 45 (see Table 2). There was no statistically significant gender difference in students' confidence in their ability to choose healthier foods. A majority of students reported they were "very sure" that they could eat fresh or frozen vegetables instead of canned vegetables ($n = 111$, 73%); popcorn without salt or butter instead of popcorn with salt and butter ($n = 90$, 59%); and baked potato instead of French fries ($n = 101$, 73%). Seventy-three percent ($n = 111$) of the students were "very sure" that they could drink low fat milk instead of whole milk, and juice instead of soda ($n = 101$, 67%).

Exercise self-efficacy. Scores for exercise self-efficacy ranged from 5 to 15 (see Table 2). Boys' and girls' mean scores were not statistically significantly different (Boy: $M = 13.48$, $SD = 1.89$; Girls: $M = 12.59$, $SD = 2.23$). Seventy-five percent of both boys (n

= 36) and girls (n = 78) reported they were confident that they could be "physically active 3 to 5 times a week."

Determinants of Eating and Exercise Behaviors

A bivariate correlation matrix was constructed to detect collinearity and examine associations between study variables (see Table 3). All correlations were in the expected direction and statistically significant. Determinant variables that correlated greater than r = .20 with eating behavior were social support for exercise (.21) and exercise self-efficacy (.23). Determinant variables that correlated greater than r = .20 with exercise behavior were dietary knowledge, dietary intention and usual food choice (.26), social support for exercise (.29), diet self-efficacy (.20), exercise self-efficacy (.33), and eating behavior (.37).

The results of the linear regression analyses tables present the beta weights after all blocks were entered, that is, the final beta weights and the adjusted R squares. Nine predictor variables explained 22% of the variability in eating behavior (see Table 4) and 25% of the variability in exercise behavior (see Table 5). The F-statistics were significant for both the eating and exercise behavior models, indicating that each predictor variable made a meaningful contribution to the fit of the models. Exercise behavior was the significant predictor in the eating behavior model. Dietary factors, social support for exercise, and exercise self-efficacy were significant predictors in the exercise behavior model.

Meeting the Public Health Standards for Eating and Exercise Behaviors

The outcome variables that measured whether children met the public health standard for eating behavior (five or more servings of fruits and vegetables per day) and

exercise behavior (30 or more minutes of exercise on five or more days per week) were coded 0 for meeting the public health standard and 1 for being at risk by not meeting the standard. Odds ratios (OR) and 95% confidence intervals (CI) were computed.

Children who were confident about eating healthier foods (OR = 1.13, CI: 1.01, 1.26, $p = .04$) and participated in regular physical activity (OR = 1.15, CI: 1.04, 1.27, $p = .001$) were 10% more likely to eat the public health minimum standard of at least five servings of fruits and vegetables per day than children who were not confident about eating healthier foods and did not participate in regular physical activity (see Table 6). Children who ate healthier (OR = 1.16, CI: 1.00, 1.35, $p = .05$) were 10% more likely to engage in the public health minimum standard of at least 30 minutes of moderate physical activity on most days of the week than children who were physically inactive (see Table 7). The overall eating behavior model was statistically significant ($\chi^2(9) = 29.73, p = .0005$), but not the overall exercise behavior model ($\chi^2(9) = 14.03, p = .12$).

Discussion

In this study, we investigated the personal (health beliefs, knowledge, intention, choice, and self-efficacy) and environmental (social support) influences of eating (dietary intake of fruits, vegetables, and milk) and exercise (TV viewing and physical activity) behaviors in children within the context of social cognitive theory (Bandura, 1997). The determinants as a whole accounted for a moderate proportion of the variance in the eating and exercise behaviors of children. Physical activity participation contributed the most to understanding children's eating behavior. Whereas, knowledge about and the intention and choice to eat healthier foods, actual eating behavior, and social support and self-efficacy for exercise contributed the most to understanding their exercise behavior.

Other researchers have shown that these determinants influence eating and exercise behaviors in children. Lowry et al. (2002), in an analysis of the 1999 YRBS data, found that sedentary behavior (TV watching $\geq$ 2 hours per day) was associated with insufficient intake of fruits and vegetables (i.e., less than 5 servings per day) in a sample of 2,797 White girls and 2,594 White boys. In a sample of 184 rural girls, Gillis (1994) found significant relationships between the girls' health promotion behaviors and health beliefs and parental social support. Dissimilar to this study's findings, no other research has reported a relationship between exercise behavior and dietary knowledge, dietary intention and usual food choice.

The children in this study were relatively healthy, knowledgeable about healthy eating and confident about eating healthier foods and exercising, but were not eating the minimum recommended servings of fruits, vegetables, or milk. A majority of them, however, were sufficiently physically active, but were not participating in PE classes. Few children watched more than 2 hours of TV on school days. Although not statistically significant, a majority of the students received more social support for healthy eating from their parents as compared to friends and teachers, and more social support for exercising from their friends as compared to parents and teachers. There seems to be a need to increase efforts to promote positive health behaviors in children with the help of their parents, friends, school, and community.

With the exception of hours per day of TV viewing, findings of this study are consistent with findings of the National Health and Nutrition Examination Survey (NHANES) III (U.S. Department of Health and Human Services (DHHS), 1998) and the YRBS (Kann et al., 2000). Findings of the NHANES III revealed that more than half of

youth do not eat the daily recommendation of five servings of fruits and vegetables and only 15% of them ate the recommended servings of fruits and vegetables in the 24 hours prior to the survey. Data from the 1999 YRBS indicated that over 43% of adolescents watched two or more hours of TV on school days (74% Blacks, 52% Hispanics, and 34% Whites, non-Hispanic). Overall, 11% of youth reported being overweight, 31% of them were sedentary (i.e., did not participate in moderate or vigorous physical activity at the recommended levels), and 76% of them ate less than five servings of fruits and vegetables per day. White, non-Hispanic youth fared worst, viewing more TV, being sedentary, and eating insufficient daily amounts of recommended fruits and vegetables.

Although there were no statistically significant differences in demographic characteristics (gender, age, grade level, race/ethnicity, and parents' income and education level) in this study, other researchers have suggested that children from low-income families, though not more likely to be overweight than those from middle-income families, may be more likely to experience conditions that limit their control over factors that affect their weight (McMurray et al., 2000). Lack of access to resources such as adequate housing, safe recreation areas, affordable fresh food sources and adequate storage may lead to reliance on high-calorie, high-fat foods and to lack of exercise.

The results of this study have implications for developing interventions that promote healthy eating and exercise behaviors in preadolescents. The American Heart Association, the National Institutes of Heath, and the Center for Disease Control and Prevention's Healthy People 2010 Initiative have all mandated increased primary prevention efforts for the 21st century. Children in this study met the public health standard of at least 30 minutes of moderate physical activity on most days of the week.

They, however, did not meet the public health standard of at least five servings per day of fruits and vegetables. Children who were confident about eating healthier foods and participated in physical activity were 10% more likely to meet the public health minimum standard for dietary intake of fruits and vegetables. Children who ate healthier were 10% more likely to meet the public health minimum standard for physical activity.

Limitations of the study are that it was a cross-sectional study that collected data at one point in time, there was a reliance on self-report measures, and a small, homogenous convenience sample. Generalization of the study findings is limited mostly to educated, middle-income, White, non-Hispanic children. Despite these limitations, we know that many modifiable risk behaviors for chronic diseases form and shape in childhood, and often, track into adulthood. Understanding the determinants of children's eating and exercise behaviors is multifactorial and involves personal and environmental influences to counteract behavioral patterns before they are resistant to change.

References

American Heart Association (2002). *Heart disease and stroke statistics--2003 update.* Dallas: American Heart Association.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: W. H. Freeman & Co.

Barnett, C.F. (1989). The relationship of selected cognitive-perceptual factors promoting behaviors of adolescents. *Dissertation Abstracts International,* 121974.

Berenson, G.S., & Srinivasan, S.R. (2001). Emergence of obesity and cardiovascular risk for coronary artery disease: The Bogalusa Heart Study. Preventive Cardiology, 4 (3), 116-121.

Brener ND, Kann L, McManus T, Kinchen S, Sundberg E, Ross J. Reliability of the 1999 youth risk behavior survey questionnaire. *Journal of Adolescent Health,* 2002; 31:336–342.

Centers for Disease Control and Prevention (2002). Youth risk behavior surveillance - United States, 2001. *Morbidity & Mortality Weekly Report,* 51, 1-64.

Dietz, W.H., Gortmaker, S.L. (2001). Preventing obesity in children and adolescents. *Annual Review in Public Health, 22,* 337-353.

Dishman, R. K., & Buckworth, J. (1996). Increasing physical activity: a quantitative synthesis. *Medicine and Science in Sports and Exercise, 28*(6), 706-719.

Garcia-Maas, L.D. (1999). Intergenerational analysis of dietary practices and health perceptions of Hispanic women and their adult daughters. *Journal of Transcultural Nursing,* 10 (3), 213-9.

Gillis, A. J. (1994). Determinants of health-promoting lifestyles in adolescent females. *Canadian Journal of Nursing Research, 26,* 13-28.

Heini, A.F., Weinsier, R.L. (1997). Divergent trends in obesity and fat intake patterns: The American paradox. *American Journal of Medicine, 102,* 259-264.

Hovell, M., Sallis, J., Hofstetter, R., Barrington, E., Hackley, M., Elder, J., Castro, F., Kilbourne, K. (1991). Identification of correlates of physical activity among Latino adults. *Journal of Community Health,* 16 (1), 23-36.

Irwin, M.L., Ainsworth, B.E., Conway, J.M. (2001). Estimation of energy expenditure from physical activity measures: determinants of accuracy. *Obesity Research,* 9(9),517-25.

Kann L., Kinchen, S.A., Williams, B.I., Ross, J.G., Lowry, R., Grunbaum, J.A., Kolbe, L.J. (2000). Youth Risk Behavior Surveillance System. Youth risk behavior surveillance--United States, 1999. *MMWR, 49* (5), 1-32.

Kelder, S. H., Perry, C. L., Klepp, K. I., & Lytle, L. L. (1994). Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. *American Journal of Public Health, 84*, 1121-1126.

Krebs-Smith, S.M., Cook, A., Subar, A.F., et al. (1996). Fruit and vegetable intakes of children and adolescents in the United States. *Pediatric Adolescent Medicine, 150,* 81-86.

Laffrey, S.L. (1986). Development of a health conception scale. *Research in Nursing and Health, 9,* 107-113.

Lawton, M. P., Moss, M., Fulconer, M. & Kleban, M. H. (1982). A research and service-oriented multilevel assessment instrument. *Journal of Gerontology, 371* (1), 91-99.

Liebman, M., Pelican, S., Moore, S.A., Holmes, B., Wardlaw, M.K., Melcher, L.M., Liddil, A.C., Paul, L.C., Dunnagan, T., Haynes, G.W. (2003). Dietary intake, eating behavior, and physical activity-related determinants of high body mass index in rural communities in Wyoming, Montana, and Idaho. *International Journal of Obesity Related Metabolic Disorders*, 27(6), 684-92.

Lindquist, C.H., Reynolds, K.D., Goran, M.I. (1999). Sociocultural determinants of physical activity among children. *Preventive Medicine, 29* (4), 305-312.

Lowry, R., Wechsler, H., Galuska, D.A., Fulton, J.E., Kann, L. (2002). Television viewing and its associations with overweight, sedentary lifestyle, and insufficient consumption of fruits and vegetables among US high school students: Differences by race, ethnicity, and gender. *Journal of School Health, 72* (10), 413-421.

McAuley, E., Courneya, K. S., Rudolph, D. L., & Lox, C. L. (1994). Enhancing exercise adherence in middle-aged males and females. *Preventive Medicine, 23*(4), 498-506.

McGinnis, J. M., & Foege, W. H. Actual causes of death in the United States. *Journal of the American Medical Association* 1993; 270: 2207-2211.

McMurray, R.G., Harrell, J.S., Deng, S., Bradley, C.B., Cox, L.M., & Bangdiwala, S.I. (2000). The influence of physical activity, socioeconomic status, and ethnicity on the weight status of adolescents. *Obesity Research 8*(2): 130-9.

Murray, J.S. (2000). Conducting psychosocial research with children and adolescents: A developmental perspective. *Applied Nursing Research, 13* (3), 151-156.

Nader, P., Sallis, J., Rupp, J., Akin, C., Patterson, T., Abramson, I. San Diego Family Health Project: Reaching families through schools. *Journal of School Health* 1986; 56: 227-231.

Neumark-Sztainer, D, Story, M, Resnick, M.D., Blum, R.W. (1996). Correlates of inadequate fruit and vegetable consumption among adolescents. Preventive Medicine, 25(5), 497-505.

Nicklas, T.A., von Duvillard, S.P., Berenson, G.S. (2002). Tracking of serum lipids and lipoproteins from childhood to dyslipidemia in adults: The Bogalusa Heart Study. *International Journal of Sports Medicine, 23*, S39-S43.

Parcel, G.S., Edmundson, C.L., Perry, C.L., Feldman, H.A., O'Hara-Tompkins,N., Nader, P.R., Johnson, C.C., Stone, E.J. (1995). Measurement of self-efficacy for diet-related behaviors among elementary school children. *Journal of School Health, 65*, (1), 23-27.

Perry, C. L., Luepker, R. V., Murray, D. M., Kurth, C., Mullis, R. Crockett, S., & Jacobs, D. (1988). Parent involvement with children's health promotion: The Minnesota home team. *The American Journal of Public Health, 78*,1156-1160.

Perry, C.L., Mullis, R.M., Maile, M.C. (1985). Modifying the eating behavior of young children. *Journal of School Health, 55*, 399-402.

Perry, C.L., Griffin, G., Murray, D.M. (1985). Assessing needs for youth health promotion. *Preventive Medicine, 14*, 379-393.

Perry, C. L., Stone, E. J., Parcel, G., Ellison, R., Nader, P., Webber, L., & Luepker, R. V. School-based cardiovascular health promotion: The child and adolescent trial for cardiovascular health (CATCH). *Journal of School Health* 1990; 60: 406-413.

Sallis, J. F., & Owen, N. (1999). *Physical activity and behavioral medicine*. Thousand Oaks, CA: Sage.

Sharlin, J., Posner, B.M., Gershoff, S.N., Zeitlin, M.F., Berger, P.D. (1992). Nutrition and behavioral characteristics and determinants of plasma cholesterol levels in men and women. *Journal of the American Dietetic Association*, 92 (4), 434-40.

U.S. Department of Health and Human Services (1998). National Center for Health Statistics. *Third National Health and Nutrition Examination Survey, 1988–1994*. Hyattsville, MD: Centers for Disease Control and Prevention.

U.S. Department of Agriculture, Center for Nutrition Policy and Promotion (2000). Nutrition and Your Health: Dietary guidelines for Americans. Available online at: http://www.usda.gov/cnpp/DietGd.pdf

Table 1

Demographic Profile

Characteristic	*n*	%
Gender		
Girls	105	68.6
Boys	48	31.4
Age		
9-10 years old	132	86.0
11-12 years old	21	14.0
Grade Level		
Fourth grade	73	48.0
Fifth grade	80	52.0
Race/Ethnicity		
Caucasian	100	66.0
Asian/Pacific Islander	20	13.0
Hispanic	23	15.0
Black	5	3.0
Multiracial	5	3.0
[a]Family's Annual Income		
< $20,000	3	2.2
$21-49,999	15	16.3
$50-89,999	25	27.2
≥ $90,000	49	53.3

Note. Percentages are adjusted for missing cases.

[a]Data reported by mothers.

Table 2

Summary Statistics of Study Variables

Variable	*Range*	*M*	*SD*
[a]Perceived health	4-12	6.28	1.52
Definition of health	70-168	130.39	21.56
Dietary knowledge, dietary intention, and usual food choice	7-41	26.06	5.99
Social support for healthy eating	0-21	7.83	4.32
Social support for exercise	4-15	9.65	1.98
Diet self-efficacy	19-45	37.58	5.46
Exercise self-efficacy	5-15	12.88	2.16
Television viewing	0-5	1.59	1.74
[b]Eating behavior			
Fruits, vegetables, and milk dietary intake	0-12	5.73	2.93
[c]Exercise behavior	4-26	12.02	4.51
[d]Moderate exercise	0-7	3.19	2.12
[d]Vigorous exercise	0-7	4.37	2.03
[d]Strength & flexibility	0-7	2.73	2.01
[d]Physical education class	0-5	1.75	0.91

Note. Higher score indicates more positive behavior. [a]Lower score indicates more positive perception of health. [b]Servings per day. [c]Higher score indicates more physical activities per week. [d] Days per week.

Table 3

Bivariate Correlations Between Study Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Perceived health	-----									
2. Definition of health	-.21**	-----								
3. Dietary knowledge, dietary intention, & usual food choice	-.14	.13	-----							
4. Social support for healthy eating	.05	.05	.24**	-----						
5. Social support for exercise	-.25**	.04	.11	.18*	-----					
6. Diet self-efficacy	-.20*	.11	.53**	.15*	.14	-----				
7. Exercise self-efficacy	-.32**	.30**	.27**	.16*	.21**	.51**	-----			
8. Television viewing	.03	-.04	-.24**	.05	-.05	-.21*	-.16	-----		
9. Eating behavior	-.15	.16	.19*	.19*	.21*	.19*	.23*	-.02	-----	
10. Exercise behavior	-.18*	.08	.26**	.05	.29**	.20*	.33**	-.00	.37**	-----

*$p < .05$. **$p < .01$.

Table 4

Regression Analysis for Determinants Predicting Eating Behavior

Determinant	*B*	*SE B*	*β*	df_{Change}	F_{Change}	R^2_{Change}
Health Belief Factors				2, 123	2.50	4%
Perceived health	-0.08	0.17	-.05			
Definition of health	0.02	0.01	.11			
Diet Factors				1, 122	3.36	3%
Dietary knowledge, dietary intention and usual food choice	0.01	0.05	.02			
Social Support Factors				2, 120	2.75	4%
Support for healthy eating	0.09	0.06	.13			
Support for exercise	0.10	0.14	.07			
Self Efficacy Factors				2,118	0.67	1%
Dietary self-efficacy	0.04	0.06	.07			
Exercise self-efficacy	0.01	0.15	.01			
Physical Activity Factors				2,116	5.29*	7%
Television viewing	0.002	0.15	.00			
Exercise behavior	0.20	0.06	.30*			

Note. Total model: $R^2 = .19$, $df = 9, 116$, $F = 3.03$, $p = .003$.

*$p < .01$.

Table 5

Regression Analysis for Determinants Predicting Exercise Behavior

Determinant	*B*	*SE B*	β	df_{Change}	F_{Change}	R^2_{Change}
Health Belief Factors				2, 123	2.13	3%
Perceived health	-0.02	0.26	-.01			
Definition of health	-0.01	0.02	-.07			
Diet Factors				2, 121	11.18***	15%
Dietary knowledge, dietary intention and usual food choice	0.17	0.07	.22*			
Eating behavior	0.42	0.13	.27**			
Social Support Factors				2, 119	3.00*	4%
Support for healthy eating	-0.18	0.09	-.11			
Support for exercise	0.43	0.19	.19*			
Self Efficacy Factors				2, 117	3.16*	4%
Dietary self-efficacy	-0.07	0.09	-.09			
Exercise self-efficacy	0.54	0.21	.30**			
Physical Activity Factors				1, 116	1.27	0.8%
Television viewing	0.24	0.22	.09			

Note. Total model: $R^2 = .27$, $df = 9, 116$, $F = 4.80$, $p < .0005$.

*$p < .05$. **$p \leq .01$. ***$p < .0005$.

Table 6

Odds Ratio of the Likelihood of Children Meeting the Public Health Standard for Dietary Intake of at Least Five Fruits and Vegetables Per Day

Determinant	Odds Ratio	95% Confidence Interval
Health Belief Factors		
Perceived health	1.03	0.75-1.42
Definition of health	1.02	0.997-1.04
Diet Factors		
Dietary knowledge, dietary intention & usual food choice	1.00	0.92-1.10
Social Support Factors		
Support for healthy eating	1.04	0.93-1.16
Support for exercise	1.01	0.79-1.29
Self Efficacy Factors		
Dietary self-efficacy	1.13*	1.01-1.26
Exercise self-efficacy	1.09	0.82-1.45
Physical Activity Factors		
Television viewing	1.09	0.85-1.397
Exercise behavior	1.15**	1.04-1.27

Table 7

Odds Ratio of the Likelihood of Children Meeting the Public Health Standard for 30 Minutes of Moderate Physical Activity on at Least 5 Days of the Week

Determinant	Odds Ratio	95% Confidence Interval
Health Belief Factors		
Perceived health	1.03	0.76-1.39
Definition of health	0.997	0.98-1.02
Diet Factors		
Dietary knowledge, dietary intention & usual food choice	1.07	0.98-1.17
Eating behavior	1.16	0.998-1.35
Social Support Factors		
Support for healthy eating	0.95	0.85-1.06
Support for exercise	1.11	0.88-1.40
Self Efficacy Factors		
Dietary self-efficacy	0.99	0.897-1.09
Exercise self-efficacy	1.20	0.94-1.54
Physical Activity Factors		
Television viewing	1.13	0.88-1.46

Chapter V

Eating and Exercise Behaviors in Preadolescents: Parental Influence?

by D. E. Norton, C. M. Waters, E. S. Froelicher, & V. Carrieri-Kohlman

Abstract

Background: Research suggests that lifestyle health behaviors, especially eating and exercise behaviors, are learned in childhood from parents.

Objectives: The purpose of this cross-sectional, matched-pairs study was to describe and compare eating and exercise behaviors and correlates between parents and their preadolescents.

Methods: Self-report data for perceived health, definition of health, knowledge of healthy eating, diet and exercise self-efficacy, television viewing, and eating and exercise behaviors were collected on 100 parents and their fourth and fifth grade preadolescents attending schools in a Northern California school district.

Results: Parents were more knowledgeable about healthy eating, whereas their preadolescents were more confident about eating healthy foods and engaging in exercise, consumed more servings per day of fruits, vegetables and milk, and participated in exercise on more days per week. There were no statistically significant differences on perceived health, definition of health, and TV viewing hours. Regression models for parents' eating ($R^2 = .18$) and exercise ($R^2 = .44$) behaviors were statistically significant. For preadolescents, only the exercise behavior model was statistically significant ($R^2 = .20$). Parents' eating and exercise correlates and behaviors did not predict preadolescents' eating and exercise behaviors.

Conclusions: The relationship between parents and their preadolescents' eating and exercise behaviors is complex. Parents and their preadolescents appear to have similar health beliefs and television viewing patterns, but differ in knowledge about healthy foods, confidence about exercising and eating healthy, and eating and exercise behaviors. In addition to parental influences, other influences - a combination of personal health choices and behaviors and the social environment - appear to affect the incorporation and adoption of healthful exercise and eating behaviors in preadolescents.

Keywords: diet, eating, exercise, physical activity, self-efficacy, health, health behaviors, television, preadolescent, children, parents, parental influence, dyad

Introduction

Positive lifestyle health behaviors, particularly healthy eating and regular physical activity, initiated in childhood are believed to reduce cardiovascular disease and other potentially preventable chronic disease rates among adults (Dietz & Gortmaker, 2001; Nicklas, von Duvillard & Berenson, 2002; Berenson & Srinivasan, 2001). Past research, such as the Framingham and Bogalusa longitudinal, epidemiological studies (Harlan, 1989) and current research indicate that health behaviors consolidate before age 10 and that these health behaviors and risk factors track from childhood into adulthood (Dunn, et al., 2000; Francis, et. al., 1999; McGuire, et. al., 2002; Taylor, et. al., 1999). From a developmental perspective, lifestyle health habits are believed to be learned from parents and are solidified in childhood during preadolescence and adolescence.

According to Piaget's (1970) developmental theory, preadolescents are in the concrete operational stage of development where their thinking is tied to the immediate problems of their world as they experience it. As experiences accumulate, preadolescents begin to conceptualize, creating logical structures that explain his or her experiences. Abstract problem solving is also possible. Preadolescence is defined as the developmental period between 9 and 11 years old, typically students in the fourth and fifth grades, during which secondary sexual characteristic changes have begun (Carnegie Council on Adolescent Development, 1995). This is the stage in which peers become important to preadolescents and they are no longer extensions of their parents (Murray, 2000).

According to social cognitive theory, modeling through observational learning and reinforcement affects new behavior, which is shaped and driven by environmental forces and inner impulses (Bandura, 1997). From this perspective, human functioning is

viewed as the product of the dynamic interplay and reciprocality of personal (cognition, affect and biology), behavioral (actions), and environmental (social and physical supports) influences. Within this context, a preadolescent is hypothesized to acquire and perform new behaviors, such as healthy eating and regular exercise, through learning or knowledge, observation of others' behaviors, self-efficacy beliefs, and positive reinforcement in the form of social support.

Preadolescents learn from their parents, peers, teachers and community the health habits that they bring into adulthood (Pittman & Hayman, 1997), however, parents' beliefs, knowledge, behaviors, and confidence and support for positive lifestyle health choices are believed to be more influential on preadolescents' adoption (Gillis, 1994) and long-term maintenance (Lau, Quadrel, & Hartman, 1990; Rossow & Rise, 1994) of health promotion behaviors. These findings, however, are inconclusive. Few studies exist in the literature that describe and compare the correlates of and health behaviors of parents and children as a dyad. A broader base of knowledge must be built to include what parents and children believe are healthy behaviors, what they know about health promotion, how parents model health beliefs and behaviors for their children, and how to build self-efficacy for positive health behaviors in parents and their children.

The purposes of this study were to describe and compare eating and exercise behaviors and correlates between parents and their preadolescents and to investigate the influence of parents' eating and exercise behaviors and correlates on their preadolescents' eating and exercise behaviors. Perceived health, definition of health, knowledge of healthy eating, diet and exercise self-efficacy, television (TV) viewing, as well as eating and exercise behaviors, were the correlates.

Method

Design

A matched-pairs design was used for this descriptive, comparison cross-sectional study.

Sample and Setting

Fourth and fifth grade students and their parents were recruited from 12 participating urban and suburban elementary schools in Northern California that were chosen in order to maximize variability in demographic characteristics. The schools are located in a school district with approximately 36,824 students in grades K through 12. Within this school district, 51% of the students are Whites, 22% are Hispanics, 12% are Blacks, 8% are Asians, 4% are Filipinos, 1% are Pacific Islanders, 1% are American Indians, and 1% are multiracial or did not report their race. The median family income is $63,300 and 28% of the students participate in the free or reduced fee lunch program.

This age group was selected because developmentally, fourth and fifth grade preadolescent students are beginning to establish independence and develop their own style, while still being involved with family and needing parental support and approval for their behavior (Murray, 2000). In addition, they have the cognitive ability to complete self-report questionnaires (Perry et al., 1988).

Recruitment

The University's Committee on Human Research, the school district's research and evaluation department, and each school's principal approved the study materials before recruitment began. Students were recruited through a 10-minute information session presented during their physical education (PE) class. In addition, a letter was sent

home to their parents explaining the purpose and procedures of the study. Parents and their fourth and fifth grade children who agreed to participate in the study mailed signed informed consent and assent forms, respectively, to the research office. Of the 4,500 consents distributed, 175 were returned and 153 students were enrolled in the study. Of the 350 parent questionnaires distributed to consenting parents, 96 mothers and 69 fathers returned the questionnaires. Matching parents and their preadolescents yielded a total sample size of 100 parent-preadolescent pairs.

Measures

To ensure uniform assessment of the study variables, the same measures were used for both parents and preadolescents. The exceptions are noted.

Eating and exercise behaviors for both parents and preadolescents were measured using the Eating and Exercise Scale from the standardized Youth Risk Behavior Survey (YRBS), distributed by the Centers for Disease Control and Prevention (2001). Adequate reliability of the YRBS has been documented (Brener et al., 2002; Krebs-Smith et al., 1996).

Eating subscale measures how often one drinks or eats fruit and fruit juice, vegetables (green salad, potato, not fried, carrots, and other vegetables), and milk in the past 7 days. The seven frequency response options are none, 1-3 times per week, 4-6 times per week, 1 time per day, 2 times per day, 3 times per day, or 4 or more times per day. Scores range from 0 to 12. Higher scores indicate a greater dietary intake of fruits, vegetables, and milk per week.

Exercise subscale measures participation in moderate, vigorous, strengthening and flexibility exercises in the past 7 days. Scores range from 4 to 26. Higher scores indicate participation in more physical activities per week.

TV viewing for both parents and preadolescents was measured by asking how many hours per day do you watch TV. Scores range from 0 to 5. A higher score indicates more hours of TV viewing.

Perceived health for both parents and preadolescents was measured with the self-rated 4-item health perception subscale (HPS) of the Multilevel Assessment Instrument (Lawton, et al., 1982). The HPS include items about current health, health compared to 3 years ago, impact of health on quality of life, and health compared to most people your age. Scores range from 4 to 13. Lower scores indicate a healthier perception of health. The scale has been used to measure perceived health in adolescents as well as older and ethnic minority populations (Garcia-Maas, 1999; Gillis, 1994). Cronbach's alpha internal consistency reliability scores have ranged from .58 to .76; criterion-related validity was established with independent ratings by a clinical psychologist, yielding correlations of r = .63 and r =.52; and test-retest reliability was r =.92 at a 3-week interval (Gillis, 1994).

Definition of health for both parents and preadolescents was measured using the Laffrey Health Conception Scale, which is a 28-item scale designed to assess a person's definition of health (Laffrey, 1986). Likert-type scale response options range from 1 (strongly disagree) to 6 (strongly agree). Scores range from 28 to 168. Higher scores indicate a eudaimonistic health conception, which is defined as exuberant well-being. Cronbach's alpha reliability coefficients for internal consistency have ranged from .87 to .90 (Barnett, 1989; Gillis, 1994). Items include statements such as "being healthy

means," "adequately carrying out my daily responsibilities," "living at my top level," and "adapting to things as they really are not as I'd like them."

Parents' knowledge of healthy eating was measured by the Adult Health Behavior Knowledge Scale (Vega, et al., 1987). The scale was developed for use in the San Diego Family Health Project to assess adults' knowledge of diet behaviors related to cardiovascular health (Nader et al., 1986, 1989; Nader, 1990). The scale consists of 12 items and is scored on a scale from 0 to 100. Higher scores indicate increased proficiency at choosing foods that are healthy, low in fat, and low in salt. Examples of the multiple-choice questions include "a good way to reduce saturated fat intake..." and "how are the ingredients listed on the label of a food product...." Examples of the true/false questions include items such as "soy sauce and steak sauce are low in sodium."

Preadolescents' knowledge of healthy eating was measured by a 14-item subscale of the Health Behavior Questionnaire, which is based on social learning theory. It has been used extensively with elementary school children and a complete description, including its reliability and validity, has been reported (Perry, Mullis, & Maile, 1985; Perry, Griffin, & Murray, 1985). Each item consists of a dichotomous response option: picture of a healthy and an unhealthy food. Respondents are asked to choose which food in the pair is "better for their health." The scale is scored from 0 to 100. Higher scores indicate more knowledge of healthier food choices.

Parents' self-efficacy for diet and exercise was measured by the Adult Diet and Exercise Self-Efficacy Scale (Vega, et al., 1987). This scale was used in the San Diego Family Health Project to measure self-efficacy or confidence in adults' behavioral capability to change eating and exercise habits (Nader et al., 1986, 1989; Nader, 1990).

The scale consists of 20 items related to diet self-efficacy and 12 items related to exercise self-efficacy. Response options range from 1 (I know I cannot) to 3 (I know I can). The scale is scored from 0 to 100. Higher scores indicate more confidence in parents' ability, for example, to "keep the salt shaker off the table," "eat poultry and fish instead of red meat at dinner," "stick to your exercise program when your family is demanding more time from you," and "stick to your exercise program when social obligations are very time-consuming."

Preadolescents' self-efficacy for diet and exercise was measured by the Health Behavior Questionnaire (Parcel et al., 1995; Perry, Griffin, & Murray, 1985; Perry, Mullis & Maile, 1985). It measures preadolescents' confidence in his or her ability to eat in a healthier way and to exercise. The scale consists of 15 items related to diet self-efficacy and five items related to exercise self-efficacy. Response options range from 1 (I know I cannot) to 3 (I know I can). The scale is scored from 0 to 100. Higher scores indicate more confidence to eat in a healthier way, for example, to eat a baked potato instead of french fries and more confidence to exercise, for example, to keep moving for most of the time you are in PE class.

Demographic characteristics that were assessed for both preadolescents and parents were gender, age, ethnicity/race, educational level, and family's annual income.

Procedure

The questionnaires were administered to students who had returned assent and consent forms. The questionnaires used in the study have been used with adolescents, though some not with preadolescents. Thus, the questionnaires were pilot-tested with preadolescents in the fourth and fifth grades; no modifications were required. Students

were interviewed in small groups of two to eight students during PE class. Each questionnaire item was read aloud; students were instructed to listen, follow along, answer each question, and try not to read each item themselves. The questionnaires were sequenced so that items related to behavior were assessed before items related to knowledge, beliefs and self-efficacy to decrease the potential for students to base their responses on what they thought was healthy for them. The interviewer circulated in the room to make certain that the students were keeping apace and stopped to answer questions as needed. Study procedures were completed in approximately 45 minutes.

After the preadolescents completed their questionnaires in PE class, the parent questionnaires for both mother and father were sent home with stamped addressed return envelopes. The instructions indicated parents should complete the questionnaires independently. Parents were contacted by phone if the questionnaires were not returned within 2 weeks.

Data Analysis

Summary descriptive statistics were computed to describe the study variables. Responses were examined for the percentage of respondents with the lowest (floor effect) and highest (ceiling effect) possible score. It was recognized that preadolescents and parents were members of a family, and thus, reported responses were not independent. Therefore, paired *t*-test analyses for mean score response differences and paired-sample correlations were computed between parents and preadolescents using a Bonferroni correction. Linear regression analyses were used to determine individual and combined relationships for eating and exercise behaviors. Groups of predictor variables (correlates) were entered concurrently by blocks, which allow an approximation of the unique

contribution of each block of correlates to variance in the outcome variable. Demographic characteristics as confounders in the models were not statistically significant, and thus, they are not discussed or included in the regression tables. The alpha level was set at .05, two-tailed, for determining statistical significance. Analyses were computed using SPSS version 11.5.

Results

Sample

The demographic profile of the 100 parent-preadolescent pairs is presented in Table 1. Parents, mostly mothers, ranged in age from 26 to 68 years ($M = 41.55$, $SD = 6.35$). There were two custodial grandmothers. Eighty-two percent of parents had some college education, and 80% of them reported annual household incomes of $50,000 or more. Preadolescents ranged in age from 9 to 12 years ($M = 9.81$, SD = 0.69). Among the preadolescents, 53% were in the fourth grade and 47% were in the fifth grade; 64% were girls and 36% were boys; and 66% of them were Caucasians, 15% were Asian/Pacific Islanders, 13% were Hispanics, 3% were African American, and 3% were multiracial. There were no statistically significant differences among the demographic variables.

Parent-Preadolescent Paired-Sample Comparisons

Results of the paired-*t* analyses between parents and their preadolescents are presented in Table 2. Parents' mean score for knowledge about healthy eating was significantly higher than their preadolescents (61.83 vs. 57.29). Compared to their parents, preadolescents' mean scores were significantly higher for confidence about eating healthy foods (83.80 vs. 77.87), confidence about engaging in exercise (85.45 vs. 64.14), consumption of servings per day of fruits and vegetables (2.81 vs. 1.74), and days

per week of participating in exercise (10.07 vs. 6.92). There were no statistically significant difference for perceived health, definition of health, and hours of TV viewing. Both parents and their preadolescents reported "good" or "excellent" health, had scores indicative of a comprehensive view of health, and watched few hours of TV.

Correlates of Eating and Exercise Behaviors

Bivariate correlation matrices were examined for associations between study variables for both parents and their preadolescents. All correlations were in the expected direction and statistically significant. Parent predictor variables that correlated $r \geq .20$ with their eating behavior were perceived health (-.24), exercise self-efficacy (.33), and exercise behavior (.36). Parent predictor variables that correlated $r \geq .20$ with their exercise behavior were perceived health (-.33), diet self-efficacy (.31), exercise self-efficacy (.60) and eating behavior (.36). Preadolescent predictor variables that correlated $r \geq .20$ with their eating behavior were diet self-efficacy (.23) and exercise behavior (.24). Preadolescent predictor variables that correlated $r \geq .20$ with their exercise behavior were knowledge of healthy eating (.28), exercise self-efficacy (.39), diet self-efficacy (.25), and dietary behavior (.24). There were no statistically significant correlations between parents' correlates and preadolescents' eating and exercise behaviors.

The results of the linear regression analyses tables present the beta weights after all blocks were entered, that is, the final beta weights and the adjusted R squares.

Parents. Seven predictor variables significantly explained 18% of the variance in parents' eating behavior (see Table 3) and 44% of the variance in their exercise behavior (see Table 4). Health belief and self-efficacy factors were statistically significant predictors in parents' eating behavior model, although individual correlates were not

statistically significant contributors to the model. Health belief, diet and self-efficacy factors were significant predictors in parents' exercise behavior model, with exercise self-efficacy being the only statistically significant individual correlate.

Preadolescents. The eating behavior model for preadolescents was not statistically significant (see Table 5). However, seven predictor variables explained significantly 20% of the variability in their exercise behavior (see Table 6). Combined diet and self-efficacy factors were significant predictors in the exercise behavior model, with exercise self-efficacy being the only statistically significant individual correlate.

Parents' correlates predicting their preadolescents' behaviors. The overall model F-statistics for parents' correlates predicting their preadolescents' eating (see Table 7) and exercise (see Table 8) behaviors were not statistically significant.

Discussion

In this matched-pairs study, we investigated whether parents' perceived health and definition of health (health correlates), dietary knowledge and eating behavior (diet correlates), confidence to eat healthier and engage in regular exercise (self-efficacy correlates), and hours of TV viewing and physical activity patterns (exercise correlates) were similar to and influenced the eating and exercise behaviors of their preadolescents. In comparison to their preadolescents, parents were more knowledgeable about healthy eating. Whereas, preadolescents were more confident about eating healthy foods and engaging in exercise, consumed more servings per day of fruits, vegetables and milk, and participated in exercise on more days per week as compared to their parents. Parents and preadolescents reported similar perceived "good" to "excellent" health, a comprehensive positive view of health, and watched fewer than 2 hours of TV per day.

Parents' eating and exercise behaviors and correlates, however, did not predict the eating and exercise behaviors of their preadolescents. The correlates were predictive of parents' eating and exercise behaviors and preadolescents' exercise behavior, but not preadolescents' eating behavior. These results, which may be due to the small sample size, indicate that these and perhaps other correlates of eating and exercise behaviors should be assessed and replicated with a larger sample. Previous research in a sample of 153 preadolescents indicated that preadolescents' exercise behavior predicted their eating behavior (Norton, Waters, Froelicher, & Carrieri-Kohlman, in press). That is, preadolescents who engaged in more physical activity were significantly more likely to eat more servings per day of fruits and vegetables. In addition, a majority of preadolescents received more social support for healthy eating from their parents as compared to friends and teachers and more social support for exercising from their friends as compared to parents and teachers, although the findings were not statistically significant.

In contrast to this study's findings, other researchers have found modest correlations between parents and their preadolescents with eating and exercise behaviors, but not with the correlates of those behaviors (Cohen, Felix, & Brownell, 1989; Rossow & Rise, 1994; Stucky-Ropp & DiLorenzo 1993). However, DiLorenzo et al. (1998) found that mothers' self-efficacy for exercise influenced significantly their preadolescents' exercise behavior. Other researchers have found that parental involvement and modeling can improve eating and exercise behaviors in preadolescents (Nader et al., 1989; Perry, et al., 1990). As parental involvement increases, preadolescents' diet and exercise self-efficacy and exercise behavior increase (Nader et al., 1996). Gillis (1994) found a

significant moderate correlation between mothers and daughters and a somewhat weaker correlation between fathers and daughters on health promotion behaviors, particularly with self-efficacy for engaging in healthy lifestyle behaviors.

The results of this study have implications for developing interventions that promote healthy eating and exercise behaviors in preadolescents that involve the preadolescent and his or her peers, parents, school and community before behavioral patterns are resistant to change. We know that these social support networks, particularly parents, may influence directly and/or indirectly the eating and exercise behaviors of preadolescents. The relationship between parents and their preadolescents' eating and exercise behaviors is complex. In addition to parental influences, other influences - a combination of personal health choices and behaviors and the social environment - appear to affect the incorporation and adoption of healthful exercise and eating behaviors in preadolescents. This cross-sectional study is limited by data collection that occurred at one point in time, a reliance of self-report measures, and a small, homogenous convenience sample.

References

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman & Co.

Barnett, C. F. (1989). The relationship of selected cognitive-perceptual factors promoting behaviors of adolescents. *Dissertation Abstracts International*, 121974.

Berenson, G. S., & Srinivasan, S. R. (2001). Emergence of obesity and cardiovascular risk for coronary artery disease: The Bogalusa Heart Study. *Preventive Cardiology, 4* (3), 116-121.

Brenner, N. D., Kann, L., McManus, T., Kinchen, S., Sundberg, E., Ross, J. (2002). Reliability of the 1999 youth risk behavior survey questionnaire. *Journal of Adolescent Health*, 31, 336–342.

Carnegie Council on Adolescent Development (1995). *Great transitions: preparing adolescents for a new century*. Woodlawn, MD: Graphtec, Inc.

Centers for Disease Control and Prevention (2002). Youth risk behavior surveillance—United States, 2001. *Morbidity & Mortality Weekly Report*, 51, 1-64.

Cohen, R., Felix, M., & Brownell, K. (1989). The role of parents and older peers in school-based cardiovascular prevention programs: Implications for program development. *Health Education Quarterly, 16,* 245-253.

Dietz, W. H., Gortmaker, S. L. (2001). Preventing obesity in children and adolescents. *Annual Review in Public Health, 22*, 337-353.

DiLorenzo, T.M., Stucky-Ropp, R.C., Vander Wal, J.S., Gotham, H.J. Determinants of exercise among children. II. A longitudinal analysis. *Preventive Medicine* 1998; 27 (3): 470-477.

Dunn, J.E., Liu, K., Greenland, P., Hilner, J.E., & Jacobs, D.R. (2000). Seven-year tracking of dietary factors in young adults: the CARDIA study. *American Journal Preventive Medicine* 18 (1):38-45.

Francis, C.C., Bope, A.A., MaWhinney, S., Czajka-Narins, D. et al. Body composition, dietary intake, and energy expenditure in nonobese, prepubertal children of obese and nonobese biological mothers. *Journal of the American Dietetic Association* 1999; *99* (1): 58-65.

Garcia-Maas, L.D. (1999). Intergenerational analysis of dietary practices and health perceptions of Hispanic women and their adult daughters.
Journal of Transcultural Nursing, 10 (3), 213-9.

Gillis, A. J. (1994). Determinants of health-promoting lifestyles in adolescent females. *Canadian Journal of Nursing Research, 26,* 13-28.

Harlan, W. R. (1989). A perspective on school-based cardiovascular research. *Health Education Quarterly, 16,* 151-154.

Krebs-Smith, S. M., Cook, A., Subar, A. F. (1996). Fruit and vegetable intakes of children and adolescents in the United States. *Pediatric Adolescent Medicine, 150,* 81-86.

Laffrey, S.L. (1986). Development of a health conception scale. *Research in Nursing and Health, 9,* 107-113.

Lawton, M. P., Moss, M., Fulconer, M., & Kleban, M. H. (1982). A research and service-oriented multilevel assessment instrument. *Journal of Gerontology, 371* (1), 91-99.

Lau, R.R.,Quadrel, M.J., & Hartman, K.A. Development and change in young adult's preventive health beliefs and behavior: Influence of parent's and peers. *Journal of Health and Social Behavior* 1990; 31: 240-259.

McGuire, M.T., Hannan, M., Neumark-Sztainer, D., Cossrow, N. H., & Story, M. Parental correlates of physical activity in a racially/ethnically diverse adolescent sample. *Journal of Adolescent Health* 2002; 30: 253-261.

Murray, J. S. (2000). Conducting psychosocial research with children and adolescents: A developmental perspective. *Applied Nursing Research, 13* (3), 151-156.

Nader, P. The concept of comprehensiveness in the design and implementation of school health programs. *Journal of School Health* 1990; 60: 133-138.

Nader, P., Sallis, J., Rupp, J., Akin, C., Patterson, T., & Abramson, I. (1986). San Diego Family Health Project: Reaching families through schools. *Journal of School Health, 56,* 227-231.

Nader, P., Sallis, J., Patterson, T., Abramson, I., Rupp, J., Senn, K., Akins, C., Roppe, B., Morris, J., Wallace, J., & Vega, W. (1989). A family approach to cardiovascular risk reduction: Results from the San Diego family health project. *Health Education Quarterly, 16,* 229-244.

Nader PR, Sellers DE, Johnson CC, Perry CL, Stone EJ, Cook KC, Bebchuk J, Luepker RV. The effect of adult participation in a school-based family intervention to improve Children's diet and physical activity: the Child and Adolescent Trial for Cardiovascular Health. *Preventive Medicine* 1996; 25 (4): 455-64.

Nicklas, T. A., von Duvillard, S. P., & Berenson, G. S. (2002). Tracking of serum lipids and lipoproteins from childhood to dyslipidemia in adults: The Bogalusa Heart Study. *International Journal of Sports Medicine, 23,* S39-S43.

Parcel, G. S., Edmundson, C. L., Perry, C. L., Feldman, H. A., O'Hara-Tompkins, N., Nader, P. R., Johnson, C. C., & Stone, E. J. (1995). Measurement of self-efficacy for diet-related behaviors among elementary school children. *Journal of School Health, 65*, (1), 23-27.

Norton, D. E., Froelicher, E. S., Waters, C. M., & Carrieri-Kohlman, V. (in press). Parental influence on models of primary prevention of cardiovascular disease in children. *European Journal of Cardiovascular Nursing*.

Perry, C.L., Griffin, G., Murray, D.M. (1985). Assessing needs for youth health promotion. *Preventive Medicine, 14*, 379-393.

Perry, C. L., Luepker, R. V., Murray, D. M., Kurth, C., Mullis, R. Crockett, S., & Jacobs, D. (1988). Parent involvement with children's health promotion: The Minnesota home team. *American Journal of Public Health, 78,* 1156-1160.

Perry, C. L., Mullis, R. M., & Maile, M. C. (1985). Modifying the eating behavior of young children. *Journal of School Health, 55*, 399-402.

Perry, C. L., Stone, E. J., Parcel, G., Ellison, R., Nader, P., Webber, L., & Luepker, R. V. School-based cardiovascular health promotion: The child and adolescent trial for cardiovascular health (CATCH). *Journal of School Health* 1990; 60: 406-413.

Piaget J. (1970). Piaget's theory. In P.H. Mussen (Ed.), Carmichail's manual of child psychology (Vol.1, pp. 703-732). New York: Wiley.

Pittman, K.P. & Hayman, L.L. Determinants of risk for cardiovascular disease during school-age/adolescent transition. *Prevention* 1997; 12 (4): 12-22.

Rossow, I. & Rise, J. Condordance of parental and adolescent health behaviors. *Social Science Medicine 1994; 38* (9): 1299-1305.

Stucky-Ropp RC, DiLorenzo TM. Determinants of exercise in children. *Preventive Medicine* 1993; 22 (6): 880-9.

Taylor, W.C., Blair, S.N., Cummings, S.S., et al. Childhood and adolescent physical activity patterns and adult physical activity. *Med Sci Sports Exercise* 1999; 21: 118-23.

Vega, W.A., Sallis, J.F., Patterson, T., Rupp, J., Atkins, C., Nader, P.R. (1987). Assessing knowledge of cardiovascular health-related diet and exercise behaviors in Anglo and Mexican-Americans. *Preventive Medicine, 16,* 696-709.

Table 1

Demographic Profile of Parents and Their Preadolescents (N = 100)

Characteristic	Parents		Preadolescents	
	n	%	*n*	%
Gender				
Females	96	96.0	64	64.0
Males	4	4.0	36	36.0
Race/Ethnicity				
Caucasian	74	74	66	66.0
Asian/Pacific Islander	12	12	15	15.0
Hispanic	13	13	13	13.0
Black	1	1	3	3.0
Multiracial	0	0	3	3.0
Age (years)				
9-10			87	87.0
11-12			13	13.0
< 35	15	15.0		
35-45	64	64.0		
> 45	21	21.0		
Education				
Fourth grade			53	53.0
Fifth grade			47	47.0
< High school	3	3.0		
High school	15	15.0		
Junior college	23	23.0		
College degree	35	35.0		
Graduate degree	24	24.0		
Annual Household Income				
< $20,000	4	4.0		
$20,000-$49,999	16	16.0		
$50,000-$89,999	26	26.0		
≥ $90,000	52	52.0		

Note. Percentages are adjusted for missing cases.

Table 2

Paired-t Mean Scores of Parents and Their Preadolescents (N = 100)

	Parents		*Preadolescents*				
	M	*SD*	*M*	*SD*	*df*	*t*	*r*
Perceived health	6.59	1.93	6.23	1.55	99	-1.35	-.17
Definition of health	131.74	24.87	130.04	22.22	99	-.53	.06
Knowledge of healthy eating	61.83	18.16	57.29	19.29	99	-1.96*	.23*
Diet self-efficacy	77.87	11.45	83.80	11.84	99	3.66**	.03
Exercise self-efficacy	64.14	15.64	85.45	14.30	98	10.09**	.02
Television viewing	1.20	1.23	1.60	1.77	88	1.70	-.05
Eating behavior	1.74	1.91	2.81	2.35	88	3.36**	.03
Exercise behavior	6.92	4.63	10.07	4.20	88	4.55**	-.09

Note. $*p < .05$, $**p < .001$

Table 3

Regression Analysis for Correlates Predicting Parents' Eating Behavior (N = 100)

Correlate	β	t	df_{Change}	F_{Change}	R^2_{Change}
Health Belief Factors			2, 90	3.47*	7%
Perceived health	-.16	-1.49			
Definition of health	.08	.81			
Diet Factors			1, 89	.36	0%
Dietary knowledge	.06	.54			
Self Efficacy Factors			2, 87	3.72*	7%
Dietary self-efficacy	-.09	-.73			
Exercise self-efficacy	.19	1.41			
Physical Activity Factors			2, 85	1.56	3%
Television viewing	.06	.58			
Exercise behavior	.20	1.57			

Note. Total model: $R^2 = .18$, $df = 7, 92$, $F = 2.63$, $p = .02$.

*$p < .05$.

Table 4

Regression Analysis for Correlates Predicting Parents' Exercise Behavior (N = 100)

Correlate	β	t	df_{Change}	F_{Change}	R^2_{Change}
Health Belief Factors			2, 90	5.41*	11%
Perceived health	-.17	-1.84			
Definition of health	-.11	-1.26			
Diet Factors			2, 88	5.15*	9%
Dietary knowledge	.14	1.61			
Eating behavior	.14	1.57			
Self Efficacy Factors			2, 86	17.77*	23%
Dietary self-efficacy	-.03	-.28			
Exercise self-efficacy	.54	5.62*			
Physical Activity Factors			1, 85	1.28	1%
Television viewing	.10	1.13			

Note. Total model: $R^2 = .44$, $df = 7, 92$, $F = 9.65$, $p = .005$.

*$p < .01$.

Table 5

Regression Analysis for Correlates Predicting Preadolescents' Eating Behavior (N = 100)

Correlate	β	t	df_{Change}	F_{Change}	R^2_{Change}
Health Belief Factors			2, 85	1.10	3%
Perceived health	.00	.04			
Definition of health	.11	1.02			
Diet Factors			1, 84	2.69	3%
Dietary knowledge	.06	.47			
Self Efficacy Factors			2, 82	1.15	3%
Dietary self-efficacy	.15	1.08			
Exercise self-efficacy	.04	.30			
Physical Activity Factors			2, 80	1.08	2%
Television viewing	.06	.52			
Exercise behavior	.16	1.34			

Note. Total model: $R^2 = .11$, $df = 7, 87$, $F = 1.35$, $p = .24$.

Table 6

Regression Analysis for Correlates Predicting Preadolescents' Exercise Behavior (N =100)

Correlate	β	t	df_{Change}	F_{Change}	R^2_{Change}
Health Belief Factors			2, 85	1.56	4%
Perceived health	-.06	-.56			
Definition of health	-.01	-.05			
Diet Factors			2, 83	4.35*	9%
Dietary knowledge	.19	1.56			
Eating behavior	.14	1.34			
Self Efficacy Factors			2,81	3.73*	7%
Dietary self-efficacy	.01	.04			
Exercise self-efficacy	.30	2.60*			
Physical Activity Factors			1,80	.27	0%
Television viewing	.05	.52			

Note. Total model: $R^2 = .20$, $df = 7, 87$, $F = 2.92$, $p = .01$.

*$p < .05$.

Table 7

Regression Analysis for Parents' Correlates Predicting Preadolescents' Eating Behavior (N =100)

Parents' Correlate	β	t	df_{Change}	F_{Change}	R^2_{Change}
Health Belief Factors			2, 97	.57	1%
Perceived health	.01	.06			
Definition of health	.07	.65			
Diet Factors			2, 95	.36	1%
Dietary knowledge	-.04	-.32			
Eating behavior	.04	.37			
Self Efficacy Factors			2, 93	.90	2%
Dietary self-efficacy	.02	.14			
Exercise self-efficacy	09	.64			
Physical Activity Factors			2, 91	.30	1%
Television viewing	.02	.23			
Exercise behavior	.10	.71			

Note. Total model: $R^2 = .04$, $df = 7, 87$, $F = .52$, $p = .84$.

Table 8

Regression Analysis for Parents' Correlates Predicting Preadolescents' Exercise Behavior (N =100)

Parents' Correlate	β	t	df_{Change}	F_{Change}	R^2_{Change}
Health Belief Factors			2, 86	1.02	2%
Perceived health	-.11	-.89			
Definition of health	.17	1.50			
Diet Factors			2, 84	1.58	4%
Dietary knowledge	.1	.94			
Eating behavior	-.17	-1.46			
Self Efficacy Factors			2, 82	.33	1%
Dietary self-efficacy	-.10	-.75			
Exercise self-efficacy	.16	1.11			
Physical Activity Factors			2,80	.71	2%
Television viewing	-.05	-.40			
Exercise behavior	-.15	-1.06			

Note. Total model: $R^2 = .08$, $df = 8, 88$, $F = .90$, $p = .52$.

Chapter VI

Summary, Implications, and Recommendations

This chapter includes a summary of the study findings and conclusions, implications for nursing and health, and recommendations for further research related to eating and exercise behaviors in preadolescents.

Summary and Conclusions

The number of children considered overweight and sedentary has doubled, increasing their risks for developing chronic diseases as these habits track from childhood into adulthood. Research suggests that lifestyle health behaviors, especially eating and exercise behaviors, are learned in childhood from parents and lasts beyond adolescence. Existing models of primary prevention of cardiovascular and other chronic diseases in school-aged children emphasize the influence of parental involvement and modeling. Developmentally, preadolescents are in the concrete operational stage of development where their thinking is tied to the immediate problems of their world as they experience it. This is the stage in which peers become important to preadolescents, they are no longer extensions of their parents, and are beginning to establish independence and develop their own style while still being involved with family and needing parental support and approval for their behavior. According to social cognitive theory, modeling through observational learning and reinforcement affects new behavior, which is shaped and driven by personal (cognition, affect and biology) and environmental (social support and availability of resources) forces.

The determinants of eating and exercise behaviors are well-documented in adults, but research on the determinants of eating and exercise behaviors in preadolescents is still

in the early stages and has been studied relatively little. The purposes of this dissertation research were to investigate the influence of specific personal and environmental influences on preadolescents' eating and exercise behaviors, determine whether preadolescents were meeting the public health standards for eating and exercise behaviors, describe and compare eating and exercise behaviors and correlates between parents and their preadolescents, and investigate the influence of parents' eating and exercise behaviors and correlates on their preadolescents' eating and exercise behaviors. Within the context of the personal-behavioral-environmental triad, the selected determinants were perceived health and definition of health (health factors), self-efficacy for eating and exercise (self-efficacy factors), social support for eating and exercise (social support factors), dietary knowledge, dietary intention, usual food choice and eating behavior (dietary factors), and TV viewing and exercise behavior (physical activity factors).

This descriptive, cross-sectional study of 153 fourth and fifth grade students, recruited from 12 urban and suburban elementary schools in Northern California, indicated that these preadolescents were relatively healthy, were knowledgeable about healthy eating, were physically active but were not participating in PE classes, watched little TV, received social support mainly from their parents, and were confident about choosing healthier foods and exercising, but were not consuming the recommended servings of fruits, vegetables and milk. These determinants explained a moderate proportion of variance in children's eating and exercise behaviors. Children who were confident about choosing healthier foods and who engaged in physical activity were 10% more likely to meet the public health standard of five servings of fruits and vegetables per

day than those who did not. Children who ate healthier were 10% more likely to meet the public health standard of at least 30 minutes of physical activity per day on most days of the week than those who did not. Understanding the determinants of children's eating and exercise behaviors is multifactorial and involves personal and environmental influences to counteract behavioral patterns before they are resistant to change.

As a follow-up to the 153 preadolescents enrolled in the study, parents and their preadolescents were matched and paired. This yielded a sample size of 100 parent-preadolescent matched pairs. In comparison to their preadolescents, parents were more knowledgeable about healthy eating. Whereas, preadolescents were more confident about eating healthy foods and engaging in exercise, consumed more servings per day of fruits, vegetables and milk, and participated in exercise on more days per week as compared to their parents. Parents and preadolescents reported similar perceived "good" to "excellent" health, a comprehensive positive view of health, and watched fewer than 2 hours of TV per day. Parents' eating and exercise behaviors and correlates, however, did not predict the eating and exercise behaviors of their preadolescents. The correlates were predictive of parents' eating and exercise behaviors and preadolescents' exercise behavior, but not preadolescents' eating behavior. The relationship between parents and their preadolescents' eating and exercise behaviors is complex. In addition to parental influences, other influences - a combination of personal health choices and behaviors and the social environment - appear to affect the incorporation and adoption of healthful exercise and eating behaviors in preadolescents.

Implications for Nursing and Health

The results of this study have implications for nursing and health practice to develop interventions that promote healthy eating and exercise behaviors in preadolescents before behavioral patterns are resistant to change. The American Heart Association, the National Institutes of Health, and the Center for Disease Control and Prevention's Healthy People 2010 Initiative have all called for increased primary prevention efforts in children in order to reduce chronic disease morbidity and mortality rates among adults.

Children and adolescents are developing their health habits and beginning to establish independence and develop their own style, while still being involved with family and needing parental, peer and other adult support and approval for their behavior. Results of this study imply factors that will likely contribute the most to designing effective interventions to promote healthy eating and exercise behaviors in preadolescents are programs that are developmentally-based; emphasize skill building to choose and eat healthier foods; use motivational techniques to encourage exercise; build confidence in children's capacity for healthy eating and exercise in various settings; and include support from peers, teachers, family and community resources. These intervention programs will need to educate peers, teachers, family and community agencies how to effectively and positively support children. Designing programs that are family-, peer-, school- and community-oriented will encourage bidirectional modeling of positive behavior. Programs need to be designed that take into consideration gender, socioeconomic status, and ethnicity/race. Other social cognitive behavioral techniques,

such as setting norms and dealing with stressful situations, will need to be incorporated into interventions.

In terms of public policy for health, the physical environment must be changed so that it promotes healthier lifestyles, such as substituting unhealthy foods with healthy foods in school vending machines, creating safe walking paths to schools, re-examining physical education (PE) class requirements, and getting more community organizations involved in promoting children's health. Schools could play an important role in positive health behavior development. Some studies have shown improve academic performance by assuring that a variety of fresh fruits, vegetables and low-fat milk are available through school food service and vending programs and providing daily PE. Although children in this study met the public health standard for physical activity, most of them only participated in one PE class per week. This is below the daily recommendation of the Centers for Disease Control, the American Heart Association, and the State of California's requirement of 200 minutes of PE instruction every 10 days for elementary school students.

Recommendations for Further Research

Parents' eating and exercise behaviors and correlates did not predict the eating and exercise behaviors of their preadolescents. A larger, more ethnically and economically diverse sample that considers gender differences is necessary to replicate this study. Studies with larger, diverse samples have shown that parents' training efforts, involvement and modeling of eating and exercise behaviors last well into college. Other studies have shown that children from lower socioeconomic homes are less likely to have access to fresh fruits and vegetables or safe areas to play outside, and as they age, girls

have been shown to be less physically active than are boys. These factors and their relationships need to be studied more extensively with greater methodological sophistication before the next steps of program design and implementation are begun. Only then can we develop models and interventions that are culturally, age and developmentally appropriate, and that fit within the social context, family structure and socioeconomic status of families. These models of positive health behavior development must represent the normative behaviors of both parents and children, and interventions must be multifaceted and include all stakeholders in order to yield sustained health behavior changes..

Consent Form
University of California, San Francisco

Eating and Exercise Study

PURPOSE AND BACKGROUND
Deborah Norton, RN, MS and Catherine Waters, Ph.D., Associate Professor, School of Nursing, Department of Community Health Systems at the University of California, San Francisco are doing a study to help understand how school children learn their eating and exercise behaviors. You are being asked to be part of this study because you are a parent of a student in the fourth or fifth-grade.

PROCEDURE
If you agree to be in the study, this is what will happen:

1. You will sign this consent form that allows you and your fourth or fifth-grader to be in the study. Your son or daughter will also sign an *assent* form to say they want to be in the study.
2. Your son or daughter in the fourth or fifth grade will answer the study questionnaire at school during a P. E. class period.
3. You will complete the study questionnaire at home, which will take you about 40 minutes.
4. Both parents are asked to complete the study questionnaire, giving their own answers.
5. Please return the completed questionnaires in the stamped envelope included in the packet we have sent home.

RISKS/DISCOMFORTS
The chance of problems from being part of this study is small. It will take about 40 minutes of your time to complete. You may also feel mild worry from answering questions about your health habits.

BENEFITS
There is no direct reward to you for participating in this study.

COSTS
There is no cost to you for being in this study.

QUESTIONS
You have received an information sheet about this study along with this consent form. If you have further questions, you may call Deborah Norton at 510-381-0590 or Catherine Waters at 415-502-7995.

If you have any questions or concerns about being part of this study, you should first talk with Ms. Norton or Dr. Waters. If for some reason you do not want to do this, you may contact the Committee on Human Research, at the University of California, San

Francisco. You can call the committee office between 8:00a.m. and 5:00p.m., Monday through Friday, by calling (415) 476-1814, or by writing to the Committee on Human Research, Box 0962, University of California, San Francisco/San Francisco, CA 94143.

CONSENT

Being in a research study is up to you. You may refuse to be in the study or drop out at any time. If you decide not to be in this study, it will not change your relationship with your elementary school your child goes to or the University of California.
If you want to be in the study please sign below.

Date	Signature of Parent
Date	Signature of Parent

11-01

Appendix B

Student Assent Form

Assent Form

Eating and Exercise Study
University of California, San Francisco

What is this study about?
We are doing a study to understand how kids learn their eating and exercise behaviors. You are being asked to be part of this study because you are in the fourth or fifth-grade.

What will happen if you are in the study?
You will be asked to answer some questions about what you eat and how you exercise. You will answer the questionnaire during one of your P.E. classes at school.

What if you have questions?
You can ask Deborah Norton or your P.E. teacher if you have any questions about the study. You can ask your questions now or later, anytime you like.

What are your choices?
You can be in this study if you want to, but you don't have to be in it if you don't want to. Nobody will get mad at you if you do not want to do this. If you choose to be in the study and change your mind later, that is okay too.

Privacy
All of your answers are private. Your teachers, parents and other students will not know how you answered any question. Your name will not be on any of the study question forms or in any reports about the study.

Being part of this study will not change your grades or your schoolwork.

I want to be in the study.

_____ _____

Signature of Student **Date**

Appendix C

Demographics Form

Identification Code _ _ _ _ _

School Code _ _ _

Student Demographic Information

Please fill in the blank or circle the number in each category.
Do not put your name on this paper. Your answers are voluntary.

1. Age:
   I am _____ years old.

   My birth date is _____month, _____day, _____year.

2. Do you have any serious health problems that require you to take medication?

   0. No 1. No

   2b. If you answered "yes", please write down your health problems.

   _____

   _____

4. Ethnicity/Race:

   1. Asian/Pacific Islander 3. Hispanic

   2. African-American 4. Caucasian

   5. Other(not listed) _____

5. Education: My current grade in school is:

   1. Fourth 2. Fifth

6. My grade average in school is:

   A B C D

7. Do you have any brothers or sisters?

   0. No 1. Yes If yes, how many? _____ (number)

8. If you answered yes, please list the age of your brothers and sisters below.

Brothers	Age in Years	Sisters	Age in Years
1.	_____	1.	_____
2.	_____	2.	_____
3.	_____	3.	_____
4.	_____	4.	_____
5.	_____	5.	_____

Identification Code _ _ _ _ _

School Code _ _ _

9. Do you live with your parents?

Mother	No	yes	Stepparent	No	yes
Father	No	yes	Other _____		

10. Do you live with other family; grandparents, aunts, uncles, cousins, other adults? If so, please circle below.

Grandma	Grandpa	Aunts	Uncles
Cousins	Other children or adults, who? _____		

11. Do your parents read English?

Father	No	Yes
Mother	No	Yes

For office use only

Date entered ____/_____/_____ Coder: _____

Health Perception Scale

Please answer the following questions by placing an "X" next to the answer that you think best describes your health.

1. How would you rate your overall health at the present time?

_____ excellent

_____ good

_____ fair

_____ poor

2. Is your health now better, about the same, or not as good as it was three years ago?

_____ better

_____ same

_____ not as good

3. To your health problems stand in the way of your doing the things you want to do?

_____ not at all

_____ a little

_____ a great deal

4. Would you say that your health is better, about the same, or not as good as most people your age?

_____ better

_____ same

_____ not as good

Lawton et al., 1982
Perceived health status/DN

Appendix E

Laffrey Health Conception Scale

Instructions. Below are 28 statements to describe the meaning that "healthy" or "being healthy" has for different people. Depending on your personal definition of health, you may agree or disagree with the statements. Beside each statement is a scale which ranges from *strongly disagree* (1) to *strongly agree* (6). For each item, please circle the number that best represents the extent to which you agree or disagree with this statement. The more strongly you disagree with a statement; the lower will be the number you circle. The more strongly you agree with a statement, then the higher than number you circle. Please make sure your answer every item and that you circle only one number per item. This is a measure of how you define health. **There are no right or wrong answers.**

Health or "being healthy" means:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1. Feeling great - on top of the world.	1	2	3	4	5	6
2. Being able to adjust to changes in my surroundings.	1	2	3	4	5	6
3. Fulfilling my daily responsibilities.	1	2	3	4	5	6
4. Being free from symptoms of disease.	1	2	3	4	5	6
5. Being able to do those things I have to do.	1	2	3	4	5	6
6. Not requiring a doctor's services.	1	2	3	4	5	6
7. Creatively living life to the fullest.	1	2	3	4	5	6
8. Adjusting to life's changes.	1	2	3	4	5	6

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
9. Not requiring pills for illness or disease.	1	2	3	4	5	6
10. Being able to function as expected.	1	2	3	4	5	6
11. Not being under a doctor's care for illness.	1	2	3	4	5	6
12. Facing each day with zest and enthusiasm.	1	2	3	4	5	6
13. Being able to cope with stressful events.	1	2	3	4	5	6
14. Being able to change and adjust to demands made by the environment.	1	2	3	4	5	6
15. Not being sick.	1	2	3	4	5	6
16. Actualizing my highest and best aspirations.	1	2	3	4	5	6
17. Adequately carrying out my daily responsibilities.	1	2	3	4	5	6
18. Living at top level.	1	2	3	4	5	6
19. Adapting to things as they really are, not as I'd like them to be.	1	2	3	4	5	6
20. I do not require medications.	1	2	3	4	5	6

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
21. Carrying on the normal functions of daily living.	1	2	3	4	5	6
22. Coping with changes in my surroundings.	1	2	3	4	5	6
23. Realizing my full potential.	1	2	3	4	5	6
24. Fulfilling my responsibilities as a husband, wife, son, or daughter.	1	2	3	4	5	6
25. Having no physical or mental problems.	1	2	3	4	5	6
26. Performing at the expected level.	1	2	3	4	5	6
27. Not collapsing under ordinary stress.	1	2	3	4	5	6
28. My mind and body function at their highest level.	1	2	3	4	5	6
TOTAL						

Appendix F

Health Behavior Questionnaire

WHAT WOULD YOU DO?

INSTRUCTIONS:	Circle <u>one</u> of the two foods that you would pick if you <u>had</u> to choose just one.

1. If you were at the movies, which one would you pick?

popcorn <u>with</u> salt or butter

popcorn without salt or butter

---

2. Which one would you pick to fix with dinner?

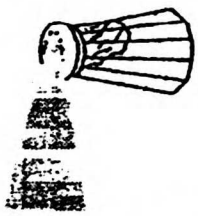
fresh or frozen vegetables

canned vegetables

---

3. If you were going to eat your lunch, which would you do?

eat the food without adding salt

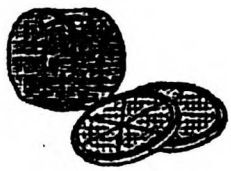


shake salt on the food before eating

---

4. Which would you put on your hamburger?

catsup



tomato

5. Which would you pick to drink?

regular milk

low fat or skim milk

---

6. Which food would you eat for a snack?

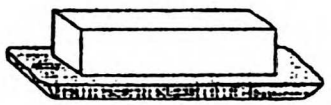
candy bar

fresh fruit

---

7. What would you put on your toast?

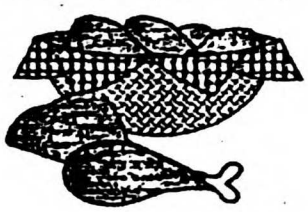
margarine



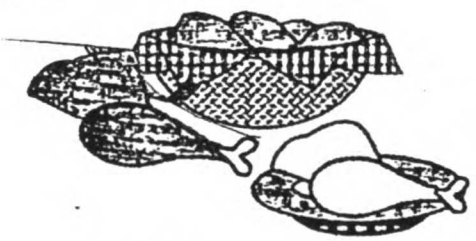
butter

---

8. Which would you do if you were going to eat a piece of chicken?



leave on the skin



take off the skin and not eat the skin

---

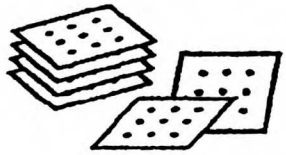
9. Which food would you ask for?

frozen yogurt

ice cream

10. Which food would you ask your parents to buy?

plain bread sticks

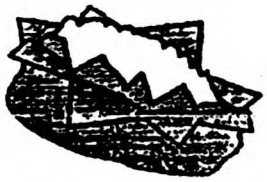


salted crackers

---

11. Which would you choose to cook if you were going to help make dinner at home?

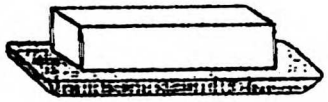
french fries



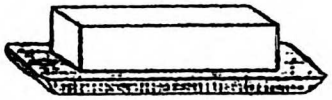
baked potato

---

12. Which would you do if you were going to eat cooked vegetables?



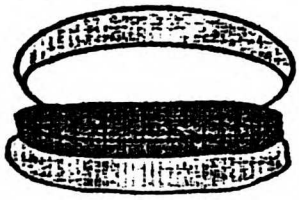
eat <u>without</u> butter



add butter

---

13. Which would you order if you were going to eat at a fast food restaurant?



a regular hamburger

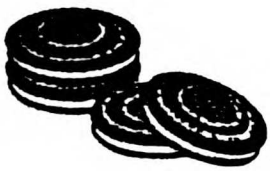
a salad from the salad bar

STOP HERE

WHAT FOODS DO YOU EAT MOST OF THE TIME?

INSTRUCTIONS: Circle <u>one</u> of the two foods that you eat most often.

1.

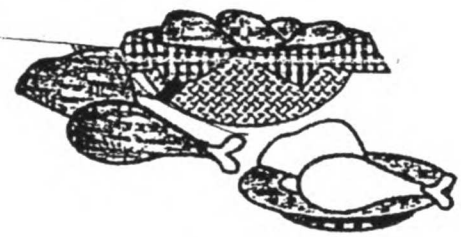


cookies

an apple

2.

hot dog



chicken

3.

buttered popcorn

unbuttered popcorn

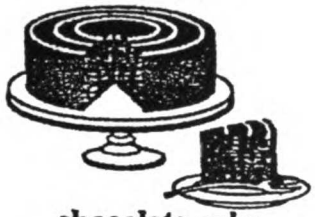
4.

bran muffin with margarine

french toast with butter and syrup

INSTRUCTIONS: Circle <u>one</u> of the two foods that you eat most often.

5.



chocolate cake

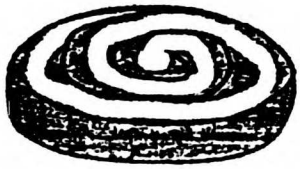
an orange

6.

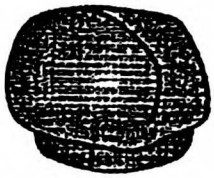
ice cream

fresh fruit popsicle

7.

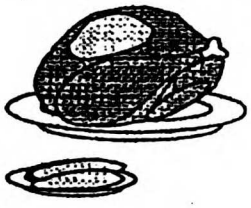


sweet roll

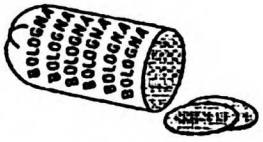


whole wheat roll

8.



turkey



bologna

9.

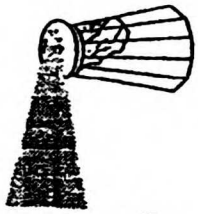
regular milk

lowfat or skim milk

INSTRUCTIONS: Circle <u>one</u> of the two foods that you eat most often.

10.

no salt



salt

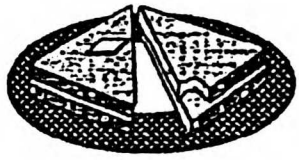
11.

frozen yogurt

ice cream

12.

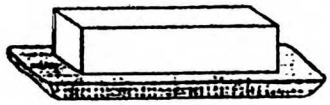
french toast



whole wheat toast

13.

margarine



butter

14.

regular hamburger

lean hamburger

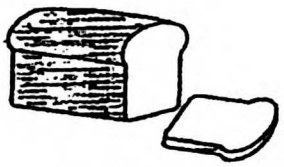
STOP HERE

WHICH FOOD IS BETTER FOR YOUR HEALTH?

INSTRUCTIONS: Circle <u>one</u> of the two foods that you think is better for your health

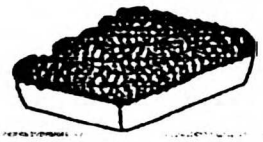
1.

whole wheat bread

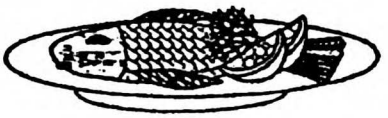


white bread

2.



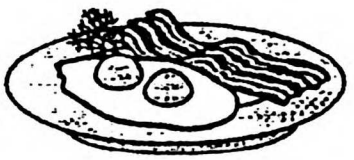
broiled beef



broiled fish

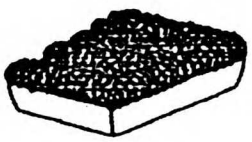
3.

cold cereal



eggs and bacon

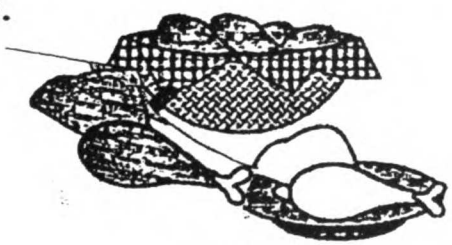
4.



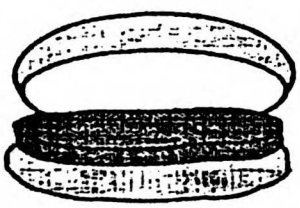
beef

beans

5.



chicken



regular hamburger

INSTRUCTIONS: Circle one of the two foods that you think is better for your health

6.

regular milk

lowfat or skim milk

7.

peanut butter

bologna

8.

frozen yogurt

ice cream

9.

green salad

french fries

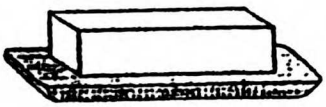
10.

raisins

candy bar

INSTRUCTIONS: Circle <u>one</u> of the two foods that you think is better for your health

11.



butter

margarine

12.

frozen corn

canned corn

13.

french fries

baked potato

14.

regular peanut butter

freshly ground peanut butter

STOP HERE

THINGS YOU DO MOST OF THE TIME

INSTRUCTIONS: **The questions in this section ask about what you do most of the time. Please answer by circling either YES or NO for each question.**

1. Do you choose or fix your own food for breakfast?	1. YES	2. NO
2. Do you choose or fix your own lunch on school days?	1. YES	2. NO
3. Do you choose foods at the grocery store?	1. YES	2. NO
4. Do you choose what you want to eat from the dinner table?	1. YES	2. NO
5. Do you choose or fix your own snacks?	1. YES	2. NO
6. Do you eat fresh fruit at home?	1. YES	2. NO
7. Do you eat ice cream at home?	1. YES	2. NO
8. Do you eat chips at home?	1. YES	2. NO
9. Do you put salt on your food at the dinner table?	1. YES	2. NO

STOP HERE

PHYSICAL ACTIVITY

INSTRUCTIONS:	**The questions in this section ask about physical activity. Please answer by circling either YES or NO for each question.**

Note: Being physically active means doing exercises like running, jogging, walking fast, bike riding, swimming, dancing, skating, or any other activity that makes you breathe faster and your heart beat faster.

1.	One or both of my parents are physically active. They do exercises like running, jogging, walking fast, bike riding, swimming, dancing, or skating.	1. YES 2. NO
2.	One or both of my parents do exercises with me like running, jogging, walking fast, bike riding, swimming, dancing, or skating.	1. YES 2. NO
3.	Most of my friends are physically active.	1. YES 2. NO
4.	Most of my teachers are physically active.	1. YES 2. NO
5.	Most of my friends want me to be physically active when we play.	1. YES 2. NO
6.	My friends and I have fun when we're physically active playing together.	1. YES 2. NO
7.	One or both of my parents want me to stay inside when I want to be physically active outside.	1. YES 2. NO

8. One or both of my parents will not let me do physical activities when I want to. 1. YES 2. NO

9. One or both of my parents like to watch me when I am being physically active. 1. YES 2. NO

10. When I am physically active, one or both of my parents smile and cheer for me. 1. YES 2. NO

11. Most of my classroom teachers criticize people who exercise. 1. YES 2. NO

12. When I am physically active at recess, most of my classroom teachers tell me to stop. 1. YES 2. NO

13. When I am physically active in PE class, my PE teacher tells me I am doing a good job. 1. YES 2. NO

14. Most of my friends tease me a lot when I am physically active. 1. YES 2. NO

15. When doing sports, most of my classmates choose me last for their team. 1. YES 2. NO

16. When I am physically active, most of my friends make fun of me. 1. YES 2. NO

17. When doing sports most of my classmates want me on their team. 1. YES 2. NO

18. When I am physically active, most of my friends tell me I am a good player. 1. YES 2. NO

STOP HERE

WHAT DO OTHER PEOPLE WANT YOU TO EAT?

INSTRUCTIONS:	**The questions in this section ask about what other people want you to eat. Please answer by circling either YES or NO for each question.**

1. **Who wants you to eat popcorn without salt and butter on it?**

   a. Your parents 1. YES 2. NO

   b. Your teachers 1. YES 2. NO

   c. Your friends 1. YES 2. NO

2. **Who wants you to eat lots of fruits and vegetables?**

   a. Your parents 1. YES 2. NO

   b. Your teachers 1. YES 2. NO

   c. Your friends 1. YES 2. NO

3. **Who wants you to eat food without putting salt on it from the salt shaker?**

   a. Your parents 1. YES 2. NO

   b. Your teachers 1. YES 2. NO

   c. Your friends 1. YES 2. NO

4. Who wants you to drink skim or low fat milk instead of whole milk?

a. Your parents	1. YES	2. NO
b. Your teachers	1. YES	2. NO
c. Your friends	1. YES	2. NO

5. Who wants you to eat margarine instead of butter?

a. Your parents	1. YES	2. NO
b. Your teachers	1. YES	2. NO
c. Your friends	1. YES	2. NO

6. Who wants you to eat the chicken meat without the skin?

a. Your parents	1. YES	2. NO
b. Your teachers	1. YES	2. NO
c. Your friends	1. YES	2. NO

7. Who wants you to eat a salad from the salad bar instead of eating a hamburger?

a. Your parents	1. YES	2. NO
b. Your teachers	1. YES	2. NO
c. Your friends	1. YES	2. NO

STOP HERE

HOW SURE ARE YOU?

INSTRUCTIONS:	The questions in this section ask how sure you are about being able to eat some of the foods below. Please answer by circling either Not Sure, A Little Sure, or Very Sure for each question.

1. How sure are you that you can eat food without adding salt from a shaker?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
2. How sure are you that you can eat fresh or frozen vegetables instead of canned vegetables?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
3. How sure are you that you can ask your parents for popcorn without salt and butter?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
4. How sure are you that you can ask for lettuce and tomato instead of pickles on your hamburger?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
5. How sure are you that you can drink low fat white milk instead of regular white milk?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
6. How sure are you that you can eat cereal instead of a donut?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE

7. How sure are you that you can eat fresh fruit instead of a candy bar?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
8. How sure are you that you can eat toast with margarine instead of real butter?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
9. How sure are you that you can take the skin off of chicken (and not eat the skin)?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
10. How sure are you that you can ask for frozen yogurt instead of ice cream?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
11. How sure are you that you can ask your parents to buy bread sticks instead of salted crackers?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
12. How sure are you that you can eat a baked potato instead of french fries?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
13. How sure are you that you can drink fruit juice instead of a soft drink (soda pop)?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
14. How sure are you that you can eat cooked vegetables without adding real butter to them?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE

15. How sure are you that you can eat a salad from the salad bar at a fast food restaurant instead of ordering a hamburger and fries?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE

STOP HERE

PHYSICAL ACTIVITY

INSTRUCTIONS:	The questions in this section ask how sure you are about being physically active. Please answer by circling either Not Sure, A Little Sure, or Very Sure for each question.

1. How sure are you that you can choose to jog during recess?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
2. How sure are you that you can be physically active 3-5 times a week?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
3. How sure are you that you can exercise and keep moving for most of the time in physical education class?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
4. How sure are you that you can improve your physical fitness by running or biking 3-5 times a week?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
5. How sure are you that you can keep up a steady pace without stopping for 15-20minutes when you are physically active?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE

STOP HERE

Appendix G

Youth Risk Behavior Survey (Eating & Exercise Scale)

Additions to the Eating and Exercise Questionnaire

Seven questions about eating and seven about exercise have been added. These questions have been adapted from the YRBS, a national youth behavior survey administered by the CDC.

Eating

1. During the past 7 days, how many times did you drink 100% fruit juice, such as orange, apple, or grape juice? (Do not count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks)
   a. none
   b. 1-3 times
   c. 4-6 times
   d. 1 time per day
   e. 2 times per day
   f. 3 times per day
   g. 4 or more times per day

2. During the past 7 days, how many times did you eat fruit? (Do not count fruit juice)
   a. none
   b. 1-3 times
   c. 4-6 times
   d. 1 time per day
   e. 2 times per day
   f. 3 times per day
   g. 4 or more times per day

3. During the past 7 days, how many times did you eat green salad?
   a. none
   b. 1-3 times
   c. 4-6 times
   d. 1 time per day
   e. 2 times per day
   f. 3 times per day
   g. 4 or more times per day

4. During the past 7 days, how many times did you eat potatoes? (Do not count French fries, fried potatoes, or potato chips)
   a. none
   b. 1-3 times
   c. 4-6 times
   d. 1 time per day
   e. 2 times per day
   f. 3 times per day
   g. 4 or more times per day

5. During the past 7 days, how many times did you eat carrots?
   a. none
   b. 1-3 times
   c. 4-6 times
   d. 1 time per day
   e. 2 times per day
   f. 3 times per day
   g. 4 or more times per day

6. During the past 7 days, how many times did you eat other vegetables? (Do not count green salad, potatoes or carrots)
   a. none
   b. 1-3 times
   c. 4-6 times
   d. 1 time per day
   e. 2 times per day
   f. 3 times per day
   g. 4 or more times per day

7. During the past 7 days, how many glasses of milk did you drink? (Include the milk you drank in a glass or a cup or from a carton or with cereal)
   a. none
   b. 1-3 times
   c. 4-6 times

d. 1 time per day
e. 2 times per day
f. 3 times per day
g. 4 or more times per day

Exercise

1. On how many of the past 7 days did you exercise at least 20 minutes that made you sweat and breathe hard, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar exercise.
   a. 0 days
   b. 1 day
   c. 2 days
   d. 3 days
   e. 4 days
   f. 5 days
   g. 6 days
   h. 7 days

2. On how many of the past 7 days did you participate in physical activity for at least 30 minutes that did not make you sweat or breathe hard, such as fast walking, slow bicycling, skating, pushing a lawn mower, or mopping floors?
   a. 0 days
   b. 1 day
   c. 2 days
   d. 3 days
   e. 4 days
   f. 5 days
   g. 6 days
   h. 7 days

4. On how many of the past 7 days did you do exercise to strengthen or tone your muscles, such as push-ups or sit-ups?
   a. 0 days
   b. 1 day
   c. 2 days
   d. 3 days
   e. 4 days
   f. 5 days
   g. 6 days
   h. 7 days

5. On the average school day, how many hours do you watch TV?
   a. None
   b. Less than 1 hour per day
   c. 1 hour per day
   d. 2 hours per day
   e. 3 hours per day
   f. 4 hours per day
   g. 5 or more hours per day

6. In an average week when you are in school, on how many days do you go to P.E. class?
   a. 0 days
   b. 1 day
   c. 2 days
   d. 3 days
   e. 4 days
   f. 5 days

7. During the average P.E. class, how many minutes do you spend actually exercising or playing sports?
   a. I do not take P.E.
   b. Less than 10 minutes
   c. 10-20 minutes
   d. 21-30 minutes
   e. 31-40 minutes
   f. 41-50 minutes
   g. 51-60 minutes
   h. more than 60 minutes

END

Appendix H

Adult Health Behavior Knowledge Scale

INSTRUCTIONS:
These questions are about eating and exercise. There are some answers you won't know, but answer the questions as best you can. If you need to guess, that's okay. For each question, circle the correct answer. You are to choose only the *one* best answer for each question.

1. The best way to reduce blood pressure without medication is to:

   a. Reduce cholesterol intake

   b. Lose weight

   c. Restrict salt

   d. 1 and 3 above

   e. 2 and 3 above

   h. Don't know

2. Which of the following foods is highest in saturated fat?

   a. Peanuts

   b. Beef liver

   c. Frankfurters (hot dogs)

   d. Roast Beef

   h. Don't know

3. How are the ingredients listed on the label of a food product?

   a. In order of nutritional content, from the most to the least nutritious

   b. In the order of their amount in the product, from the most to the least

   c. In order of how expensive the ingredients are, from the most expensive to the least expensive

   d. There is no standard order of ingredient labeling, each manufacturer sets its own policy on this matter

   h. Don't know

4. A good way to reduce saturated fat intake is to:

   a. Use more cheese

   b. Decrease the use of vegetable oil

   c. Cut down on bacon, sausage, and luncheon meat

   d. Use fewer nuts and beans

   h. Don't know

5. How long and how often do you need to exercise to improve the fitness of your heart and lungs?

   a. 1 hour each time, once per week

   b. 20 minutes each time, 2 times per week

   c. 20 minutes each time, 3 times per week

   d. 10 minutes each time, 6 times per week

   h. Don't know

6. Below are ingredient labels from 3 brands of margarine, check the one that is best for your heart.

   a. Contains partially hydrogenated soybean and cottonseed oil

   b. Contains liquid safflower oil, partially hydrogenated soy oil

   c. Contains palm oil, partially hydrogenated soy oil

   h. Don't know

7. Exercises that are the best for preventing heart disease are:

   a. Short, energetic hard bursts of physical exercise

   b. Physical activity in which breathing pure air is important

   c. Physical activity which causes hard and rapid breathing for a sustained period of time

   d. Exercise involving specially designed equipment

   h. Don't know

8. The best way to reduce the amount of cholesterol in the blood is to:

   a. Avoid tension and stress

   b. Decrease the amount of fat you eat

   c. Quick smoking and drink less alcohol

   d. Decrease the amount of starchy foods in diet

   h. Don't know

9. Hydrogenated vegetable fats are:

   a. Mainly saturated fats

   b. Mainly polyunsaturated fats

   c. Solid at room temperature

   d. 1 and 2 above

   e. 2 and 3 above

   h. Don't know

The following statements about health are either true or false. Please read each one and circle "True" if this statement is true or circle "False" if it is false. Please mark only one response for each statement.

10. Soy sauce and steak sauce are low in sodium.

    a. True b. False h. Don't know

11. Mechanical devices like sauna belts make it easier for develop physical fitness.

    a. True b. False h. Don't know

12. Exercising for 2 hours on the weekend is just as good as exercising for 30 minutes on 4 different days.

    a. True b. False h. Don't know

13. Seasoned salt, garlic salt and onion salt should be avoided on a low sodium diet.

    a. True b. False h. Don't know

14. White cheese is lower in fat than yellow cheese.

    a. True b. False h. Don't know

15. If you're in good physical condition, your pulse should return to normal within 15 minutes after exercising.

    a. True b. False h. Don't know

16. Most frozen convenience foods, like T.V. dinners have large amounts of salt added.

    a. True b. False h. Don't know

17. Riding your bicycle for 10 minutes twice a day will give you the same results as riding your bicycle for 20 minutes a day.

    a. True b. False h. Don't know

18. Fresh pork has as much salt as ham.

    a. True b. False h. Don't know **(END)**

For office use only

Date entered: ____/____/____ Coder: _____

Vega et al. (1987).
UCSF –DN-01

Appendix I

Adult Diet & Exercise Self-Efficacy Scale

Identification code _ _ _ _ _ _ _

School code _ _ _

Adult Health Self-Efficacy Scale

INSTRUCTIONS:
These questions are about eating and exercise behavior. You will be asked to rate your confidence in your ability to regularly engage in specific eating and exercise behaviors. Please answer all questions by circling the best response for you.

SAMPLE:
If I thought made that maybe I could eat salad for lunch, I would answer like this:

	I know I cannot		Maybe I can		I know I can	Does not apply
A. Eat salads for lunch	1	2	3	4	5	(8)

How sure are you that you can do these eating behaviors?

1. Eat smaller portions at dinner.	1	2	3	4	5	(8)
2. Cook smaller portions so there are no leftovers.	1	2	3	4	5	(8)
3. Eat lunch as your main meal of the day, rather than dinner.	1	2	3	4	5	(8)
4. Eat smaller portions of food at a party.	1	2	3	4	5	(8)
5. Eat salads for lunch.	1	2	3	4	5	(8)
6. Eat low-fat, low-salt foods (e.g., fruit, pretzels, veggies w low-fat dip when you feel depressed, bored, or tense.	1	2	3	4	5	(8)
7. Eat low-fat, low-salt foods when there is high-fat, high salt food readily available at a party.	1	2	3	4	5	(8)
8. Eat low-fat, low-salt foods when dining with friends or co-workers.	1	2	3	4	5	(8)
9. Eat low-fat low-salt foods when the only snack closed by it is available from a vending machine.	1	2	3	4	5	(8)
10. Eat low-fat, low-salt foods when you are alone, and there is no one to watch you.	1	2	3	4	5	(8)
11. Add less salt that the recipe calls for.	1	2	3	4	5	(8)
12. Eat unsalted peanuts, chips, crackers, and pretzels.	1	2	3	4	5	(8)

(GO ON TO THE NEXT PAGE)

	I know I cannot		Maybe I can		I know I can	Does not apply
	1	2	3	4	5	(8)
13. Avoid add insult at the table.	1	2	3	4	5	(8)
14. Eat unsalted, unbuttered or 'light' popcorn.	1	2	3	4	5	(8)
15. Keep the salt shaker off the kitchen table.	1	2	3	4	5	(8)
16. Eat meatless (vegetarian) entrees for dinner (e.g. meatless lasagna).	1	2	3	4	5	(8)
17. Substitute low or nonfat milk for whole milk at breakfast.	1	2	3	4	5	(8)
18. Cut down on gravies and cream sauces.	1	2	3	4	5	(8)
19. Eat poultry and fish instead of red meat at dinner.	1	2	3	4	5	(8)
20. Avoid ordering red meat (beef, pork, ham, lamb) at a restaurant.	1	2	3	4	5	(8)

How sure are you that you can do these exercise behaviors?

21. Get up early, even on weekends, to exercise.	1	2	3	4	5	(8)
22. Stick to your exercise program after a long, tiring day at work.	1	2	3	4	5	(8)
23. Exercise even though you are feeling depressed.	1	2	3	4	5	(8)
24. Set aside time for a physical activity program; that is, walking, jogging, swimming, biking or other continuous activities for at least 30 minutes, three times per week.	1	2	3	4	5	(8)
25. Continue to exercise with others even though they seem to fast or to slow for you.	1	2	3	4	5	(8)
26. Stick to your exercise program when undergoing a stressful life change (e.g., divorce, death in the family, moving).	1	2	3	4	5	(8)

(GO ON TO THE NEXT PAGE)

Identification code _ _ _ _ _ _ _

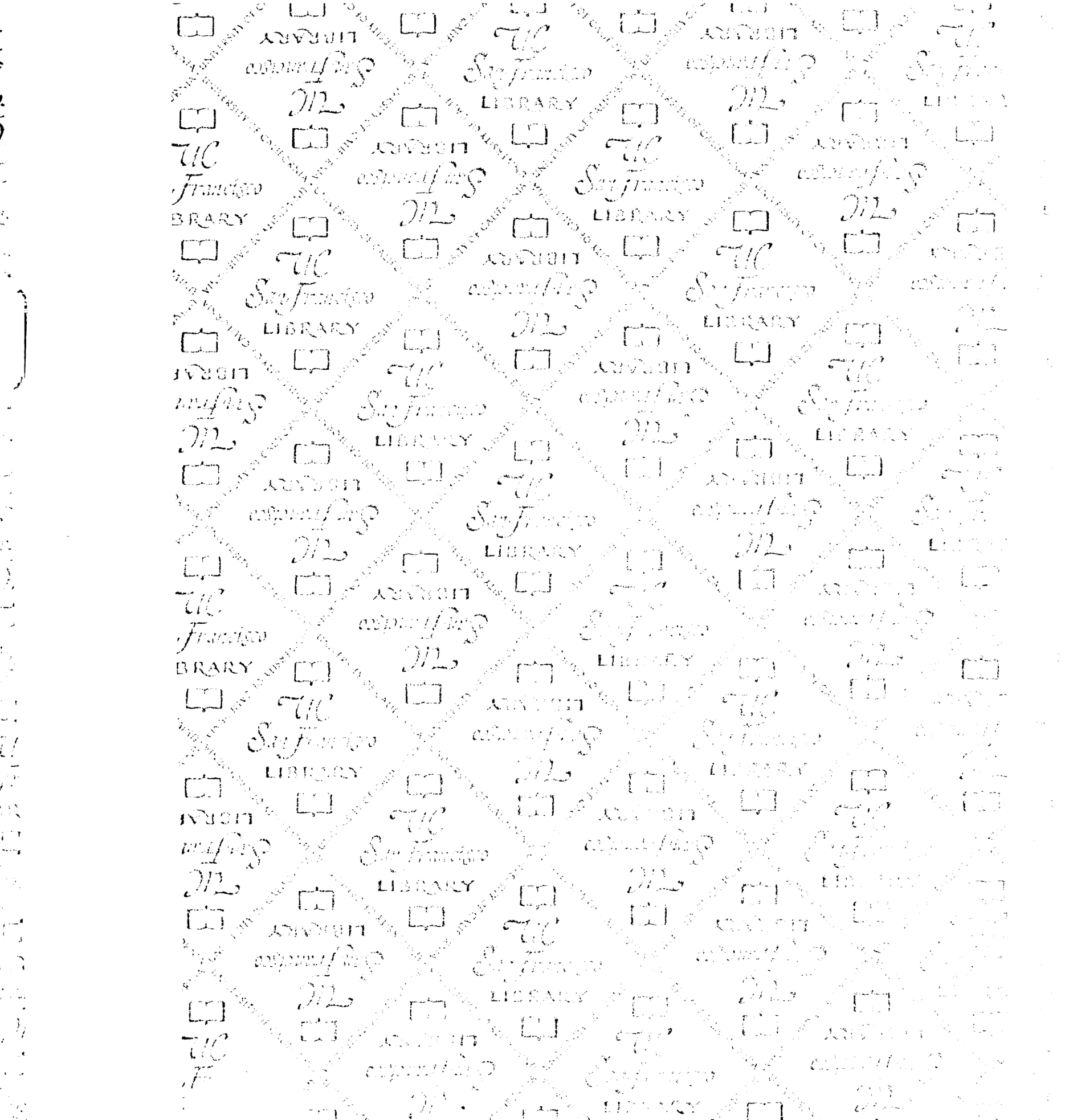
School code _ _ _

	I know I cannot		Maybe I can		I know I can	Does not apply
	1	2	3	4	5	(8)
27. Attend a party only after exercising.	1	2	3	4	5	(8)
28. Stick to your exercise program when your family is demanding more time from you.	1	2	3	4	5	(8)
29. Stick to your exercise program when you have household chores to do.	1	2	3	4	5	(8)
30. Stick to your exercise program even when you have excessive demands at work.	1	2	3	4	5	(8)
31. Stick to your exercise program when social obligations are very time-consuming.	1	2	3	4	5	(8)
32. Read or study less in order to exercise more.	1	2	3	4	5	(8)

END

Office use only

Date Entered: ____ /_____/_____ Coder: _____


The San Francisco LIBRARY