Theses and Dissertations

Graduate School

2006

The Influence of Physical Activity and Television on the Intention and Self-Efficacy to Engage in Health-Enhancing Behaviors

Ian Joseph Wallace
Virginia Commonwealth University

Follow this and additional works at: https://scholarscompass.vcu.edu/etd

Part of the Psychology Commons

The Influence of Physical Activity and Television on the Intention and Self-Efficacy to Engage in Health-Enhancing Behaviors

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

by

Ian Joseph Wallace
Bachelor of Arts, The College of New Jersey, 2000
Master of Arts, Pepperdine University, 2002

Director: Steven J. Danish, Ph.D.
Professor, Department of Psychology
Virginia Commonwealth University

Virginia Commonwealth University
Richmond, VA
January, 2006

Acknowledgements

I owe the completion of this work to a number of people who have helped me in a variety of ways. First, my advisor, Dr. Steven Danish, has been instrumental at every stage of this project. He has provided me with a balance of guidance and autonomy that is essential for professional development. The support and encouragement I have received from Dr. Kathleen Ingram has been vital to the success of this project. Her comments, suggestions, and broad knowledge of the field have bolstered this final product. The statistical expertise and guidance of Dr. Donna McClish have significantly contributed to the overall soundness of this project.

In addition to my committee members, I want to acknowledge friends and family for their continued support of my endeavor to become a psychologist. My parents, you have each been supportive of my journey and I thank you immeasurably. Morgana, your return has been sweet and I appreciate the interest you have taken in my life. And where would this project be without the weekly support of my Thursday night gang? In an ever-changing environment such as graduate school, the regularity "ya'll" provided was essential for the self-care necessary to persevere and succeed. Lastly, the devotion and unyielding support I receive from my Bear, fuels my passion to make all of my dreams come true.

Table of Contents

List of Tables

List of Figures

Abstract

THE INFLUENCE OF PHYSICAL ACTIVITY AND TELEVISION ON THE

INTENTION AND SELF-EFFICACY TO ENGAGE IN HEALTH-ENHANCING

BEHAVIORS

Ian J. Wallace, B.S., M.A.

A thesis submitted in partial fulfillment of the requirements for the degree of
Masters of Science at Virginia Commonwealth University

Virginia Commonwealth University, 2006

Major Director: Steven J. Danish, Ph.D., Professor, Psychology

Cancer and heart disease account for the largest proportion of morbidity and
mortality among all adult diseases in the United States. Research has focused on
identifying causal risk factors among adolescents. However, theories of health behavior
change also stress the intermediary factors of intention and efficacy for effective behavior
change. Existing research supports the potential of physical activity (PA), particularly
learned through the domains of exercise and sport, as a means to developing these
necessary skills (Danish, Petitpas, & Hale, 1993). The current investigation examined the
influence of PA and television watching (TV) on intentions and efficacy to engage in
health-enhancing behaviors. This was achieved by analyzing data from Building a

BRIDGE to Better Health, a school-based health promotion program. Results indicate that independently, PA and TV significantly influence specific as well as general intentions and efficacy. These findings have important implications for adolescent health behavior.

Introduction

Cancer and heart disease have significantly affected the American population for decades. These chronic diseases account for the largest proportion of morbidity and mortality (51%) among all adult diseases (Jemal, Murray, Ward, Samuels, Tiwari, Jemal et al., 2005). The most recent mortality statistics indicate that each year approximately, 557,000 people die from cancer and 697,000 people die from heart disease in the United States (American Cancer Society, 2005). Most recently, the American Cancer Society (ACS) estimated that in 2005 the number of total deaths from cancer will surpass those from heart disease, making it the number one killer in America (Jemal et al., 2005). Furthermore, the lifetime probability of developing cancer is estimated to be 50% for men and 33% for women (American Cancer Society, 2005). This evidence suggests that chronic diseases will continue to account for the largest proportion of mortality for many years. Interestingly though, these diseases are largely due to controllable lifestyle factors (Orlandi & Dalton, 1998). As a result of the broad impact and preventability of these diseases, an immense literature has developed to investigate and combat the development of cancer and heart disease.

Research has found that most chronic diseases result from lifestyle and environmental factors rather than from inheritable determinants (ACS, 2005; United States Department of Health and Human Services, 2000; World Health Organization [WHO],

1998). Therefore, psychological investigations have focused on identifying personal and controllable risk factors that lead to increased rates of cancer and heart disease (Dryfoos, 1998; Elster, 1993; Friedman & Fisher, 1992; Litt, 1997). In adult populations, identified risk factors include smoking (Altman & Jackson, 1998), sedentary behavior (Bauman, 2004; Lowry, Wechsler, Galuska, Fulton, & Kann, 2002), high-fat and caloric intake (Lowry et al., 2002), obesity (WHO, 1998), and lack of physical activity (PA) (Dubbert, 2002). Genetics has also been shown to account for approximately 5-10% of all cancers (ACS, 2004).

A recent literature review corroborates the assertion that risk factors comprise the focus of the majority of current research. Rise (2004) found that the majority of health-related research focuses on predicting risk factors, which are also known as negative health behaviors. Insufficient vigorous activity has been shown to be the most significant and consistent single factor contributing to obesity, one of the greatest risk factors for chronic disease (Patrick et al., 2004). Insufficient vigorous activity has also been shown to correlate with other negative health behaviors such as smoking and intake of unhealthy food (Wilson et al., 2005). Based on the interconnectedness of these variables, individuals who do not engage in recommended levels of physical activity are at risk for a host of disease-contributing behaviors.

In addition to risk factors, the literature has identified protective factors, which are also known as health-enhancing behaviors (Bauman, 2004). Identified protective factors include eating at least five fruits and vegetables daily, having knowledge of family health history and engaging in physical activity. Government standards for physical activity

recommend either 20 minutes of vigorous exercise 3 days per week or 30 minutes of

moderate exercise 5 days per week (USDHHS, 2000). These standards are based on

scientific research indicating the positive health benefits of physical exercise, which

include reduced body mass index (BMI), reduced rates for cancer and heart disease, and

increased overall well-being (Bauman, 2004).

Based on the positive health outcomes generated by physical activity, researchers

have searched for correlates of adult physical activity in an attempt to target other health

behaviors that are closely related to physical activity, which may lead to increases in levels

of physical activity (Trost, Owen, Bauman, Sallis, & Brown, 2002). Among adults, the

following variables have been found to correlate highly with physical activity: physical

activity efficacy, previous physical activity, socioeconomic status, and social support

(Trost et al., 2002). Attempts to discover clusters of positive behaviors, which include

physical activity, have led researchers to identify clustering patterns of adolescent health

behavior.

Adolescent health behavior

Identifying the origin of both positive and negative health behaviors early in life is

crucial to preventing chronic disease. Therefore, research has attempted to identify clusters

of health behaviors among adolescents. Reduced smoking, intake of healthy food (Wilson

et al., 2005), and productive sedentary behavior (Ehrmann Feldman, Barnett, Shrier,

Rossignol, & Abenhaim, 2003) have been shown to positively cluster with increased

adolescent physical activity. The identification of clusters is critical because the health

behaviors and beliefs that develop early in life establish the foundation for the same or similar behaviors in adulthood (Orlandi & Dalton, 1998).

A number of studies have demonstrated the relationship between youth health behavior and subsequent adult health behavior (Orlandi & Dalton, 1998; Trost et al., 2002; Wing, 2000). Specific health behaviors, both positive and negative, that have been shown to persist from an early age through adulthood include smoking, fruit and vegetable consumption, knowledge of family health history, self-screening, substance abuse, physical activity, and sedentary behavior (Orlandi & Dalton, 1998). Not only do these behaviors continue into an adult's life, but as noted earlier, they significantly contribute to the morbidity and mortality of chronic diseases experienced or not experienced during adulthood.

Within the movement to identify single factors that significantly affect adolescent health (He, Kramer, Houser, Chomitz, & Hacker, 2004), both risk factors and protective health factors have been investigated. The health-enhancing factor of physical activity has received enormous research attention. A uniquely consistent finding among youth populations, as well as for adults, has been that *vigorous* physical activity is a protective factor for obesity (Patrick et al., 2004). However, the singular impact of *moderate* physical activity as a protective factor against obesity has been inconclusive.

A significant risk factor for adolescents that contributes to unhealthy outcomes is sedentary behavior, the opposite of physical activity. Television watching is one specific type of sedentary behavior that has been linked to increased rates of obesity in youth (Anderson, Crespo, Bartlett, Cheskin, & Pratt, 1998; Eisenmann, Bartee, & Wang, 2002).

The association between television watching and obesity among youth illustrates the positively correlated relationship between the early life habits of physical activity and sedentary behavior, which contribute to the prevalence of adult chronic disease.

Importance of physical activity

The importance of physical activity has been outlined by governmental and private organizations for over 40 years (Dubbert, 2002). The United States Department of Health and Human Services (USDHHS), The Centers for Disease Control and Prevention (CDC), the American College of Sports Medicine (ACSM), the National Institutes of Health (NIH), the United States Surgeon General, and the American Heart Association all have recommendations for what constitutes healthy physical activity. These recommendations have transformed over time, but have generally concurred that cardiovascular activity, multiple times per week, is beneficial for physiological health. Therefore, according to the USDHHS, adults are urged to exercise moderately most days per week for 30 minutes (USDHHS, 1999). Currently, the Healthy People 2010 initiative from the USDHHS recommends that youth engage in at least 20 minutes of vigorous activity 3 days per week or 30 minutes of moderate activity 5 days per week (USDHHS, 2000).

Recommendations have developed based upon scientific research that indicates physical activity has an inverse dose-response relationship with the leading causes of death; heart disease, cancer, and obesity (Bauman, 2004; Dubbert, 2002). An approximate reduction in risk of 30% was found for those achieving the national recommendations for physical activity. Moreover, vigorous physical activity has been significantly related to healthy eating, healthy body image, reduced emotional distress (Harrison & Narayan,

2003), and reduced BMI (Eisenmann, Bartee, & Qi Wang, 2002; Patrick et al., 2004). In the preventive health literature, vigorous physical activity has been defined as heavy breathing and sweating, which includes activities such as jogging, basketball, soccer, and swimming. This is in contrast to moderate physical activity, which has been defined as activity that does not make you sweat or breathe hard. Activities in this category include walking, slow bicycling, skating, doing yard work, or mopping/vacuuming floors.

The Youth Risk Behavior Survey reports that the rates of physical activity among youth are below national recommendations (Grunbaum et al., 2004). Overall, 62.6% of high school students report engaging in vigorous physical activity at least 3 times per week. Approximately 25% of high school students reported engaging in moderate physical activity five times per week. However, evidence exists that these self-report statistics may not reflect the true estimate of youth physical activity. Pate and colleagues (2002) found that as few as 30% of teenagers met recommended physical activity guidelines. Regardless of the actual percentages, these statistics reinforce the need for increased efforts to promote physical activity for youth.

A common assumption of youth physical activity is that it is achieved through physical education classes. However, research shows that the majority of schools do not require physical education classes and that on average children receive only 3 minutes of vigorous physical activity per class (Simons-Morton, Taylor, Snider, Huang, & Fulton, 1994). In fact, Illinois is the only state in the country that requires daily physical education classes from Pre-K through grade 12 (National Association for Sport and Physical Education, 2005). McGuiness (as cited in Pender, 1998) further noted that the vast

majority of physical activity (80%) occurs outside of school. It is important to recognize that youth are generally not receiving vigorous physical activity through their physical education classes, but rather in alternative environments.

Despite the consistently significant findings between physical activity and positive health outcomes, this relationship has been shown to be influenced by different variables. Gender is an important factor, as boys have been found to engage in vigorous physical activity significantly more than girls (Pate, Trost, Levin, & Dowda, 2000). Boys have also consistently been shown to participate more in moderate physical activity. Ethnicity has also played a role in this relationship. African American girls have shown significantly less participation in moderate and vigorous physical activity (USDHHS, 2005; Pate et al., 1997). Caucasian boys on the other hand have shown the most moderate and vigorous physical activity participation compared to other ethnic groups. Additionally, physical activity has been shown to positively correlate with social support, socioeconomic status, previous physical activity, and efficacy of physical activity (Trost et al., 2002). The findings from these studies further demonstrate the interrelatedness of physical activity and other variables.

Vigorous physical activity has consistently been shown to be a protective factor for negative health outcomes. However, research has also shown, albeit inconsistently, that exercise through sport may contribute to risky health behavior such as increased substance use, increased sexual behavior, and aggressiveness (Dubbert, 2002). It is hypothesized that the primary contributing factor to the negative health outcomes in sport is the process of socialization, rather than an inherent component of physical activity (Weiss, 2004). The

social and developmental nature of sport makes youth susceptible to the negative

influences of peer pressure, which include the above noted behaviors. Despite these

findings, research on the benefits of physical activity through sport has generally produced

positive outcomes (Dubbert, 2002).

Television watching as a sedentary behavior

Based on the strong evidence for the positive health benefits of physical activity, a

considerable amount of attention has been devoted to researching its contrary activity,

sedentary behavior. Previous studies have defined sedentary behavior as watching

television, doing homework, or playing on the computer (Ehrmann Feldman et al., 2003).

Overall, television watching has been most frequently researched. It is estimated that 43%

of children watch greater than 2 hours of television per school day (Lowry et al., 2002) and

that 26% of children watch 4 hours or more of television per school day (Anderson et al.,

1998). Television watching has been shown to predict multiple unhealthy outcomes such

as decreased physical activity and increased caloric consumption (Gortmaker et al., 1999;

Lowry et al., 2002; Utter, Neumark-Sztainer, Jeffery, & Story, 2003). Gortmaker and

colleagues (1999) found complementary evidence that a reduction in television viewing

predicted positive health outcomes.

These conclusions, however, are generally moderated by multiple variables. One

investigation indicated that television watching was positively associated with the

prevalence of being overweight for Caucasian boys and girls but not for African-American

boys and girls (Gordon-Larsen, Adair, & Popkin, 2002). Pate and colleagues (1997) also

showed that rural African American youth have increased sedentary behavior as compared

to rural Caucasian youth. Ethnic and gender differences appear to contribute a significant role in determining the impact sedentary behavior has on health outcomes.

The consumption of high fat and high caloric foods may also moderate the relationship between sedentary behavior and obesity (Lowry et al., 2002). In previous investigations, television watching has been inconsistently linked to higher rates of obesity (Strauss et al., 2001; Eisenmann et al., 2002), yet computer usage and homework (productive sedentary behaviors) have been occasionally linked to healthy behaviors such as fruit and vegetable consumption (Ehrmann Feldman et al., 2003). These findings, some of which are cross-sectional, support the possibility that the impact of television watching on obesity may be moderated by caloric intake during sedentary behavior.

Another influential factor in this research is how the construct of sedentary behavior has been categorized. The construct has been divided into productive (homework or computer use) and unproductive (television or video games) sedentary behavior (Ehrmann Feldman et al., 2003). Ehrmann Feldman and colleagues (2003) found a positive relationship between productive sedentary behavior and physical activity in adolescents. However, in the same study, television/video game time was not associated with decreased physical activity. This inconsistency may be due to the grouping of unproductive sedentary behavior. The combination of video games and television in this category may possibly eliminate the impact of caloric intake. This would be due to the structure of playing video games, which is more active and less conducive to the consumption of food, as compared to watching television. However, Utter and colleagues (2003) provided evidence that unproductive sedentary behavior, video games included, did lead to negative health

outcomes. They found that adolescents who watch television or play video games had increased BMI and unhealthy nutrition. The inconsistent findings that characterize this area of research appear to show that multiple variables contribute to healthy behavior, rather than the independent effect of one single factor.

Physical activity and television watching

Researchers who study physical activity and television watching have primarily sought to isolate each variable's individual effects on health behaviors. Yet, the interrelationship between physical activity and television watching is relevant to understanding and predicting chronic disease. Limited research has demonstrated how these variables appear to have an inverse relationship, whereby as physical activity increases, television watching decreases (Eisenmann et al., 2002). Ehrmann Feldman and colleagues (2003) have proposed that the caloric intake during television watching is an additional predictive factor in this relationship. As noted earlier, additional differences within the relationship between physical activity and television watching have been found across ethnicity and gender, which further complicates investigations attempting to determine the affect of any one variable.

Limited studies have shown how the interaction of television and physical activity may be a significant predictor of adolescent health. Yet, investigative attention continues to generally focus on the significance of each individual predictor. It appears that the relationship between these variables has investigative potential beyond the influence of solitary predictors. Physical activity and television watching may interact to produce a symbiotic relationship that has positive and/or negative health consequences.

Adolescent health behavior change

Efforts to identify the effect of a single risk factor for adolescent health behavior change have been useful, but limited. The majority of research on the predictive power of a single risk factor has been only marginally conclusive. Knowledge of risk factors that lead to unhealthy adult behavior is very important for targeting specific areas of adolescent health, but researchers have often concluded that the interconnectedness of these risk factors may be more predictive than single factors (Dubbert, 2002). Practical and methodological obstacles, such as obtaining accurate assessment and conducting complex statistical analyses, have restricted these interrelated research investigations (Dubbert, 2002). Therefore, researchers have pursued alternative routes to understanding health behavior by examining the nature of adolescent behavior change.

Smalley, Wittler, and Oliverson (2004) demonstrated that the majority of adolescents are aware of risk factors for heart disease and cancer, yet their lifestyle choices do not reflect implementation of this knowledge. These results show that knowledge of unhealthy behavior is not sufficient for adolescent behavior change. Identifying behaviors that cause cancer and heart disease is only the first step, while changing these behaviors is a separate step. Thus, to change behavior, theories have focused on identifying intermediary factors that are more easily modified, such as self-efficacy and intentions to change behavior (Glanz, Lewis, & Rimer, 1997).

According to Bandura (1986) as well as Prochaska and colleagues (1998), efficacy and planned behavior are core elements of behavior change among adolescents. Self-efficacy is defined as the confidence or certainty one has in their ability to complete

specific behaviors. Intention is the planning to engage in a particular behavior. According to the transtheoretical model, the nature of behavior change for youth, as well as adults, is largely dependant upon self-efficacy as a predictor of progress through stages of change (Prochaska, Johnson, & Lee, 1998). Bandura (1986) further added that self-efficacy is the most important factor in accounting for the amount of effort and persistence an individual exerts to achieve a desired behavior. Therefore, self-efficacy and intention appear to be prerequisites for health behavior change among adolescents.

In an investigation specifically related to physical activity, Trost and colleagues (1999) found that boys and girls' objective measures of physical activity were influenced by physical activity self-efficacy. As noted earlier, research has primarily focused on the risk factors for unhealthy behavior, without investigating the potential widespread protective nature of factors natural to physical activity such as efficacy and intention, which may impact other health behaviors. To illustrate this connection, Danish and colleagues (Danish, Petitpas, & Hale, 1993; Papacharisis, Goudas, Danish, & Theodorakis, 2005) have repeatedly described how skills learned through sport and exercise can be transferred and applied to other life domains such as school, relationships, and career. Therefore, it is important to investigate whether these skills learned through physical activity such as perseverance and goal-setting, which involve efficacy and intention, can be transferred to adolescents' ability to change other health behaviors. To further endorse this point, Bauman's (2004) review of the physical activity literature concluded that there still exists a need for research on the tertiary psychological affects of physical activity.

Modifying adolescent behavior change poses additional difficulties. Interventions aimed at altering health behavior in adult populations may not be appropriate for adolescents, and vice versa. It has also been shown that youth value healthy behavior significantly less than adult populations (Pender, 1998). The targeted environment for behavior change is an additional difference between adults and adolescents. For adolescents, school-based interventions are popular, convenient, and familiar, thus constituting the majority of health promotion intervention sites.

Despite literature indicating that the nature of behavior change requires more than identification of risk factors, significantly fewer studies have attempted to enact actual behavior change. In a review of recent literature on health behavior in adolescents, Rice (2004) reported, "most of the papers are concerned with predicting various types of health behaviors." (p.129). It is possible that more studies have not attempted to change adolescent behavior because of the intermediating variables that dictate change in an adolescent population. A vital step to consider within the process is assessing and modifying the mediating variables of behavior change, which include the transferable life skills of self-efficacy and intention to engage in health-enhancing behaviors. Altering these forces is a difficult but necessary step within itself that must be achieved in order to enact lasting behavior change for adolescents.

Transferability of skills learned through sport and exercise

In an attempt to understand factors that lead to heath behavior change, researchers have looked at the secondary or tertiary effects of physical activity. It has been shown to have benefits above and beyond physiological changes to the body. Specifically, research

has continually documented how life skills can be learned, practiced, and enhanced through physical activity (Hodge & Danish, 1999; Strauss et al., 2001; Trost et al., 2002). Examples of these life skills include perseverance, intention to change behavior, efficacy, and goal setting.

The most common setting for the development of life skills through physical activity among youth is through sport and exercise. Team and individual sport provide the most consistent and accessible environment for youth to obtain physical activity, yet personal exercise is also becoming an increasingly popular option. It is within these contexts where youth are capable of learning life skills, which significantly contribute to their development. Kleiber and Kirshnit (1991) stated that since youth sport is inextricably tied to developmental processes, it therefore plays a significant role in youth identity formation. This perspective emphasizes the ability of sport and exercise to teach foundational life skills that become ingrained within one's identity. Hodge and Danish (1999) further iterate this point by stating that sport is capable of promoting psychosocial development, specifically among boys and adolescent males. They assert that sport can be a vehicle for teaching life skills to male youth because of the community-based psychoeducational interventions that are inherent to the nature of sport.

However, the development of life skills does not occur automatically. Even though youth may possess life skills prior to engaging in physical activity, their skills are practiced, enhanced, and sometimes learned through the instruction, demonstration, and supervised practice within the sport and exercise environment (Hodge & Danish, 1999). Over time, the repetition and reinforcement of these skills, much like the process of

developing physical skills, becomes ingrained within the individual's habits and thought processes. This outcome has been demonstrated by Strauss and colleagues (2001), who showed that youth with higher levels of physical activity self-efficacy were significantly more likely to engage in high levels of physical activity. Observational learning also aids this process, whereby youth are able to view their peers successfully completing desired behaviors (Bandura, 1986). This vicarious observation leads to increased self-efficacy. The development, practice, and enhancing of life skills through physical activity is a process that allows youth the benefit of developing skills that can potentially be generalized to multiple settings.

Support for transferability of skills learned in a sport setting to other life domains has been demonstrated by the work of Danish and colleagues (Danish, Petitpas, & Hale, 1993; Papacharisis et al., 2005). They have consistently affirmed that the skills and values learned through sport and exercise can be applied to other life domains such as education, occupation, and interpersonal relationships. They have also shown how a health promotion intervention based on life skills can be effective in helping youth make positive changes related to specific health-enhancing behaviors (Danish et al., 1992). The hands-on experience of applying life skills to multiple life domains has been shown to be effective in helping youth change their attitudes, intentions, and behavior about their personal health. Efforts to import life skills to youth through sport and non-sport contexts allow students to learn new information and then practically incorporate this knowledge into their daily lives. Although not all youth sport experiences are akin to receiving life skills programming, physical activity environments have the potential to teach fundamental

principles. It is within these environments where youth engage in physical activity that allows for the absorption of life skills, which are transferable to other areas of life.

One of the most important life skills to be learned through the environments where physical activity transpires is self-efficacy. As noted earlier, it is the confidence individuals have to be able to engage in a particular task and it is a precursor to actual behavior change. Efficacy has been shown to significantly influence continued participation, enjoyment, and openness to future opportunities across many areas of life (Strauss et al., 2001; Trost et al., 1999). This life skill is particularly present throughout sport and exercise whereby opportunities are continually provided to facilitate its development. These opportunities include positive reinforcement, competition, goal setting and a social environment. While research has documented how physical activity self-efficacy leads to greater participation in sport and exercise (Strauss et al., 2001), what is less clear within the literature is whether self-efficacy gained through sport and exercise can be transferred to other health-enhancing behaviors such as determining to become or remain tobacco free, to eat healthy, use sunscreen, and perform self-exams.

Generally speaking, life skills are fundamental lessons that have the potential to guide behavior within many areas of life. Danish and colleagues have proposed the applicability of this hypothesis across multiple settings (Danish, Petitpas, & Hale, 1993). Sport and exercise are environments of physical activity that are particularly fertile for the acquisition, practice, and enhancement of these skills (Hodge & Danish, 1999). While the applicability of these skills to the domain in which they were learned has been documented (Strauss et al., 2001), research has yet to conclusively show whether life skills applied in a

physical activity setting can be similarly applied to other health-enhancing behaviors. The current study aims to support this positive relationship, yet consideration of alternative explanations will be included.

The current study

The current study is a cross-sectional investigation of an adolescent population that seeks to examine how differences in physical activity influence the intentions and self-efficacy to engage in other health-enhancing behaviors. Television watching will also be included in the study to examine its moderating effect on these relationships. These aims will be achieved by analyzing preliminary data from a health promotion program, *Building a BRIDGE to Better Health (BRIDGE)* (Westerberg, Hoy, Danish, et al., 2001), where data has been collected from over 1,700 9th graders in central Virginia.

The primary health behavior under investigation in this study is physical activity. Developmental theory posits that within adolescent populations, physical activity is most frequently obtained through sport, whether school, community, or privately-based (Hodge & Danish, 1999). Physical activity among adolescents has also been shown to cluster with multiple positive health outcomes. This clustering of behaviors underlies differences between those who are regularly physical active and those who are not. Current recommendations for physical activity stipulate that youth receive at least 20 minutes of vigorous exercise 3 days per week. Based on these recommendations, the current study will examine how differences in physical activity influence the intention and efficacy of other health-enhancing behaviors such as healthy eating, sunscreen use, and tobacco use. Based on previous research (Dubbert, 2002), the influential role of television watching will

be incorporated into the analyses as a moderating variable, while gender and ethnicity will each be examined for their influence upon the dependent variables.

It is hypothesized that individuals with physical activity behavior that matches or exceeds government recommendations of 20 minutes of vigorous exercise 3 times per week, will show significantly greater self-efficacy and intention to practice other health-enhancing behaviors. Specifically, multiple health-enhancing behaviors will be examined, as will groupings of health-enhancing behaviors. The transferability of skills learned through sport is a principle underlying these effects. The clustering of health-enhancing behaviors may be an additional explanation for potential differences between physical activity groups and the outcome variables of intention and efficacy to engage in other health-enhancing behaviors. It is also hypothesized that television-watching will interact with physical activity to show significant differences on the outcome variables of intention and efficacy to engage in behavior.

Hypotheses

Intention to Engage in Health-Enhancing Behavior

1. *Specific health-enhancing behaviors*

    a. Students who meet national standards for recommended vigorous physical activity will intend to reduce fat intake significantly more than students who do not meet national standards.

    b. Students who meet national standards for recommended vigorous physical activity will intend to increase fruit and vegetable intake significantly more than students who do not meet national standards.

c. Students who meet national standards for recommended vigorous physical activity will intend to increase fiber intake significantly more than students who do not meet national standards.

d. Students who meet national standards for recommended vigorous physical activity will intend to live a tobacco-free life significantly more than students who do not meet national standards.

e. Students who meet national standards for recommended vigorous physical activity will intend to conduct self-exams significantly more than students who do not meet national standards.

f. Students who meet national standards for recommended vigorous physical activity will intend to wear sunscreen significantly more than students who do not meet national standards.

g. Students who meet national standards for recommended vigorous physical activity will intend to set goals significantly more than students who do not meet national standards

2. *Grouped intention*

Students who meet national standards for recommended vigorous physical activity will intend to eat healthier (H1a – H1c) significantly more than students who do not meet national standards.

3. *Overall intention*

Students who meet national standards for recommended vigorous physical activity will intend to engage in health-enhancing behaviors (H1a – H1g) all significantly more than students who do not meet national standards.

Efficacy to Engage in Health-Enhancing Behavior

4. *Specific health-enhancing behaviors*

    a. Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to reduce fat intake than students who do not meet national standards.

    b. Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to increase fruit and vegetable intake than students who do not meet national standards.

    c. Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to set goals than students who do not meet national standards.

    d. Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to wear sunscreen than students who do not meet national standards.

    e. Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to refuse cigarettes than students who do not meet national standards.

    f.   Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to conduct self-exams than students who do not meet national standards.

5. *Grouped efficacy*

Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to eat healthier (H4a and H4b) than students who do not meet national standards.

6. *Overall efficacy*

Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to engage in health-enhancing behaviors (H4a – H4f) than students who do not meet national standards.

Intention and Efficacy Moderated by Television Watching

7. *Intention – grouped and overall*

    a.   Students who meet national standards for recommended vigorous physical activity will intend to eat healthier (H1a – H1c) significantly more if they watch fewer hours of television.

    b.   Students who meet national standards for recommended vigorous physical activity will intend to engage in health-enhancing behaviors (H1a – H1g) significantly more if they watch fewer hours of television.

8. *Efficacy – grouped and overall*

a. Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to eat healthier (H4a and H4b) if they watch fewer hours of television.

b. Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to engage in health-enhancing behaviors (H4a – H4f) if they watch fewer hours of television.

9. *Controlling for gender and ethnicity*

a. Students who meet national standards for recommended vigorous physical activity will intend to engage in health-enhancing behaviors (H1a – H1g) significantly more if they watch fewer hours of television, which will be demonstrated above and beyond the influence of gender and ethnicity.

b. Students who meet national standards for recommended vigorous physical activity will have significantly more efficacy to engage in health-enhancing behaviors (H4a – H4f) if they watch fewer hours of television, which will be demonstrated above and beyond the influence of gender and ethnicity.

Method

Overview

The data for this study were collected as part of the data collected for *A Bridge to Better Health (BRIDGE)* (grant # 1 RO1 CA102760-01A1 – P.I. S Danish) project. BRIDGE is a life skills program that was created to promote cancer-risk reduction among adolescents. This program is based on a genealogy and health promotion/disease prevention model and has two main components: (1) teaching the use of genealogy to increase adolescents' motivation to be their own health historians and increase their awareness of cancer risks; and (2) teaching life and health skills (such as breast and testicular self-examinations, increasing fruit and vegetable intake, reducing fat intake, and being tobacco-free) to increase the knowledge and practice of behaviors designed to prevent or reduce the harmful effects of cancer.

Study Design

This study was a medium-scale school-based randomized trial with a multi-level evaluation at baseline, post-intervention, and 3-month post-intervention. Seven (7) high schools in Chesterfield County, VA were randomly assigned to an intervention (3) or wait-list control (4) condition. Evaluation by student survey was conducted three times: prior to the intervention, a week following the intervention and 3 months following the

intervention. Surveys included self-reported behaviors about self-efficacy, intentions and attitudes.

Participants

Participants were ninth grade students who were recruited from health and physical education classes at 7 suburban high schools in central Virginia. One control school that was initially included in the data collection was dropped from the data set due to a substantially lower response rate of less than 15 percent. A total of 1,726 students received parental consent and assented to complete the surveys at baseline. Pre test demographic data indicates that of these students, 56% were female and 44% male. The ethnicity distribution was: 65% Caucasian, 22% African American, 4% multi-racial, 4% Hispanic or Latino, 3% Asian, and approximately 1% of both American Indian and Hawaiian native.

Surveys were administered to the participants in classrooms prior to the BRIDGE intervention. The surveys included evaluations of self-reported behaviors, intentions, attitudes, and perceptions of family importance of cancer-risk reducing behaviors.

Materials

BRIDGE survey. The survey in this research was part of a larger grant, funded by the National Cancer Institute (NCI) for the BRIDGE project. The individual items used were based on the Youth Risk Behavior Surveillance System (YRBSS) questions from the Centers for Disease Control and Prevention (CDC), the Goals for Health (GFH) (Fries, Meyer, & Danish, et al., 2001) survey as well as locally designed questions. The survey included questions on demographics; genealogy; knowledge of cancer and heart disease; health self-efficacy; planned health behavior; health behavior; family history of cancer and

heart disease; family health attitudes; family closeness; and fat and fiber consumption. For the purpose of this investigation, questions of demographics, health self-efficacy, planned health behavior, television watching, and physical activity will be used.

With a few exceptions (e.g. program knowledge & family measures), all measures have previously been reliably administered on a similar population and/or are validated and published measures. Wherever possible, the most current, state-of-the-art methods for assessing all variables were used. In some cases, measures were adapted for the population.

Demographic Questions (Appendix A): Students were asked to provide demographic information including their race/ethnicity, age, and gender. These questions have been tested and were found to be reliable and valid, and have also been used in previous studies (Farrell, Danish, & Howard, 1992).

Intention to Practice (Appendix B): Seven intention to practice questions are contained within this section. The questions pertain specifically to self-examination, sunscreen use, fat intake, fruit and vegetable consumption, tobacco use, physical activity, and health history. Two examples include, "I plan to lower the amount of fat in my diet next month" and "I plan to conduct a breast/testicular self-exam in the next month." Once again, physical activity will not be considered in the analysis due to its place as a predictive variable of other health-enhancing behaviors. Responses are recorded on a five-point Likert scale, ranging from *strongly disagree* to *strongly agree*. These items have been validated in a previous study (Azjen & Fishbein, 1980) and the format has been adapted to this project for a youth population.

Self-Efficacy (Appendix C): There were seven self-efficacy questions. Individual questions pertained to the self-efficacy to conduct self-examination, to use sunscreen, to reduce fat intake, to increase fruit and vegetable consumption, to refuse tobacco, to increase physical activity, and to conduct a health history. Two examples include, "I am sure I can refuse cigarettes if someone offered them to me" and "I am sure that I can wear sunscreen when I go out in the sun." Physical activity will not be considered in the analysis due to its place as a predictive variable of other health-enhancing behaviors. These questions were formatted on a five-point Likert scale, ranging from *strongly disagree* to *strongly agree*. The questions were pre-tested and were based on validated items in the Goals for Health survey (Fries, Meyer, & Danish, et al., 2001).

Vigorous Physical Activity (Appendix D): This construct was measured via one question. Based on the NIH physical activity recommendations, the question asked the number of days per week the student has participated in vigorous physical activity where they were sweating and breathing heavy for at least 20 minutes. Examples of activities such as, "basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities" were provided for clarification.

Television Watching Behavior (Appendix D): This construct was measured by one self-report question within the BRIDGE survey. The question contained six responses ("I do not watch TV on an average school day", "Less than 1 hour per day", "1, 2, 3, or 4 hours per day", and "5 or more hours per day") and reads, "How many hours of television do you watch per day?" For statistical analysis purposes, responses to this question will be dichotomized into those who watch one hour or less of television per day and those who

watch greater than one hour of television per day. This method is common within the literature and based on previous analyses (Lowry et al., 2002; Utter et al., 2003).

Procedure

The data for this study were collected as part of data collected for *A Bridge to Better Health (BRIDGE)*. BRIDGE is a life skills program that was created to promote cancer-risk reduction among adolescents. This program is based on a genealogy and health promotion/disease prevention model and has two main components: (1) teaching the use of genealogy to increase adolescents' motivation to be their own health historians and increase their awareness of cancer risks; and (2) teaching life and health skills (such as breast and testicular self-examinations, increasing fruit and vegetable intake, reducing fat intake, and being tobacco-free) to increase the knowledge and practice of behaviors designed to prevent or reduce the harmful effects of cancer.

Evaluation Procedure

Surveys were administered to all students (control and intervention) in the classroom prior to the intervention (approximately 1-week pre-intervention), following the intervention (1-week post-intervention), and 3-months after the intervention. For the purposes of this study, only data collected prior to the intervention will be examined.

Data Analysis

SPSS version 13.0 was used for data analysis. Descriptive statistics were analyzed for all variables of interest to this investigation. Diagnostics were conducted on all analyses to ensure the assumptions of the data were not violated. The data was also reviewed for outliers, normality, homogeneity of variances, and multicollinearity.

Corrections for violations of assumptions were taken if necessary cases. Based on the preliminary data analysis of the BRIDGE project, sufficient power was present for analyses at a .01 significance level.

Hypotheses 1 through 6 were analyzed using two one-way Multivariate Analyses of Covariance (MANCOVA). This was done by separating cases based on the continuous vigorous activity variable into those who meet physical activity recommendations and those who did not. Differences between these groups were examined across the intention and efficacy to engage in multiple health-enhancing behaviors. A preliminary frequency analysis was conducted on the outcome variables, which indicated that the scores across the 5-point Likert scale were sufficiently distributed for the proposed analyses. Additionally, due to the multiple outcome variables, it is important to reduce the potential for Type 1 error. Thus, a significance level of $p < .01$ was adopted to reduce such a possibility.

H1a – H1g: Examined the differences between physical activity groups on the intention to engage in specific health-enhancing behaviors (fat intake, fruit and vegetable intake, fiber intake, tobacco use, sunscreen use, self-screening, and goal setting). Each hypothesis is based on a specific question within the intentions section of the BRIDGE survey.

H2: Examined a grouping of healthy eating behaviors. This will be done by statistically summing the scores from three intentions to engage in health-enhancing behaviors related to diet (fat intake, fiber intake, and fruit and vegetable consumption). All questions are scored in a direction whereby higher scores indicate healthier behavior, thus

allowing for an interpretable analysis. The reliability of this combined variable was assessed by computing a Cronbach's Alpha statistic, which measured .590.

H3: Examined an overall intention to practice health-enhancing behaviors. A similar summing method to Hypothesis 2 was proposed for purposes of statistical analysis. The reliability of this combined variable was assessed by computing a Cronbach's Alpha statistic, which measured .620.

H4a – H4f: Examined the differences between physical activity groups on specific health behavior efficacy (fat intake, fruit and vegetable intake, tobacco use, sunscreen use, self-screening, and goal setting). Each hypothesis was based on a specific question within the BRIDGE survey.

H5: Examine a grouping of healthy eating behaviors. This was done by statistically summing the scores from two questions of health-enhancing behaviors efficacy related to diet (fat intake and fruit and vegetable consumption). Both questions are scored in a direction whereby higher scores indicate healthier behavior, thus allowing for an interpretable analysis. The reliability of this combined variable was assessed by computing a Cronbach's Alpha statistic, which measured .580.

H6: Examined overall health behavior efficacy. A similar summing method to Hypothesis 5 was conducted for purposes of statistical analysis. The reliability of this combined variable was assessed by computing a Cronbach's Alpha statistic, which measured .634.

H7 – H8: Examined the interaction of physical activity and television watching on the intention and efficacy to engage in health-enhancing behaviors. Each hypothesis was

statistically analyzed using two two-way Multivariate Analyses of Covariance

(MANCOVA). Both physical activity and television watching were dichotomized for each

analysis. This grouped each variable into high and low categories. The physical activity

variable was dichotomized so to examine the differences between those who met national

recommendation for physical activity and those who did not. Television watching was

dichotomized into low (one hour or less of television watching per day) and high (greater

than one hour of television watching per day) to examine differences between groups that

have previously been researched in the literature (Lowry, Wechsler, Galuska, Fulton, &

Kann, 2002).

H7a and H7b: Examined the moderating effect television watching has on the

intention to engage in healthy eating and multiple health-enhancing behaviors. Hypothesis

7a examine the intention to engage in three diet behaviors (fat, fiber, and fruit/vegetable),

while Hypothesis 7b examined the intention to engage in multiple health enhancing

behaviors.

H8a and H8b: Examine the moderating effect television watching has on the

efficacy to engage in healthy eating and multiple health-enhancing behaviors. Hypothesis

8a examined the outcome variable of two diet behaviors (fat and fruit/vegetable), while

Hypothesis 8b examined 6 health-enhancing behaviors.

H9a and H9b: Examined the interaction of physical activity and television watching

on the intention and efficacy to engage in multiple health-enhancing behaviors while

statistically controlling for the influence of gender and ethnicity. Each hypothesis was

statistically analyzed using a two-step hierarchical regression. The variables of gender and

ethnicity were inserted into the first step of the regression model for each of these

hypotheses in an attempt to statistically control for their influence upon the outcome

variables of overall intention and efficacy. This allowed for investigation as to whether the

outcome variables display significance while controlling for the effects of gender and

ethnicity.

Results

This section contains information pertaining to the statistical analyses performed for the current study. Relevant subheadings are chronologically organized and separated based on the hypotheses topics. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 13.0.

Four Multivariate Analyses of Covariance (MANCOVA) procedures have been chosen to test hypotheses 1 through 8. The decision to use these procedures is based on the following reasons: 1) MANCOVA's capability to encompass multiple tests within one analysis reduces the chance of a Type I error, which is crucial for interpretation of results. 2) There were both theoretical similarity between dependent variables as well as a significant correlation between dependent variables, further justifying the use of multivariate tests. 3) Due to potential differences of nested cases within schools, statistical control of this variable was necessary. *T test* procedures are not capable of this type of statistical control. Thus, a MANCOVA was chosen for its ability to control for covariance of the school variable. The hierarchical multiple regressions originally intended for Hypothesis 9 have been retained.

Sample Characteristics

During the 2004-2005 school-year, a total of 1726 ninth grade students were surveyed from health and physical education classes at six suburban high schools in central Virginia. However, complete data on all analysis variables (13 outcome measures,

demographics, PA, & TV) was obtained for 62% of this population ($N = 1070$).

Approximately 50% of the missing cases were due to omitted data for the intention to

perform a self-exam and the efficacy for performing a self-exam. Missing data was also

present throughout the other 11 outcome variables, PA, TV, and the demographic

variables. The sample of complete data was 62% female ($N = 662$) and 38% male ($N =$

408). The ethnic distribution was 67% Caucasian ($N = 721$), 21% African American ($N =$

229), and 11% other ($N = 120$). The other category was comprised of 4% American Indian

or Alaska Native ($N = 5$), 24% Asian ($N = 29$), 33% Hispanic or Latino ($N = 40$), 2%

Native Hawaiian or Other Pacific Islander ($N = 2$), and 37% multi-ethnic ($N = 44$). Due to

the small number of these cases, the variable was recoded into three categories. See Table

1 for further description of the sample. Differences in ethnicity and gender were present

across the six schools where data were collected, which are presented in Table 2.

Table 1. *Sample Characteristics*

Variable	N	%
Gender		
Female		
High PA	432	65%
Low PA	230	35%
Male		
High PA	309	76%
Low PA	99	24%
Ethnicity		
Caucasian		
High PA	532	74%
Low PA	189	26%
African American		
High PA	124	54%
Low PA	105	46%
Other		
High PA	85	71%
Low PA	35	29%

Table 2. *Ethnic and Gender Differences between Schools*

Variable	N	%	gender %		ethnicity %		
			(F	M)	(C	AA	O)
School							
1	212	19.8%	57.5	42.5	66.0	23.6	10.4
2	146	13.6%	66.4	33.6	81.5	8.2	10.3
3	64	6.0%	68.8	31.2	25.0	48.4	26.6
4	127	11.9%	62.2	37.8	86.6	5.5	7.9
5	320	29.9%	60.3	39.7	63.4	27.2	9.4
6	201	18.8%	63.2	36.8	66.2	20.9	12.9

Abbreviations (F-female, M-male; C-Caucasian, AA-African American, O-Other)

Preliminary Analyses

Prior to analyzing the hypotheses, the data were examined for outliers, missing data, normality, and other assumptions of statistical procedures. Based on the forced response format of the survey, the data did not contain outliers. Cases with missing data were statistically analyzed using independent samples t tests and chi-square tests. Cases with incomplete data were compared to those with complete data to examine potential differences between groups. Independent samples t tests of 13 outcome variables revealed two significant findings at a level of $p < .01$. Those with complete data had significantly greater intention to reduce fat intake and had significantly greater efficacy to perform self-exams. The results of chi-square tests for PA, TV, gender, and ethnicity revealed one significant finding at a level of $p < .01$. Males were significantly more likely than females

to have incomplete data. The differences noted here are considered in the discussion of the overall results. Power analyses were also conducted at a .01 significance level to assess the adequacy of each statistical test. Within the Multivariate Analysis of Covariance (MANCOVA) the majority of power estimates ranged from .819 to 1.0, indicating satisfactory power. Two exceptions included an intention to use sunscreen variable with an observed power of .602 and a tobacco efficacy variable with an observed power of .735. Tests for power were also sufficient for the hierarchical regression analyses.

Tests for normality produced conflicting results. According to the Kolmogorov-Smirnov test of normality significance, the majority of variables were not normally distributed. However, this statistic is notably influenced by the large sample. Tests of kurtosis revealed that the majority of variables have significant "peakedness", which is partly attributable to the limited responses (5-point Likert scale) within most dependent variables. However, tests of skewness demonstrated that the assumption of normality was generally met across all variables. The majority of variables were shown to range from -.89 to +.04. However, a potentially non-normal distribution of data was identified for tobacco intention (-1.74) and tobacco efficacy (-1.91). This was also evident in the histograms of each variable, which are presented in Figures 1 and 2.

Figure 1. *Distribution of Tobacco Intentions*

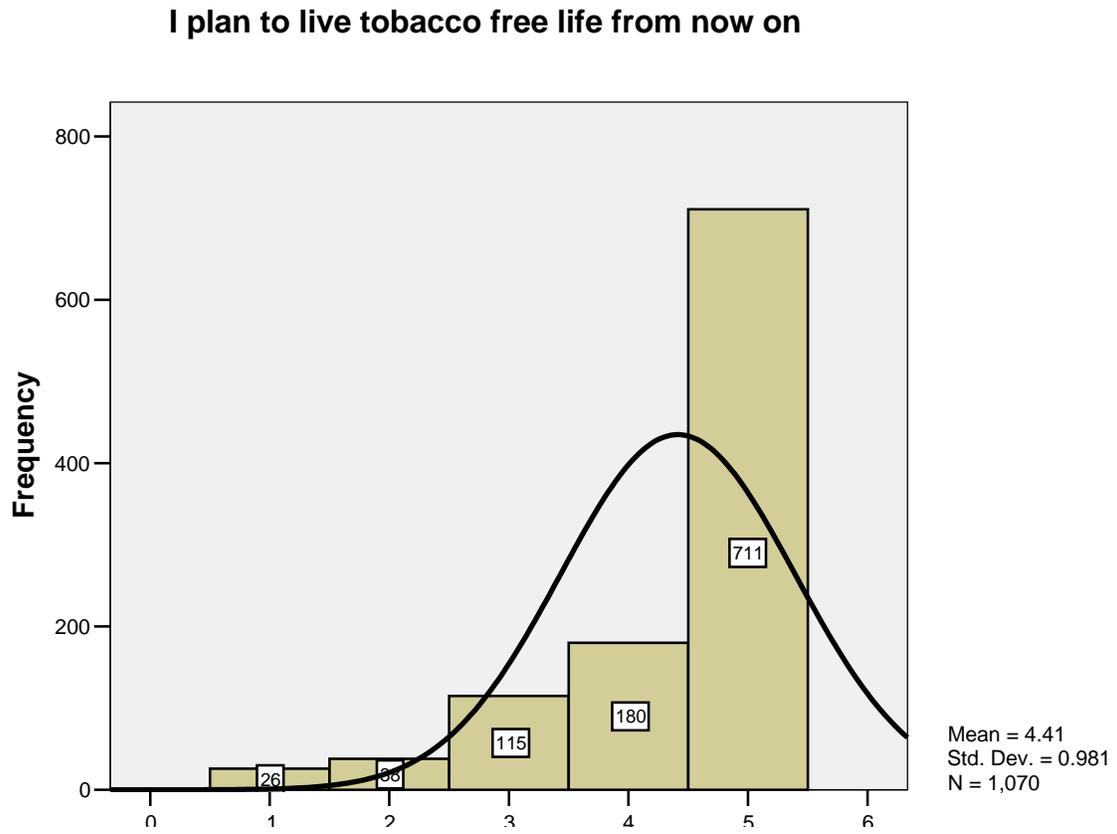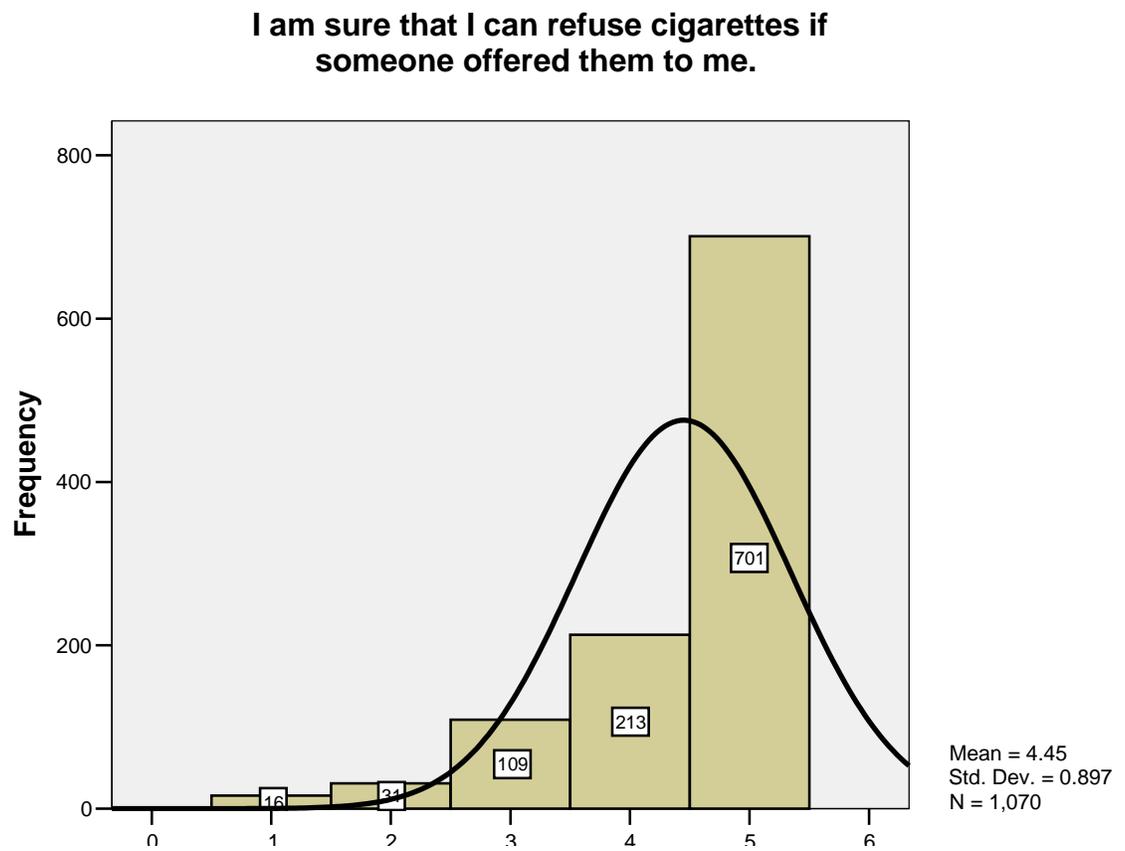**I plan to live tobacco free life from now on**

Mean = 4.41
Std. Dev. = 0.981
N = 1,070

Figure 2. *Distribution of Tobacco Efficacy*

I am sure that I can refuse cigarettes if someone offered them to me.

Mean = 4.45
Std. Dev. = 0.897
N = 1,070

Additional statistical assumptions for MANCOVAs and hierarchical regressions were examined prior to conducting analyses. Equal sample sizes are preferred, yet although there were substantial differences between cases in the exercise and television watching categories, the overall sample (N=1070) was large enough to support analyses of unequal groups. This is additionally supported by the previously reported power estimates. Statistical tests for homogeneity of variance revealed that among five dependent variables (intentions for tobacco, fiber, and goals, and efficacy for fat and tobacco) the independent variables violated the equality of variance assumption. Additionally, within a MANCOVA, it is important that the co-varying variables do not significantly interact with the independent variables. No significance was found among any of the current study's interactions. Within hierarchical regression analysis it is important that multicollinearity, the significant correlation among independent variables, not exist. Results of the collinearity diagnostics tests showed that condition index scores were all below 20, indicating that the data did not have multicollinearity problems.

Due to the noted violations above, consideration of compensatory factors is important and corrections have been enacted to ensure valid and reliable interpretation of statistical results. First, establishing an a priori alpha significance of .01 reduces the possibility of a Type I error and thus increases the legitimacy of results found at this stricter significance level. Second, the substantially large sample being analyzed is noteworthy due to its positive effect on the power of the statistical tests. Lastly, where there are violations of statistical assumptions, caution will be employed when interpreting results.

Physical Activity and Intention

Hypotheses 1a through 1g predicted that students who met national standards for recommended vigorous physical activity would intend to engage in specific health-enhancing behaviors significantly more than students who did not meet national recommendations. A one-way Multivariate Analysis of Covariance was used to explore the differences in intention to engage in specific health-enhancing behaviors between two groups of physically active (PA) 9th graders. Physical activity was grouped into two categories, recommended PA and below recommended PA, which were based on national recommendations. A nested variable for school was factored into the MANCOVA as a covariate. The most general finding from the MANCOVA showed that PA significantly affected intention to engage in health-enhancing behaviors beyond differences between schools, F (7, 1060) = 5.663, p < .001. Eta^2 indicated that PA accounted for 3.6% of the variance, which was present beyond the effect of school.

This multivariate analysis also revealed significant differences across multiple specific health-enhancing behaviors. Students who met national recommendations for PA had significantly greater intentions to: reduce fat intake, F (1, 1061) = 8.32, p < .01; increase fruit and vegetable intake, F (1, 1061) = 18.91, p < .001; increase fiber intake, F (1, 1061) = 15.86, p < .001; and set goals, F (1, 1061) = 22.47, p < .001. Differences approaching significance were also demonstrated for intentions to: live a tobacco-free life, F (1, 1061) = 4.77, p < .05; and wear sunscreen, F (1, 1061) = 6.03, p < .05. No significant differences were found for intention to perform self-exams. Additional statistics for Hypothesis 1 are summarized and presented in Table 3.

Table 3. *Effect of Physical Activity (PA) on Intention to Engage in Specific Health-Enhancing Behaviors*

	M	*SD*	*N*	*p* value
1a. Reduce fat:				
High PA	3.36	1.09	742	.004*
Low PA	3.15	1.15	328	
1b. Eat more fruits and vegetables:				
High PA	3.24	.91	742	<.001*
Low PA	2.97	.95	328	
1c. Eat more fiber:				
High PA	3.20	.76	742	<.001*
Low PA	3.00	.72	328	
1d. Live tobacco-free:				
High PA	4.46	.97	742	.029
Low PA	4.31	1.01	328	
1e. Conduct self-exams:				
High PA	2.87	1.03	742	.229
Low PA	2.77	1.05	328	
1f. Wear sunscreen:				
High PA	3.26	1.11	742	.014
Low PA	3.08	1.10	328	
1g. Set goals:				

High PA	4.01	.83	742	<.001*
Low PA	3.73	1.02	328	

*p < .01
M = Mean, SD = Standard Deviation

The above MANCOVA also included Hypothesis 2, which predicted that students who met national standards for recommended PA would intend to eat healthier than students who did not meet national recommendations. Students who met national recommendations for PA had significantly greater intentions to eat healthier (M = 9.80-9.12), F (1, 1060) = 24.86, p < .001. PA accounted for 2.3% of the variance within the model. The differences in intention to eat healthier are congruent with the differences noted above for fat, fruit/vegetable, and fiber intake.

Hypothesis 3, which was also included in the first MANCOVA, predicted that students who met national standards for recommended vigorous physical activity would have significantly greater intentions to engage in multiple health-enhancing behaviors than would students who did not meet national recommendations. Students who met national recommendations for PA did have significantly greater intentions to engage in multiple health-enhancing behaviors (M = 24.41-23.01), F (1, 1060) = 30.80, p < .001. PA accounted for 2.8% of the variance within the model. The significance of this global measure of intentions is also congruent with the findings noted above.

Physical Activity and Efficacy

Hypotheses 4a through 4f predicted that students who met national standards for recommended vigorous physical activity would have significantly greater efficacy to

engage in specific health-enhancing behaviors than students who did not meet national recommendations. A second one-way MANCOVA was used to explore the differences in efficacy to engage in specific health-enhancing behaviors between the same two groups of 9th graders. The nested variable of school was again factored into this MANCOVA test. The most general finding from the MANCOVA showed that PA significantly affected efficacy to engage in health-enhancing behaviors beyond differences between schools, F (6, 1061) = 4.96, $p < .001$. Eta^2 indicated that PA accounted for 3.2% of the variance, which was beyond the effect of school.

This multivariate analysis also revealed significant differences across multiple specific health-enhancing behaviors. Students who met national recommendations for PA had significantly greater efficacy than students below recommended PA to: reduce fat intake, F (1, 1061) = 22.51, $p < .001$; increase fruit and vegetable intake, F (1, 1061) = 9.93, $p < .01$; set goals, F (1, 1061) = 19.01, $p < .001$; and refuse cigarettes, F (1, 1061) = 5.74, $p < .01$. No significant differences were found for efficacy to perform self-exams or to use sunscreen. Additional statistics for hypothesis 4 are summarized and presented in Table 4.

Table 4. *Effect of Physical Activity (PA) on Efficacy to Engage in Specific Health-Enhancing Behaviors*

	M	*SD*	*N*	*p* value
4a. Reduce fat:				
High PA	3.77	.85	741	<.001*
Low PA	3.50	.92	329	
4b. Eat more fruits and vegetables:				
High PA	3.60	.87	741	.002*
Low PA	3.41	.92	329	
4c. Set goals:				
High PA	4.31	.67	741	<.001*
Low PA	4.10	.79	329	
4d. Wear sunscreen:				
High PA	3.72	.95	741	.196
Low PA	3.63	.96	329	
4e. Refuse cigarettes:				
High PA	4.49	.87	741	.009*
Low PA	4.36	.96	329	
4f. Conduct self-exams:				
High PA	3.37	.99	741	.904
Low PA	3.33	1.01	329	

*$p < .01$

M = Mean, SD = Standard Deviation

This MANCOVA also included hypothesis 5, which predicted that students who met national standards for recommended PA would have significantly greater efficacy to eat healthier than students who did not meet national recommendations. Students who met national recommendations had significantly greater efficacy to eat healthier ($M = 7.37$-6.91), $F(1, 1061) = 21.33$, $p < .001$. This result accounted for 2.0% of the variance. The difference is congruent with the differences noted above for fat and fruit/vegetable intake.

Hypothesis 6, which was also included in the second MANCOVA, predicted that students who met national standards for recommended vigorous physical activity would have significantly greater efficacy to engage in multiple health-enhancing behaviors than students who did not meet national recommendations. Students who met national recommendations for PA did have significantly greater efficacy to engage in multiple health-enhancing behaviors ($M = 23.26$-22.34), $F(1, 1061) = 17.92$, $p < .001$. This result accounted for 1.7% of the variance. The significance of this global measure of intentions is also congruent with the differences noted above.

Physical Activity, Television, and Intention

Hypotheses 7a and 7b predicted that students who met national standards for recommended vigorous physical activity would intend to eat healthier and engage in multiple health-enhancing behaviors significantly more if they watched one hour of less of television per day. A two-way MANCOVA was used to explore the differences in intention to engage in specific health-enhancing behaviors between two groups of

physically active (PA) 9th graders and two groups of television watching (TV) 9th graders.

As in the earlier analyses, PA was grouped into two categories, recommended PA and

below recommended PA, which were based on national recommendations. TV was also

grouped into two categories, high (greater than one hour of TV per day) and low television

watching, which was based on previously similar groupings in the literature (Lowry et al.,

2002; Utter et al., 2003). A nested variable for school was factored into the MANCOVA as

a covariate. The null hypothesis was not rejected as the MANCOVA showed that there

were was no interaction between PA and TV that significantly affected intention to engage

in healthy eating or multiple health-enhancing behaviors, $p > .05$. However, a significant

main effect was shown for PA ($p < .001$) and approached significance for TV ($p = .010$),

which means that independently they each are influential, particularly PA. These
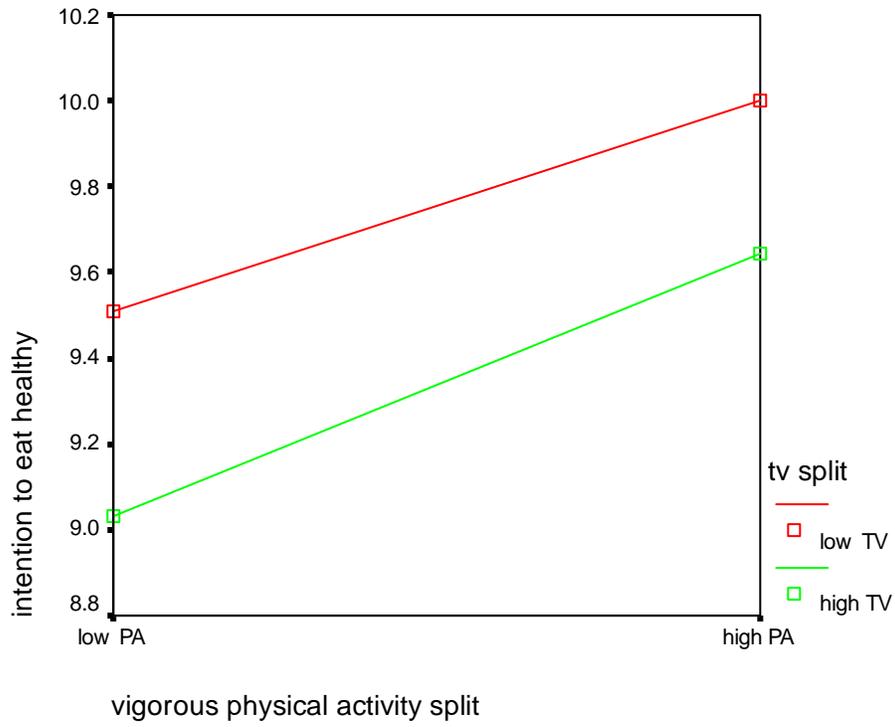
differences are displayed in Figures 3 and 4.

Figure 3. E*ffects of PA and TV on intention to eat healthy*

Figure 4. *Effects of PA and TV on intention to engage in multiple health-enhancing behaviors*
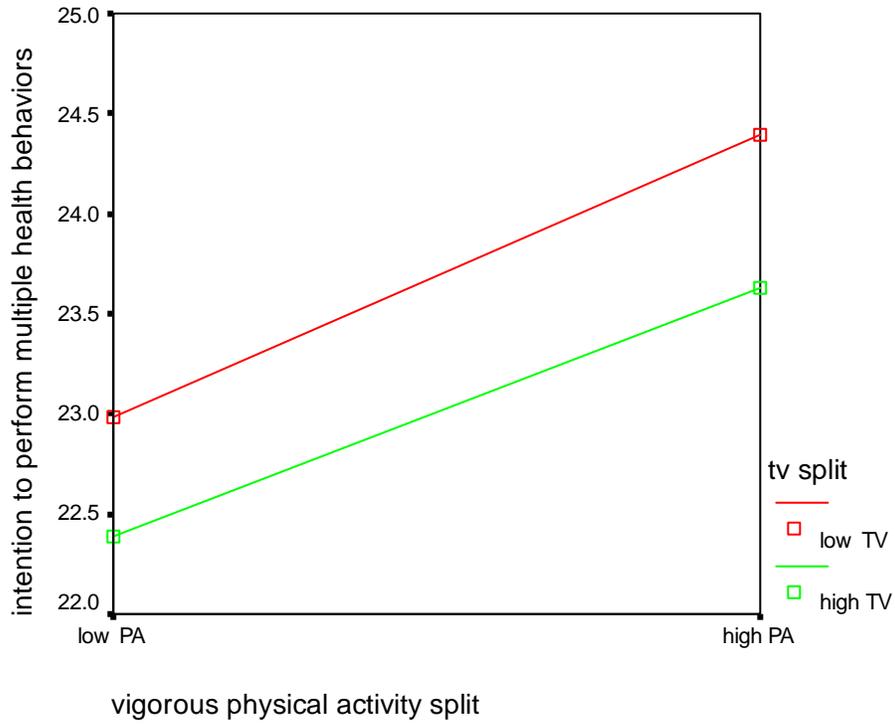
Physical Activity, Television, and Efficacy

Hypotheses 8a and 8b predicted that students who met national standards for recommended vigorous physical activity would have significantly greater efficacy to eat healthier and perform multiple health-enhancing behaviors if they watch fewer hours of television. A two-way MANCOVA was used to explore the differences in efficacy for specific health-enhancing behaviors between two groups of physically active (PA) 9th graders and two groups of television watching (TV) 9th graders, which were categorized according to the previous description. A nested variable for school was again factored into the MANCOVA as a covariate. The null hypothesis was not rejected as the MANCOVA showed that there was no interaction between PA and TV that significantly affected efficacy for healthy eating or multiple health-enhancing behaviors, $p > .05$. However, significant main effects upon the dependent variables were shown for both PA ($p < .01$) and TV ($p < .01$). This result is similar to the previously reported result, which again means that independently they each influence intention to engage in health-enhancing behaviors. These results are displayed in Figures 5 and 6.

Figure 5. *Effects of PA and TV efficacy to eat healthy*
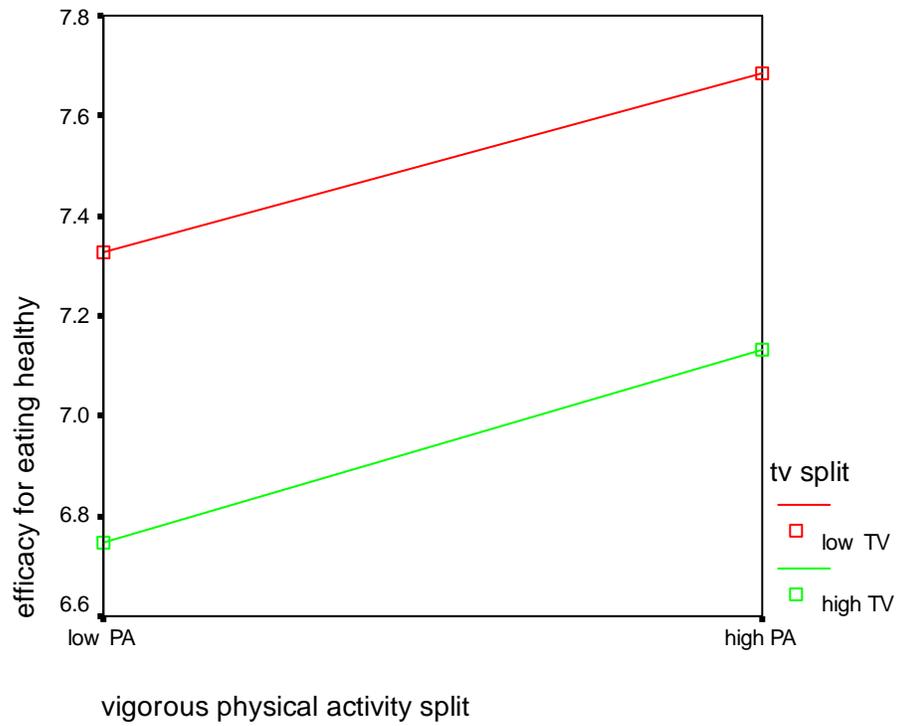
Figure 6. *Effects of PA and TV efficacy to engage in multiple health-enhancing behaviors*
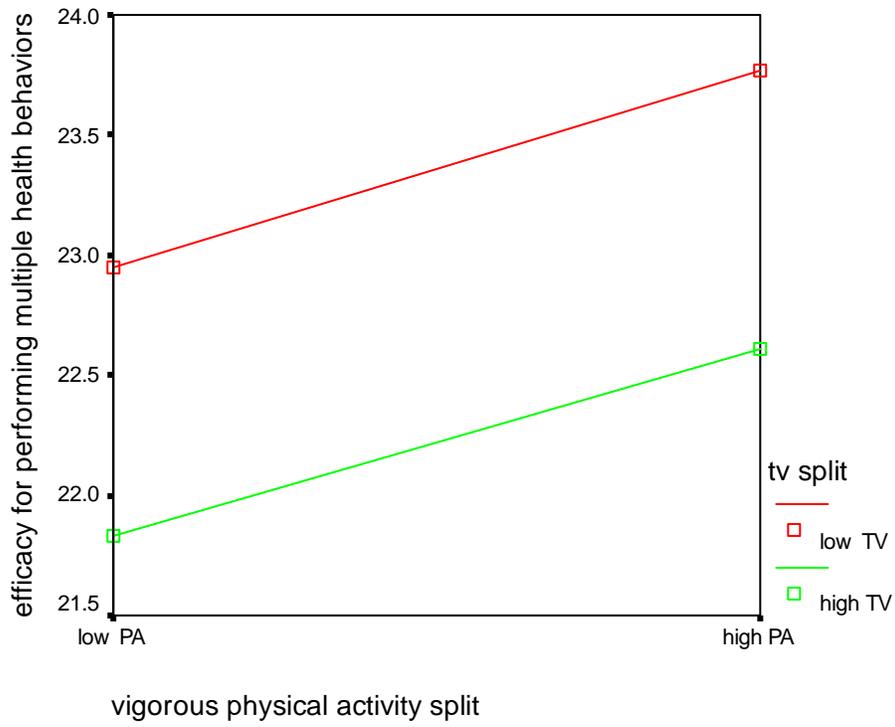
Physical Activity, Television, Intention and Efficacy while Controlling for Variables

Hypothesis 9a predicted that students who met national standards for recommended vigorous physical activity would intend to engage in multiple health-enhancing behaviors significantly more if they watched fewer hours of television, when controlling for school, gender, and ethnicity. A linear hierarchical multiple regression was employed to analyze this hypothesis. The variables of school, gender, and ethnicity were entered into step one of the model so to statistically control for their effects. Physical activity (PA) and television watching (TV) were entered into step two of the model, and an interaction term combining these two variables was also entered at this step. The overall model was significant for its effect on the intention to engage in multiple health-enhancing behaviors, $F(6, 1064) = 18.35$, $p < .001$. Furthermore, step two of the model was significant above and beyond the effects of school, gender, and ethnicity, $F(3, 1064) = 22.90$, $p < .001$, R^2 change = .040. No significant interaction was revealed between PA and TV. See Tables 5, 6, and 7 for statistics related to Hypotheses 9a and 9b.

Table 5. *Hierarchical Regression Analysis for Physical Activity and Television Watching as Predictors of Intention to Engage in Multiple Health-Enhancing Behaviors*

	R	ΔR^2	ΔF	B	$SE\ B$	β
Step 1	.210	.044	10.82			
School				.170	.045	.103
Gender				-.796	.193	-.114
Ethnicity				-.101	.134	-.021
Step 2	.289*	.040	29.61			
Television Watching*				-1.06	.203	-.144
Physical Activity*				1.01	.200	.138
Step 3	.289	.000	.001			
Product Variable				-.011	.446	-.003

*$p < .01$

Hypothesis 9b predicted that students who met national standards for recommended vigorous physical activity would have significantly greater efficacy to engage in multiple health-enhancing behaviors if they watched fewer hours of television, when controlling for school, gender, and ethnicity. A second linear hierarchical multiple regression was employed to analyze this hypothesis. The steps within this model were identical to those for the previous regression analysis. The overall model was significant for its effect on efficacy to engage in multiple health-enhancing behaviors, $F (6, 1064) = 15.10, p < .001$. Moreover, the effects of PA and TV were significant above and beyond the effects of school, gender, and ethnicity, $F (3, 1064) = 23.95, p < .001, R^2$ change = .042. No significant interaction was revealed between PA and TV.

Table 6. *Hierarchical Regression Analysis for Physical Activity and Television Watching as Predictors of Efficacy to Engage in Multiple Health-Enhancing Behaviors*

	R	ΔR^2	ΔF	B	$SE\ B$	β
Step 1	.157	.025	8.83			
School				.133	.046	.088
Gender				-.794	.198	-.122
Ethnicity				.172	.140	.037
Step 2	.260*	.043	15.99			
Television Watching*				-1.28	.857	-.188
Physical Activity*				.591	.856	.086
Step 3	.260	.000	15.28			
Product Variable				.155	.559	.045

*$p < .01$

Table 7. *Effects of Physical Activity (PA) and Television Watching (TV) on Global Intention and Global Efficacy to Engage in Health-Enhancing Behaviors*

	Intentions:				Efficacy:		
	M	*SD*	*N*		*M*	*SD*	*N*
High PA + Low TV	24.68	3.56	265		23.88	3.04	265
High PA + High TV	24.26	3.71	476		22.91	3.08	476
Low PA + Low TV	23.34	4.20	71		23.71	3.33	71
Low PA + High TV	22.91	3.67	258		22.11	3.20	258

M = Mean, SD = Standard Deviation

Discussion

This section will discuss the results of the current investigation into the intentions and efficacy of 9th graders to engage in health-enhancing behaviors. Interpretations will be made from the data analyses presented in the previous section. Strengths and limitations of the study will be noted. Lastly, directions for future research in similar and/or related areas will be proposed.

Hypothesis 1: The first hypothesis investigated differences in intentions to engage in seven specific health-enhancing behaviors among 9th graders who met national recommendations for physical activity (PA) as opposed to students who did not meet national recommendations. The results showed that physically active 9th graders had significantly greater intentions to reduce fat, increase fiber, eat more fruits and vegetables, and to set goals. These significant findings appear to reflect the importance physically active students place on behaviors designed to enhance health and well-being. Physiologically speaking, being physically active is enhanced by proper diet, and psychologically speaking, setting goals is a healthy intentional activity that enhances physical activity. Previous research has supported this relationship (Dubbert, 2002; Utter, Neumark-Sztainer, Jeffery, & Story, 2003; Wilson, Smith, Speizer, et al., 2005) as does the current focus of health promotion in the United States with its dual emphasis on diet and exercise (USDHHS, 2000). The significance of goal setting in this study may also be based on the emphasis it receives within sport, which is the predominating context where most 9th

graders receive PA (Pender, 1998). Goals are commonplace within athletic competition and thus it would be expected that 9th graders with PA experience through sport would be more likely to intend to set them. Therefore, as predicted, intending to engage in a healthy diet and set goals were significantly greater among adolescents who met national PA recommendations.

The insignificant findings for sunscreen and self-exams from hypothesis 1 appear to indicate the nonexistence of a differential relationship with those who meet PA recommendations compared to those who do not. The lack of significance may be attributable to the similar education and exposure most 9th graders receive for self-exams and sunscreen use, which is minimal compared to other health behaviors. While diet, exercise, and tobacco are continually stressed within the contexts of PA, self-exams and sunscreen use are less emphasized. This difference may account for the current non-significance. An additional explanation of this finding may be related to the equal importance 9th graders place on the health behaviors of using sunscreen and performing self-exams. The interconnectedness of diet, PA, and tobacco-use appears to be separate from the intention to engage in the other health-enhancing behaviors of using sunscreen and performing self-exams, thus accounting for the lack of significance in the current investigation.

Hypothesis 2: The second hypothesis investigated differences in intentions to eat healthy among 9th graders who met national recommendations for physical activity (PA) as opposed to students who did not meet national recommendations. The intention to eat healthy variable was a combination of three diet behaviors, which as just reported, were

each found to be independently significant. Therefore, it is not surprising that the composite of these variables, healthy eating, was found to be significant for those who met national recommendations for PA.

Hypothesis 3: The third hypothesis investigated differences in intentions to engage in multiple health-enhancing behaviors among 9th graders who met national recommendations for physical activity (PA) as opposed to students who did not meet national recommendations. The overall intention to engage in multiple healthy behaviors variable was a composite of the seven specific health behaviors. This variable was found to be significant for those who met national recommendations for PA. This finding may be attributed to the significance of the specific intention health behavior variables to reduce fat, increase fiber, eat more fruits and vegetables, and to set goals. It was originally hypothesized that an overall intention to engage in health-enhancing behaviors would exist for those who were physically active and thus be demonstrated for each specific health behavior. However, based on these results, a more valid conclusion appears to be that 9th graders who are physically active intend to eat healthy and set goals, which accounts for the majority of significance for the global intentions variable.

Hypothesis 4: Hypothesis 4 predicted that 9th graders, whose physical activity level met national recommendations, would have a greater sense of self-efficacy to engage in six specific health-enhancing behaviors than those students whose level of activity was below the recommended level. Results from the data analyses revealed that these predictions were significant for the specific behaviors of decreasing fat, increasing fruit and vegetables, setting goals, and living tobacco-free. These findings are similar to those found for

intentions, with the exception of living tobacco-free. The diet variables of decreasing fat and increasing fruit and vegetables are likely related to the finding previously presented that PA and diet have a reciprocal relationship. The significance of feeling efficacious for setting goals is also likely related to the context of sport, where the majority of PA occurs for 9th graders (Pender, 1998).

A distinct finding in Hypothesis 4 was that physically active 9th graders felt a significantly greater sense of self-efficacy to live tobacco-free. This finding is slightly different than these students' intention to live a tobacco-free life. Whereas the differences could be accounted for by a statistical artifact, there may be a qualitative distinction between intention and efficacy for living tobacco-free. While 9th graders who are physically active feel they have the efficacy to live without tobacco, they may question whether they can maintain such a lifestyle given the multiple opportunities they have to use tobacco during their schooling. Their responses appear to reflect an honesty regarding the likelihood of abstaining from tobacco for an entire lifetime. It may be valuable to provide information to these students that with a strong commitment and belief in the importance of being healthy, they may be able to resist trying tobacco. Furthermore, if they do try tobacco, they need to learn that they can stop before it becomes an addictive habit, and that their strong belief in themselves will be helpful in assisting them to stop.

Hypotheses 5 and 6: Hypotheses 5 and 6 investigated differences in self-efficacy to eat healthy and engage in multiple health-enhancing behaviors among 9th graders who met national recommendations for physical activity (PA) as opposed to students who did not meet national recommendations. The healthy eating variable was a composite of two diet

variables (reduce fat and increase fruits and vegetables) and global efficacy was a

composite of the six specific health behavior variables investigated in Hypothesis 4.

Significant results were found for both dependent variables. These results parallel those for

intentions and appear to be significantly influenced by the significance of the specific

health-enhancing behaviors of diet and goal setting. Although Hypothesis 6 initially

predicted that physically active individuals would possess significantly greater global

efficacy, the significance of the healthy eating, goal setting, and living tobacco-free

variables appear to account for the significance of the overall efficacy variable.

Hypotheses 7 and 8: Hypotheses 7 and 8 predicted that 9th graders who were more

physically active and watched less television would have greater intention and efficacy for

engaging in health-enhancing behaviors. Results showed that the effect of physical activity

is greater for those who watch little TV as compared to those who watch more than one

hour of TV per day. There were differences between efficacy as well as intention. Those

who met national standards for recommended physical activity and watched less than one

hour of television per day did have significantly greater efficacy, but not intentions to eat

healthier and engage in multiple health-enhancing behaviors as compared to those who did

not meet PA recommendations.

As seen in Table 3, groups formed by the PA and TV variables were significantly

different from one another. The 9th graders with the greatest intentions and efficacy to

engage in health-enhancing behaviors were the group high in PA, low in TV. Next, two

groups with moderate intentions and efficacy were those high in PA, high in TV as well as

those low in PA, low in TV. Lastly, the group with the lowest intentions and efficacy were

those low in PA, high in TV. These differences are also displayed graphically in Figures 3 through 6.

Differences between the groups may be explained via a number of possibilities. First, PA has inherently unique qualities. As previously mentioned, 9th graders receive the bulk of their PA through organized sport, which provides a structured environment that has the possibility to teach life skills. Life skills are transferable lessons and abilities that can be applied to other life domains (Hodge & Danish, 1999). The life skills learned through sport/PA may provide youth with a foundation of efficacy and intention, which may be demonstrated in the results of this study. It is also possible that students have entered sport/PA because they have an existing sense of efficacy and intention that helps them excel. However, based on the non-experimental nature of the current study, determining the direction of causal significance within these relationships is speculative rather than conclusive.

An alternative interpretation of these results lies in the effect of TV. It appears that a negative relationship exists between watching television and having intention and efficacy to engage in multiple health-enhancing behaviors. Watching television may have a negative effect on the intention and efficacy to engage in health-enhancing behaviors. The consumption of high caloric foods during the unproductive sedentary behavior of watching television, which has been documented in previous research (Ehrmann Feldman et al., 2003), may be a significant contributing factor to this negative relationship. Yet, there may be an a priori explanation suggesting that having low intentions and efficacy for health-enhancing behaviors in 9th grade leads to watching greater than one hour of television per

day. Again, based on the cross-sectional nature of this study, such interpretations are tentative.

A final explanation may exist in the construction of the global intention and efficacy variables. These dependent variables were combined of specific health-enhancing behavior variables. In particular, the specific healthy eating variables comprised a majority within each, accounting for 3 of 7 in global intention and 2 of 6 in global efficacy. Based on the significant analyses of these individual variables which were noted earlier, they appear to account for a large proportion of the significance within the global dependent variables. Therefore, the strong connection between PA and diet may account for the significance found in hypotheses 7 and 8. This is in contrast to the initial prediction that an overall intention and efficacy to engage in multiple health-enhancing behaviors would exist for those who met national recommendations for PA and watched less television. The lack of significance for intention and efficacy to engage in self-exams and sunscreen use among the high PA group, provide two examples that refute the existence of an overall transferable sense of intention and/or efficacy.

Hypothesis 9: Hypothesis 9 examined whether engaging in PA and watching TV significantly influenced the intention and efficacy for multiple health-enhancing behaviors of 9th graders above and beyond differences in school, gender, and ethnicity. Results showed that PA and TV levels remained significant for both intention and efficacy after controlling for these variables. These outcomes further strengthen the relationship between the independent variables of PA and TV, and the dependent variables of global intention and efficacy. Specifically, the effects of PA and TV appear to have an additive relationship

with intention and efficacy, and do not have an interaction effect. This relationship was also demonstrated in earlier analyses without the statistical control of the additional variables of gender and ethnicity.

Overall, the similarity of findings across multiple analyses demonstrates the strong relationship in 9th graders between PA and TV, and the intention and efficacy to engage in multiple health-enhancing behaviors. The national recommendations for PA as denoted in Healthy People 2010 (USDHHS, 2000), which were incorporated into the current study, are supported by these findings. Although the Healthy People 2010 demarcation for PA was primarily based on its healthy physiological effects, the results of this study demonstrate secondary benefits for increasing the intention and efficacy of other health-enhancing behaviors among a 9th grade population. Despite these encouraging tertiary benefits, as noted earlier, the findings do not imply a causal relationship. Rather, these results raise questions as to the influence of additional factors such as a priori characteristics and finer distinctions within the independent variables on the significant relationships demonstrated in the current study.

Strengths

The results from this study are supported by strengths that significantly contribute to the previously noted interpretations. First and foremost, the large average sample size (N=1070) that composed each analysis provided ample power to support the findings. Power was also maintained despite divisions within the analyses based on the levels of physical activity and television watching. This sample was further strengthened by data collection from six schools, which adds generalizability to the findings.

Based on the recommendations from the Healthy People 2010 initiative (USDHHS, 2000), the distinction between low and high physically active 9th graders allowed for relevant interpretation of differences between these groups. This method was also employed with the TV variable so that the results would be compatible with those of previous research (Ehrmann Feldman et al., 2003).

Limitations

Statistical tests of normality revealed the need for cautionary interpretation of some results. The non-normal distribution for intention to live tobacco-free, increase fiber, and set goals as well as for the efficacy variables of decreased fat, living tobacco-free, and goal setting, warrant reserved conclusions regarding the significance of the findings. However, the skewed distribution of scores or significant kurtosis within these variables may be indicative of a normal adolescent population's distribution among these variables. For instance, tobacco intention and efficacy were significantly skewed in a positive direction, which appears be an accurate reflection of the current prevalence of tobacco use among this population. Therefore, it is important to consider both the statistical implications of non-normal data and the realistic representation of the data. Perhaps an alternative method of data collection other than a self-report survey would have captured a more normal distribution of the current variables.

The high number (656) and percentage (38%) of cases that were dropped from the original sample due to missing data is a limitation to the current study. This limitation exists despite statistical tests indicating minor differences between the two groups. While the remaining sample size ($N = 1070$) was still more than adequate for analyses, the

reasons why so many cases were missing data may be detrimental to the results. Due to the high number of dependent variables used in the current investigation, there is an increased likelihood of missing data, which was represented by a generally even distribution of missing data across each of the variables. Yet, the omission of over 650 cases raises concerns as to the reliability of data that was collected. If such a high percentage of the data were omitted for missing information, it may be possible that survey questions were misunderstood, skipped, or omitted in a systematic fashion. Although differences between the investigated sample and missing cases did not yield such systematic omission, caution should be employed when interpreting the results of the investigation.

One of the most significant limitations of this cross-sectional study was the lack of causal inference, which is inherent to experiments with manipulated independent variables. Although the current cross-sectional investigation of differences between physically active 9th graders does support Prochaska's theory of behavior change (Prochaska, Johnson, & Lee, 1998), it does not and cannot make causal predictions that increased physical activity will lead to increases in other health-enhancing behaviors. The findings from this study are limited to conclusions based on a "snapshot" of a moment within the process of health behavior change for 9th graders rather than causal predictions of future behavior.

The self-report method used in this study to collect data was generally reliable, valid, convenient, yet also imperfect. Measuring the average physical activity and television watching levels of 9th graders would ideally be obtained through a method of constant and accurate monitoring of each individual subject. This example highlights the potential for gathering more precise data. Although more precise methods are scarce, new

technology involving the use of personal electronic diaries is allowing for the *in vivo* measurement of variables such as PA (Dubbert, 2002). Despite the limitations of self-report, efforts were made within the current study to increase reliable and valid measurement. The questionnaire given to subjects contained differentiating PA questions to accurately assess vigorous PA, versus moderate PA, versus time spent in physical education classes. These questions contributed increased validity to the results being discussed. However, in future research greater acumen is warranted when measuring adolescent health behaviors such as PA and TV.

The current sample's lack of ethnic diversity is a limitation to the generalizability of the results. Although ethnicity was statistically controlled within the final analyses and results remained significant, the lack of representation among ethnic groups such as Asian-Americans and Hispanics provide sufficient justification for caution when generalizing conclusions about intentions and efficacy to engage in health-enhancing behaviors to these underrepresented populations.

Finally, the percentage of students in the current study's sample who met national recommendations for PA was greater than previously reported averages. Over 69% of the 9th graders surveyed, reported participating in vigorous PA for 20 minutes, three or more time per week. Previous data suggests that 63% is a robust estimate for this population (Grunbaum et al., 2004). Therefore, the sample from where the data was collected may represent a population that is significantly different from others. This difference is a potential hindrance to the generalizability of the results.

Future Directions

Findings from the current study provide direction for a number of potential research investigations. First, further inquiry is needed to examine the processes and variables responsible for the transformation of intentions and efficacy into actual behavior change. While these results support Prochaska and colleagues' theory of behavior change (Prochaska, Johnson, & Lee, 1998), the current design was only a small piece of the health behavior puzzle. Cross-sectional designs are limited inquiries into the process of change. They are "snapshots" of a moment in time, which are incomplete. Longitudinal designs with mixed methods can provide the most comprehensive examinations of the development of health behaviors. Tracking adolescents through elementary and secondary education can provide key developmental information to the acquisition, modification, and maintenance of health behaviors. The mixed method component allows for research questions both within and between groups, which provides information that can elucidate the complex and entangled differences that comprise this area of research. Although the multiple costs of such studies often preclude their availability, they can provide the most valuable information research can offer.

Another potential direction within this area of study involves distinctions within PA. It was noted that PA for 9th graders predominantly occurs through sport, yet specific differences within type of PA were not investigated. Intentions and efficacy for health-enhancing behaviors may differentially exist among team versus individual sports, weight contingent sports such as wrestling or boxing versus non-weight contingent sports, or judged athletic competitions versus objectively scored sports. Differences such as these

exist within the nature of particular sports, which may influence the efficacy and intention of youth to engage in health-enhancing behaviors.

Nuanced differences, such as those within PA, may also exist within the category of sedentary behavior. Productive and unproductive sedentary behaviors have begun to receive investigative attention (Ehrmann Feldman et al., 2003), however, research has not looked at the differential effects they may have on the intentions and efficacy of youth to engage in health-enhancing behaviors.

As the pandemics of cancer, heart disease, and obesity continue to exponentially impinge on people's lives, continued research into preventive measures is increasingly necessary. Within psychology, further understanding of the process of health behavior change (Prochaska, Johnson, & Lee, 1998) is an area that holds promise for helping prevent the continued prevalence of these chronic diseases. Among adolescents, the intention and efficacy to engage in health-enhancing behaviors appear to be malleable variables that are influenced by multiple factors. Psychologists can contribute to decreasing the rates of chronic disease by continuing to identifying the psychological factors and processes that lead to health-enhancing as well as compromising behaviors.

List of References

List of References

Altman, D. G., & Jackson, C. (1998). Adolescent tobacco use and the social context. In S. S. Shumaker, E. B. Schron, J. K. Ockene, & W. L. McBee (Eds.), *Health Behavior Change (2nd ed.)* (pp. 59-84). New York: Springer.

American Cancer Society. (2005). www.cancer.org/.

Anderson, R. E., Crespo, C. J., Bartlett, S. J., Cheskin, L. J., & Pratt, M. (1998). Relationship of physical activity and television watching with body weight and level of fatness among children. *Journal of the American Medical Association, 279*(12), 938-942.

Azjen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bauman, A. E. (2004). Updating the evidence that physical activity is good for health: An epidemiological review 2000-2003. *Journal of Science and Medicine in Sport, 7*(1Suppl), 6-19.

Danish, S. Mash, J., Howard, C., et al. (1992). *Going for the goal: Leader manual.*

Danish, S. J., Petitpas, A. J., & Hale, B. D. (1993). Life development intervention for athletes: Life skills through sports. *Counseling Psychologist, 21*(3), 352-385.

Dubbert, P. M. (2002). Physical activity and exercise: recent advances and current challenges. *Journal of Consulting and Clinical Psychology, 70*(3), 526-536.

Dryfoos, J. (1998). *Adolescents at risk.* New York: Oxford University Press.

Ehrmann Feldman, D., Barnett, T., Shrier, I., Rossignol, M., & Abenhaim, L. (2003). Is physical activity differentially associated with different types of sedentary pursuits?. *Archives of Pediatrics & Adolescent Medicine, 157*, 797-802.

Eisenmann, J. C., Bartee, R. T., & Qi Wang, M. (2002). Physical activity, TV viewing,

and weight in U.S. Youth: 1999 youth risk behavior survey. *Obesity Research, 10*(5), 379-385.

Elster, A B. (1993). Prevention and adolescent health: Commentary on progress of the past two years. *American Journal of Diseases of Children, 147*, 510-511.

Farrell, A. D., Danish, S. J., & Howard, C. W. (1992). Relationship between drug use and other problem behaviors in urban adolescents. *Journal of Consulting and Clinical Psychology, 60*(5), 705-712.

Friedman, S., & Fisher, M. (1992). *Comprehensive adolescent health care*. St. Louis, MO: Quality Medical Publishers, Inc.

Fries, E., Meyer, A., Danish, S., Stanton , C., Figueiredo, M., Green, S., Brunelle, J. et al. (2000). Cancer prevention in rural youth: Teaching goals for health: The pilot experience. *Journal of Cancer Education , 15*, 225-230.

Glanz, K., Lewis, F. M., & Rimer, B. (1997). Linking theory, research and practice. In K. Glanz, F. M. Lewis, & B. Rimer (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice*, (pp. 19-35). San Francisco, CA: Jossey Bass.

Gordon-Larsen, P., Adair, L. S., & Popkin, B. M. (2002). Ethnic differences in physical activity and inactivity patterns and overweight status. *Obesity Research, 10*(3), 141-149.

Gortmaker, S. L., Peterson, K., Wiecha, J., Sobol, A. M., Dixit, S., Fox, M. K., et al. (1999). Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. *Archives of Pediatrics & Adolescent Medicine, 153*(4), 409-418.

Grunbaum, J., Kann, L., Kinchen, S., Ross, J., Hawkins, J., Lowery, R., et al. (2004). Youth Rick Behavior Surveillance-United States, 2003. In: *Surveillance Summaries,* May 21, 2004. MMWR 2004:53(No. SS-2): pp.23-31.

Harmon, A. L., Westerberg, A. L., Bond, D. S., Hoy, K. N., Fries, E. A., & Danish, S. J. (2005). Cancer prevention among rural youth: building a "bridge" to better health with genealogy. *Journal of Cancer Education, 20*(2), 103-107.

Harrison, P. A., & Narayan, G. (2003). Differences in behavior, psychological factors, and environmental factors associated with participation in school sports and other activities in adolescence. *Journal of School Health, 73*(3), 113-120.

He, K., Kramer, E., Houser, R. F., Chomitz, V. R., & Hacker, K. A. (2004). Defining and

understanding healthy lifestyle choices for adolescents. *Journal of Adolescent Health, 35*, 26-33.

Hodge, K., & Danish, S. (1999). Promoting life skills for adolescent males through sport. In Horne, A. M. & Kiselica, M. S. *Handbook of counseling boys and adolescent males: A practitioner's guide* (pp. 55 – 71). Thousand Oaks, CA: Sage Publications, Inc.

Jemal, A., Murray, T., Ward, E., Samuels, A., Tiwari, R. C., Jemal, A. A., et al. (2005).Cancer statistics, 2005. *CA: A Cancer Journal for Clinicians, 55*, 10-30.

Kleiber, D. A., & Kirshnit, C. E. (1991). Sport involvement and identity formation. In Diamant, L. *Psychological approaches to sports, exercise, and fitness* (pp. 193 – 211). Washington, DC: Hemisphere Publishing Corp.

Litt, I. (1997). *Taking our pulse: the health of America's women*. Palo Alto, CA: Stanford University Press.

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.

National Association for Sport and Physical Education (NASPE) (2005). *Statistics for advocacy.* Retrieved on August 22, 2005 from http://www.aahperd.org/naspe/template.cfm?template=stats.html.

Orlandi, M. A. & Dalton, L. T. (1998). Lifestyle interventions for the young. In S. S. Shumaker, E. B. Schron, J. K. Ockene, & W. L. McBee (Eds.), *Health behavior change (2nd ed.)* (pp. 59-84). New York, NY: Springer Publishing Company, Inc.

Papacharisis, V., Gordas, M., Danish, S., & Theodorakis, Y. (2005). The effectiveness of teaching a life skills program in a sport context. *Journal of Applied Sport Psychology, 17*(2), 247-254.

Pate, R. R., Freedson, P. S., Sallis, J. F., taylor, W. C., Sirard, J., Trost, S. G., et al. (2002). Compliance with physical activity guidelines. *Annals of Epidemiology, 12*, 303-308.

Pate, R. R., Trost, S. G., Felton, G. M., Ward, D. S., Dowda, M., & Saunders, R. (1997). Correlates of physical activity behavior in rural youth. *Research Quarterly for Exercise and Sport, 68*(3), 241-248.

Pate, R. R., Trost, S. G., Levin, S., & Dowda, M. (2000). Sports participation and health-

related behaviors among US youth. *Archives of Pediatrics & Adolescent Medicine, 154*, 904-911.

Patrick, K., Norman, G. J., Calfas, K. J., Sallis, J. F., Zabinski, M. F., Rupp, J. et al. (2004). Diet, physical activity, and sedentary behaviors as risk factors for overweight in adolescence. *Archives of Pediatrics & Adolescent Medicine, 158*(4), 385-390.

Pender, N. J. (1998). Motivation for physical activity among children and adolescents. *Annual Review of Nursing Research, 16*, 139-172.

Prochaska, J. O., Johnson, S., & Lee, P. (1998). The Transtheoretical model of behavior change. In S. S. Shumaker, E. B. Schron, J. K. Ockene, & W. L. McBee (Eds.), *Health behavior change (2nd ed.)* (pp. 59-84). New York: Springer Publishing Company, Inc.

Rice, J. (2004). Modifying adolescent health behaviors. *Current Opinion in Psychiatry, 17*(2), 129-132.

Simons-Morton, B. G., Taylor, W. C., Snider, S. A., Huang, I., & Fulton, J. E. (1994). Observed levels of elementary and middle school children's physical activity during physical education classes. *Preventive Medicine, 23*, 437-441.

Smalley, S. E., Wittler, R. R., & Oliverson, R. H. (2004). Adolescent assessment of cardiovascular heart disease risk factor attitudes and habits. *Journal of Adolescent Health, 35*, 374-379.

Strauss, R. S., Rodzilsky, D., Burack, G., & Colin, M. (2001). Psychosocial correlates of physical activity in healthy children. *Archives of Pediatrics and Adolescent Medicine, 155*(8), 897-902.

Trost, S. G., Pate, R. R., Ward, D. S., Saunders, R. & Riner, W. (1999). Correlates of objectively measured physical activity in preadolescent youth. *American Journal of Preventive Medicine, 17*(2), 120-126.

Trost, S. G., Owen, N., Bauman, A. E., Sallis, J. F., & Brown, W. (2002). Correlates of adults' participation in physical activity: review and update. *Medicine and Science in Sport and Exercise, 34*(12), 1996-2001.

US Department of Health and Human Services. (2005). Centers for Disease Control and Prevention. National Center for Health Statistics. *Health, United States,* 2004. Retrieved August 22, 2005 from http://www.cdc.gov/nchs/hus.htm.

US Department of Health and Human Services. (2000). *Health People 2010:*

Understanding and improving health. 2nd ed. Washington, DC: US Government Printing Office.

US Department of Health and Human Services. (1999). *Physical activity and health: A report of the surgeon general*. Retrieved August 22, 2005 from http://www.cdc.gov/nccdphp/sgr/sgr.htm.

Utter, J., Neumark-Sztainer, D., Jeffery, R., & Story, M. (2003). Couch potatoes or french fries: Are sedentary behaviors associated with body mass index, physical activity, and dietary behaviors among adolescents?. *Journal of the American Dietetic Association, 103*(10), 1298-1305.

Weiss, M. R. (Ed.). (2004). *Developmental sport and exercise psychology: A lifespan perspective*. Morgantown, WV: Fitness Information Technology, Inc.

Westerberg, A., Hoy, K., Danish, S., et al. (2001). *BRIDGE: A bridge to better health*. Manual.

World Health Organization. (1998). *Obesity: Preventing and managing the global epidemic*. Geneva, Switzerland.

Wilson, D. B., Smith, B. N., Speizer, I. S., Bean, M. K., Mitchell, K. S., Uguy, L. S., et al. (2005). Differences in food intake and exercise by smoking status in adolescents. *Preventive Medicine, 40*, 872-879.

Wing, R. R. (2000). Cross-cutting themes in maintenance of behavior change. *Health Psychology, 19*(1), 84-88.

Appendix A

BRIDGE Questionnaire – Demographic Questions

Below are questions that describe who you are. Please circle one answer for each question.

1. How old are you?
      [1]   13 years old or younger
      [2]   14 years old
      [3]   15 years old
      [4]   16 years old
      [5]   17 years old or older

2. What is your sex?
      [1]   Female
      [2]   Male

3. How do you describe yourself? (Select one or more responses.)
      [1]   American Indian or Alaska Native
      [2]   Asian
      [3]   Black or African American
      [4]   Hispanic or Latino
      [5]   Native Hawaiian or Other Pacific Islander
      [6]   White

Appendix B

BRIDGE Questionnaire – Intention Questions

Below are statements relating to your future behavior (Intentions). Please circle one response per statement.

1. I plan to lower the amount of fat in my diet in the next month.

   [1]   [2]   [3]   [4]   [5]
   Strongly   Disagree   Not Sure   Agree   Strongly
   Disagree   Agree

2. I plan to eat at least five fruits and vegetables a day in the next month.

   [1]   [2]   [3]   [4]   [5]
   Strongly   Disagree   Not Sure   Agree   Strongly
   Disagree   Agree

3. I plan to eat more high-fiber foods in the next month.

   [1]   [2]   [3]   [4]   [5]
   Strongly   Disagree   Not Sure   Agree   Strongly
   Disagree   Agree

4. I plan to live a tobacco-free life from now on.

   [1]   [2]   [3]   [4]   [5]
   Strongly   Disagree   Not Sure   Agree   Strongly
   Disagree   Agree

5. I plan to conduct a breast / testicular self-exam in the next month.

   [1]   [2]   [3]   [4]   [5]
   Strongly   Disagree   Not Sure   Agree   Strongly
   Disagree   Agree

6. I plan to wear sunscreen when I go out into the sun in the next month.

[1]	[2]	[3]	[4]	[5]
Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

7. I plan to set a goal to achieve within the next month.

[1]	[2]	[3]	[4]	[5]
Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Appendix C

BRIDGE Questionnaire – Efficacy Questions

Below are statements relating to your beliefs about your ability to live a healthy lifestyle (Efficacy). Please circle one response for each statement.

1.   I am sure I can switch to eating foods that are lower in fat.

    [1]   [2]   [3]   [4]   [5]
    Strongly   Disagree   Not Sure   Agree   Strongly
    Disagree   Agree

2.   I am sure I can eat at least five fruits and vegetables a day.

    [1]   [2]   [3]   [4]   [5]
    Strongly   Disagree   Not Sure   Agree   Strongly
    Disagree   Agree

3.   I am sure that I can set and achieve a goal.

    [1]   [2]   [3]   [4]   [5]
    Strongly   Disagree   Not Sure   Agree   Strongly
    Disagree   Agree

4.   I am sure that I can wear sunscreen when I go out in the sun

    [1]   [2]   [3]   [4]   [5]
    Strongly   Disagree   Not Sure   Agree   Strongly
    Disagree   Agree

5.   I am sure that I can refuse cigarettes if someone offered them to me

    [1]   [2]   [3]   [4]   [5]
    Strongly   Disagree   Not Sure   Agree   Strongly
    Disagree   Agree

6. I am sure I can conduct a breast or testicular self-examination.

[1]	[2]	[3]	[4]	[5]
Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

Appendix D

BRIDGE Questionnaire – Vigorous Physical Activity and Television Watching
Questions

Vigorous Physical Activity
1. On how many of the past seven days did you exercise or participate in physical activity
for at least 20 minutes that made you sweat and breathe hard, such as basketball, soccer,
running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities?

[1]   0 days
[2]   1 day
[3]   2 days
[4]   3 days
[5]   4 days
[6]   5 days
[7]   6 days
[8]   7 days

Television Watching
1. On an average school day, how many hours do you watch TV?

[1]   I do not watch TV on an average school day
[2]   Less than 1 hour per day
[3]   1 hour per day
[4]   2 hours per day
[5]   3 hours per day
[6]   4 hours per day
[7]   5 or more hours per day

VITA

Ian Joseph Wallace was born on December 19, 1977 in Chicago, Illinois and is an American citizen. He graduated from Glen Ridge High School, Glen Ridge, New Jersey, in 1996. He enrolled at The College of New Jersey (TCNJ) in the fall of 1996 as a psychology major and received his Bachelor of Arts in Psychology from TCNJ in 2000. During his undergraduate years, he studied abroad at the University of Northumbria at Newcastle, in Newcastle, England. In college he also worked as a community advisor, volunteered in multiple mental health settings, and financially supported himself by waiting tables. Ian completed a senior independent study under the direction of Dr. Ruth Hall, entitled "The Mental Aspects of Training for a Marathon." Upon graduating, he enrolled in the Clinical Psychology Masters program at Pepperdine University, with a focus on marriage and family therapy. During this time, he lived in Los Angeles and participated on a research team directed by Dr. Tara Scanlan in the International Center for Talent Development at The University of California, Los Angeles. Ian also gained additional clinical experience working at a private psychiatric facility as a Marriage and Family Therapy Intern in the state of California. He enrolled in the Doctoral program at Virginia Commonwealth University (VCU) in the fall of 2003 under the advisement of Dr. Steven J. Danish. His current research interests are in health, exercise, and sport psychology. Thus far at VCU Ian has co-edited and co-authored a book to be published by the American Psychological Association entitled "You Can Get into a Psychology Graduate Program: Advice from Successful Students and Prominent Psychologists." Ian is an avid sportsman who particularly enjoys basketball, running, and weight training.