Adolescent Motivation for Healthy Behaviors:

A Theory-based Enhanced Health Curriculum for Adolescents

by

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ABSTRACT

Adolescence is a period marked by significant physical, developmental, cognitive, and social changes, all of which contribute to health concerns for teens. A steady rise in life expectancy over the past two centuries is potentially diminishing due to the increase in prevalence, severity, and consequences of obesity in children and adolescents related to unhealthy lifestyle behaviors. Health behaviors are often established during childhood and adolescence that continue into adulthood. The development and integration of healthy lifestyle behaviors are vital through adolescence. Self-determination theory (SDT) offers a theoretical framework for attempting to understand individual differences in motivation and behavior. Recent studies have primarily focused on how adolescents make choices related to eating behaviors, physical activity, and self-care habits, and how the resultant behaviors are measured. Participants in this study were 63 healthy adolescents enrolled in 9th grade health class. All participants provided baseline data at Time 1 and again following the five-week pretest posttest intervention study at Time 2. This study examined the utility of SDT in the development of the Adolescent Intrinsic Motivation, a healthy lifestyle behavior intervention, using the tenets of SDT to explain healthy lifestyle motivational beliefs in adolescents, along with healthy lifestyle behaviors and knowledge. The AIM intervention study introduced basic health recommendations to adolescents in an autonomy-supportive environment, which has been shown to encourage the adolescent to make healthy behavior choices based on their own interest and enjoyment. Preliminary effects of the study indicated that participants receiving the AIM intervention demonstrated significant differences in motivational beliefs, healthy lifestyle knowledge, as well as healthy lifestyle behaviors from Time 1

(baseline) to Time 2 (post-intervention). Results of this study provide support for the use of SDT to address the competence, relatedness, and autonomy of adolescents in the development of health education material. Testing this intervention in a larger, random sampling of schools within the state, or even in more than one state, with a three- or six-month follow-up would be useful in determining the longer-term effects of the intervention.

DEDICATION

To Crystal

My canine companion for 15 years:

Unconditional

Pure dog love and acceptance

I have learned from you

I was not ready for you to leave.

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CHAPTER 1. INTRODUCTION

Introduction

Adolescence is a period marked by significant physical, developmental, cognitive, and social changes. These changes contribute to health concerns for teens including obesity and the resulting health consequences such as (a) hypertension and dyslipidemia, which are risk factors for cardiovascular disease (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007); (b) joint problems, musculoskeletal discomfort, and chronic inflammation (Han, Lawlor, & Kimm, 2010; Taylor et al., 2006); (c) increased risk for impaired glucose tolerance, insulin resistance, and type 2 diabetes (Whitlock, Williams, Gold, Smith, & Shipman, 2005); as well as (d) breathing problems including sleep apnea and asthma (Han et al., 2010; Sutherland, 2008). Obese children are more likely to be obese adults, and adult obesity is more likely to be severe if the obesity begins in childhood and adolescence (Biro & Wein, 2010; Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001).

The past two centuries have seen a steady rise in life expectancy due to increasing the likelihood of survival for children (Olshansky et al., 2005), yet the increasing prevalence, severity, and consequences of obesity in children and adolescents has the potential to diminish the health and life expectancy of this and future generations (Ebbeling, Pawlak, & Ludwig, 2002; Olshansky et al., 2005). Health behaviors are often established during childhood and adolescence and continue into adulthood (Centers for Disease Control and Prevention [CDC], 2011).

Importantly, during adolescence there is an emphasis on conformity of behavior with the peer group, and consequently most adolescent risk-taking is a group

phenomenon (Steinberg, 2004). This chapter will focus on issues around adolescent health behaviors, epidemiological data characterizing adolescent eating behaviors and food choices, physical and sedentary activity, and sleep, as well as provide a synthesis and critique of intervention literature targeting adolescent health behaviors. This chapter concludes with a summary statement of the proposed research contribution to nursing and healthcare innovation science and the research questions, which will be the focus of this study.

Adolescent Development

Classic theorists on child development such as Piaget and Erikson held that child development evolves in a predetermined order. Adolescence is a period of exploration and development of physical, cognitive, social, emotional, and moral values. According to Paperny (2011), expected outcomes of adolescent development include competence, confidence, and connection. In addition, Paperny (2011) explains that

> adolescents strive for autonomy in three domains: (a) emotional, or the establishment of close relationships; (b) behavioral, or the ability to make independent decisions and follow through with them; and (c) value, or the development of principles about right and wrong. (p. 37)

With their new abilities of abstract thought, adolescents convert experiences into abstract ideas, and can think about the consequences of their behaviors.

Egocentrism is part of cognitive development (Alberts, Elkind, & Ginsberg, 2007; Schwartz, Maynard, & Uzelac, 2008), and is observed at every stage of cognitive development. In adolescence, egocentric thought is manifested by beliefs that everyone should view events as she/he does, and think the same way as well. Egocentrism is characterized by the application of logic to human and societal actions, with inadequate

understanding that events are not always ordered logically (Schwartz et al., 2008). Understanding of logical sequencing of events increases in adolescence, as the use of logic in relation to life decision-making improves. Adolescents develop new skills of logical thought and are able to create general rules of thinking, but they do not have the experiences to apply these rules to the real world. This often leads to idealistic crises, discrepancy between what they say and what they do, and the need to reformulate schemes for real world application (Paperny, 2011). Adolescents seek to feel competent and capable of achieving desired outcomes.

From an Eriksonian perspective, psychosocial development in adolescence includes *identity crisis*, with a focus on the adolescent redefining self-concept by trying out different roles, which may create role confusion (Colyar, 2003). Physically, pubertal development is occurring, and teens with delayed or accelerated sexual characteristics may experience disruption in self-image. Any departure from the peer group causes anxiety, and behavior is greatly influenced by the peer group (Steinberg, 2004). Adolescents seek relatedness, a sense of belonging with their peers, family, and community and will sometimes voluntarily follow peer leaders who influence them to engage in unhealthy and risky behaviors such as illegal acts and substance abuse (Steinberg, 2004; Ward, Lundberg, Ellis, & Berrett, 2010).

Early adolescence, from 11-14 years old, represents a time of pubertal changes and increased cognitive development, while middle adolescents from 15-17 years of age show increasing autonomy and experimentation (Colyar, 2003). Linear growth is a hallmark of puberty, which also includes growth of the cranium and different brain systems (Steinberg, 2004). Changes in the dopaminergic system also take place within

the brain during puberty (Chambers, Taylor, &Potenza, 2003; Spear, 2000). This system is involved with the processing of social and emotional information, which plays a critical role in affective and motivational processing and behaviors (Steinberg, 2008).

There also are weight changes that differ by gender; weight increases in females is mostly an increase in body fat, while increased weight in males reflects increased muscularity. At any stage in adolescence, poor nutrition may result in health and cognitive consequences (e.g., risk for overweight and obesity, increased risk for certain kinds of cancer, impaired learning and concentration, slower memory recall, and increased errors in work) that affect the teen for a lifetime (CDC, 2014). Developmental changes in adolescence bring about a new set of unhealthy behaviors and risk factors, including (a) poor dietary intake, (b) lack of physical activity, (c) weight problems, (d) lack of adequate sleep, (e) increased stress, (f) sexual behaviors, (g) exposure to violence and victimization, (h) physical injury and safety, (i) experimentation with illegal substances, and (j) mental health issues (Waters et al., 2011).

Access to care and feared threats to confidentiality are barriers for adolescents seeking health care (Hogben et al., 2005). In addition, learning how to make important healthcare decisions and navigate the complicated healthcare system is critical for adolescents as they move into young adulthood. Most high school-aged adolescents are beginning to be cognitively mature enough to understand the consequences of their actions regarding their own health and health concerns (Kuther, 2003; Schachter, Kleinman, & Harvey, 2005; Spear & English, 2007). Guidance from health professionals during adolescence includes assisting the adolescent to develop the capability to make their own decisions about health and health care as they enter adulthood, and to act

responsibly and independently with respect to these decisions (Ford, English, & Sigman, 2004; Spear & English, 2007). While there have been a number of interventions designed to promote adolescent health behaviors, few have built upon the basic psychological needs of adolescents for autonomy, relatedness, and competence in an autonomy-supportive environment in relation to health behavior (Chatzisarantis & Hagger, 2009).

Adolescence is a period where attainment of autonomy, relationships, and competence are major developmental milestones. Middle adolescents especially have an increase in their sense of self, are able to think more abstractly, plan more effectively, and have a better understanding of the consequences of their behaviors (Paperny, 2011). They struggle with autonomy and their desire for independence, attaining competence while sorting through values and beliefs, and improving relatedness by developing strong peer alliances as well as challenging authority and rules.

Motivation

According to Ryan and Deci (2000), motivation gives purpose and direction to behavior, and highlights the importance of inner resources for personality development and behavioral self-regulation. Self-regulation describes forms of adaptation, conscious and unconscious, to control emotions, behaviors, or thoughts. Self-control reflects the ability to consciously override unhealthy or maladaptive impulses in order to respond in more adaptive and beneficial ways (Baumeister & Alquist, 2009).

Adolescent psychosocial development is consistent with the basic psychological needs of autonomy, relatedness, and competence. All three of these needs are essential for growth and development (Ryan & Deci, 2002). In this view, these basic

psychological needs are essential sources of nourishment necessary for the growth and well-being of the teen's personality and cognitive structures (Ryan & Deci, 2000). These psychological needs provide a basis for identifying characteristics that create an environment that will support (versus undermine) and allow for fulfillment of these needs. Behaviors that are motivated intrinsically are based on the innate satisfaction of these needs and allow teens to act freely for interest or enjoyment. Extrinsically motivated behaviors are based on reward, punishment, and coercion. The dimensions of intrinsic motivation have been linked to healthy behaviors in adolescents (Chatzisarantis & Hagger, 2009; Spruijt-Metz, Nguyen-Michel, Goran, Chou, & Huang, 2008; Vansteenkiste, Simons, Soenens, & Lens, 2004). Based on self-determination theory (SDT; Ryan & Deci, 1991), the proposed research builds on a theory-based approach by testing a healthy lifestyle intervention designed to promote autonomy, relatedness, and competence, and to support intrinsic motivation in an autonomy-supportive environment.

Adolescent Health Behavior

As mentioned previously, the primary factors that influence adolescent health behaviors include advancing cognitive development along with peer, parental, and media influences (Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007). Research targeting adolescent health behaviors has primarily focused on how adolescents make choices, and how the resultant behaviors are measured. The focus of prior research has included eating behaviors and food choices, physical activity, and self-care habits.

The Youth Risk Behavior Surveillance System (YRBSS) was originally developed in 1990 by the CDC to track six types of adolescent health-risk behaviors over time, and include those targeted in the proposed research (e.g., unhealthy dietary

behaviors, inadequate physical activity, and selected self-care behaviors). These behaviors contribute to the leading causes of death and disability among youth and young adults (CDC, 2015). As part of the YRBSS, the CDC, along with state and local education and health agencies, conducts a national school-based Youth Risk Behavior Survey (YRBS), which summarizes results from the national survey, 43 state surveys, and 21 large urban school district surveys among 9-12th grade students. The most current reporting period is September 2012 to December 2013. These data are also collected on the local level in some states which allows for comparison of risk behaviors among local teens to other communities.

In 2009, Maine implemented the Maine Integrated Youth Health Survey (MIYHS) to monitor the health of youth in the state. This was done to take the place of multiple health surveys that were being used to collect data, including the YRBS. Several of the questions on the MIYHS are identical to the YRBS however some of the questions have been modified to capture specific data for teens in Maine.

This intervention and research study took place in Southern Maine at Noble High School, where adolescent risk behavior statistics are very similar to adolescent risk behaviors found nationally. See Table 1 for national YRBS statistics along with corresponding statistics from the MIYHS for Maine and Noble High School when available. The participant data were obtained from the study participants.

Table 1

High School Risk Behavior Survey Results United States and Maine 2013

Question	YRBS % U.S.	MIYHS %Maine	MIYHS %Noble	Study %T1
Did not eat breakfast *	13.7	**	**	11.7
Drank a sugary drink *		26.2	24.9	50.0
Drank a soda or pop *	77.7	**	**	41.7
Did not participate in at least 60 minutes of physical activity on at least 1 day* (doing any activity that increased their heart rate and made them out of breath some of the time)	15.2	14.0	**	10.0
Were not physically active for at least 60 minutes per day on 5 or more days *	52.7	56.9	32.8	46.7
Were not physically active at least 60 minutes per day on all 7 days *	72.9	77.7	83.3	68.3
Played video or computer games or used a computer 3 or more hours per day for something that was not school work on an average school day	41.3	36.8	**	54.0
Watched television 3 or more hours per day on an average school day	32.5	23.1	**	20.0
Did not attend physical education classes on 1 or more days in an average week when in school	52.0	59.8	58.8	63.5
Did not attend physical education classes on all 5 days in an average week when in school	70.6	95.5	97.7	**
Did not play on at least one sports team run by school or community groups in the past 12 months before the survey	46.0	**	**	35.0
Describe themselves as slightly or very overweight	31.1	**	**	25.4
Did not have 8 or more hours of sleep on an average school night	68.3	**	**	65.1

Note. * During the past 7 days before the survey.
** No data reported.

Adolescent nutrition. Nutritional deficits and poor eating habits established during adolescence have long-term health, growth, and developmental consequences (Massey-Stokes, 2002; Story & Stang, 2005). Nutrition is broadly understood as eating behaviors with definitions focusing on what is considered healthy and unhealthy eating behaviors as inversely related. For example, eating breakfast is considered healthy behavior and not eating breakfast is considered unhealthy behavior. In the literature, eating behaviors of adolescents that influence their health are commonly discussed as the consumption of fruits and vegetables, intake of sugar and high fat foods, drinking water, eating breakfast, intake of soda and sugar-sweetened beverages (SSBs), and daily caloric intake (Boardman, 2006; Chen, Chou, & Yang, 2005; Delisle, Werch, Wong, Bian, & Weiler, 2010; Diaz, Marshak, Montgomery, Rea, & Backman, 2009; Duffy & Popkin, 2007; Franko, Thompson, Bauserman, Affenito, & Striegel-Moore, 2008; Junger & Kampen, 2010; Murnaghan et al., 2010; Page & Suwanteerangkul, 2009; Popkin, 2010; Roy & Gauvin, 2010; Stevenson et al., 2007; Tassitano et al., 2010). These eating behaviors have been targeted in adolescent intervention research.

As a result of unhealthy nutritional intake, overweight and obesity in youth is associated with emerging critical adolescent health problems including cardiovascular disease, impaired glucose tolerance, and type 2 diabetes (Gidding et al., 2005; Sinha et al., 2002). In addition, obesity has been shown to contribute to depression and anxiety disorders in adolescents (Anderson, Cohen, Naumova, Jacques, & Must, 2007). Nutrition-related concerns for adolescents include dietary excess of saturated fats, cholesterol, sodium, and sugar. In addition to concerns about inadequate and unhealthy nutritional intake, behavioral concerns in adolescence can include unsafe weight

management methods and the emergence of eating disorders (Foltz et al., 2011; Massey-Stokes, 2002; Shelomenseff & Andreoni, 2000).

Assessment of adolescent weight is consistently evaluated by utilizing body mass index (BMI) calculations of weight-to-height ratio percentage. The BMI is used internationally as a measure of obesity and has been repeatedly shown to correlate well with more direct and expensive measures of overall adiposity (Must & Anderson, 2006; Semiz, Ozgoren, & Sabir, 2007). BMI is widely used to track changes over time for children and adolescents and is graphed on an age- and gender-specific growth chart that indicates the child/adolescent's BMI percentile (CDC, 2010). Overweight is defined as a BMI at or above the 85th percentile and lower than the 95th percentile on the appropriate growth chart for age and gender. Obesity is defined as at or above the 95th percentile on the appropriate growth chart for age and gender (Barlow, 2007). As a result of unhealthy nutritional and increased sedentary behaviors, and negative environmental influences, obesity in adolescents aged 12-19 more than tripled from 5% in 1920 to 18% in 2008 (CDC, 2011). In 2011, 13% of adolescents were found to be obese in the United States (U.S.), and 15.2% were found to be overweight (CDC, 2015).

Breakfast is considered the most important meal of the day, and is associated with a range of benefits including improved short-term memory, attention, and mood (Tapper et al., 2008). Eating breakfast can have positive effects on cognition, learning, and self-reported alertness in high school students (Pearson, Biddle, & Gorely, 2009; Widenhorn-Muller, Hille, Klenk, & Weiland, 2008). However, young people are more likely to skip breakfast than any other meal (Cooper, Bandelow, & Nevill, 2011). Croezen, Visscher, Ter Bogt, Veling, and Haveman-Nies (2009) found that the most important risk factor for

overweight and obesity in a sample of over 35,000 adolescents was skipping breakfast. According to the YRBS (CDC, 2015), 13.7% of adolescents report they did not eat breakfast during the seven days before the survey, and 61.9% of those reported not eating breakfast for the entire seven days before the survey. Maine did not report any data specific for breakfast behaviors.

Consumption of SSBs may be a key contributor to overweight and obesity (Duffy & Popkin, 2007; Malik, Schulze, & Hu, 2006). Adolescents are the highest consumers of SSBs in the U.S. (Park, Blanck, Sherry, Brener, & O'Toole, 2011). In addition to soda, SSBs include fruit-flavored drinks, tea and coffee drinks, sweetened milk, soy, and nut drinks, sport and energy drinks, and any other beverage with added sugar (Duffy & Popkin, 2007; Popkin, 2010). Sugar Sweetened Beverages, particularly soda, are the largest sources of added sugar to the adolescent's diet and have little or no nutritional benefit. Consumption of SSBs have been associated with health problems including obesity, dental caries, type 2 diabetes, and hypertension (Malik et al., 2006; Park et al., 2011). According to the YRBS (CDC, 2015), 27.0% of high school students reported drinking soda one or more times a day, 19.4% students report they drank soda two or more times a day, and 11.2% reported drinking soda three or more times a day in the seven days before the survey. In the MIYHS for 2013 the survey question reflected drinking soda, sports drinks, energy drinks, and other sugary drinks combined. In Maine, 26.2% of high school students reported any kind of sugary beverage at least one time per day in the previous week. During the same year, 24.9% of students at Noble High School report this behavior as reported by the MIYHS (2013).

Adolescent physical activity. According to recommendations from the U.S. Department of Health and Human Services (USDHHS, 2011), children and adolescents 6-17 years of age should participate in 60 minutes or more of physical activity daily. This includes moderate- and/or vigorous-intensity aerobic physical activity at least three days a week, muscle strengthening on at least three days of the week, and bone-strengthening activities on at least three days of the week.

The relationship between physical activity and health in adolescence has been well established (Strong et al., 2005). Moderate physical activity is defined as nonexhausting activities such as fast walking, baseball, tennis, and slow biking (Delisle et al., 2010; Junger & Kampen, 2010; Page & Suwanteerangkul, 2009). Vigorous physical activities are defined as those that result in rapid heart rate and include running/jogging, football, soccer, and fast biking (Delisle et al., 2010). Other studies have measured physical activity as participation in team sports, physical education (PE) classes, and exercise programs without regard to exertion (Chen, Shiao, & Gau, 2007; Mattila et al., 2008; Murnaghan et al., 2010; Siyez, 2008; Tassitano et al., 2010). Different methods and inventories have been used to measure physical activity; however, self-report measures have been found to correlate well with objective measures of physical activity in adolescents (Prochaska, Sallis, & Long, 2001).

The 2013 YRBS report shows that 15.2% of U.S. high school students report participating in physical activity for 60 minutes on at least one day during the seven days before the survey (CDC, 2015). The 2013 MIYHS shows that 14.0% of high school students report participating in physical activity for 60 minutes on at least one day during the seven days before the survey. Nationally, the 2013 YRBS reports that 52.7% of high

school students do not participate in at least 60 minutes of physical activity five or more days during the seven days before the survey; from the MIYHS in Maine this figure is 43.7% and at Noble High School this figure is 32.8%. Nationally, the 2013 YRBS report shows 72.9% of adolescents report not participating in physical activity 60 minutes a day on all days of the week; in Maine results of the MIYHS indicate that 77.7% of adolescents report not participating in physical activity 60 minutes a day on all days of the week. Nationally, 46% of high school students did not play on at least one sports team; Maine did not report on this area of physical activity.

In the nation, 55.6% of high school students report participating in muscle strengthening activities three or more days in the previous seven days; Maine did not report on this type of physical activity. Nationally, 52.0% attended PE class on one or more days in an average week when they were at school. In Maine, the survey results indicate that 59.8% attended PE class on one or more days. Nationally, 70.6% of adolescents did not attend daily PE class on all five days when they were in school; in Maine that number is 95.5%.

In general, lack of adequate physical activity is reflected in increased sedentary behavior. Sedentary behavior includes the number of hours adolescents viewed television or videos, played computer or video games, surfed the internet, and/or texted, emailed, or messaged with family and friends using the computer or cellular telephone (Siyez, 2008; Tassitano et al., 2010). The current recommendation is for adolescents to limit nonacademic screen time to less than three hours per day. Nationally, 41.3% of adolescents reported playing video or computer games or using the computer for three or more hours per day on an average school day. Almost 37% of adolescents in Maine

reported playing video or computer games or using the computer for three or more hours per day on an average day. The YRBS indicates that 32.5% of adolescents watch television for three or more hours per day; the MIYHS indicates that 23.1% of adolescents watch television for three or more hours per day.

Adolescent self-care behaviors. Self-care reflects the practice of performing healthy behaviors targeting (a) psychosocial functioning including healthy responses to loneliness, hopelessness, shyness, perceptions of social status, happiness, and perception of physical attractiveness (Page & Suwanteerangkul, 2009); (b) social support systems of family, friends, teachers, neighbors, healthcare providers, and clergy (Callaghan, 2006; Chen et al., 2005, 2007; Diaz et al., 2009; Rink & Tricker, 2005); and (c) improving lifestyle habits of sleep and stress management (Delisle et al., 2010; Junger & Kampen, 2010; Mattila et al., 2008; Page & Suwanteerangkul, 2009; Rew, Wong, Torres, & Howell, 2007; Siyez, 2008; Stevenson et al., 2007; Tassitano et al., 2010).

Sleep difficulties in adolescents can include delayed sleep onset, early wakening, insomnia, night wakening, and the inability to obtain adequate hours of sleep (Cain, Gradisar, & Moseley, 2010). Many studies have associated altered sleep duration with chronic health conditions such as type 2 diabetes, hypertension, obesity, and hypertension (Ayas et al., 2003; Cappuccio et al., 2008; Chaput, Brunet, & Tremblay, 2006; Chen, Beydoun, & Wang, 2008; Gangwisch, Heymsfield, & Boden-Albala, 2006; Knutson, Ryden, Mander, & VanCauter, 2006; Ogden, Carroll, Curtin, Lamb, & Flegal, 2010; Wing, Li, Li, Zhang, & Kong, 2009; Yaggi, Araujo, & McKinlay, 2006). Inadequate sleep has been shown to contribute to motor vehicle crashes (CDC, 2010; Pizza et al., 2010) and suicide (CDC, 2010). Short-term consequences of sleep problems include

daytime sleepiness, poor concentration, poor academic performance, impaired working memory, and behavioral problems (Cain et al., 2010; Curcio, Ferrara, & deGennaro, 2006; Gradisar, Terrill, Johnston, & Douglas, 2008; Gregory & O'Connor, 2002). Although many disease processes can cause sleep problems, this intervention focused on addressing sleep problems related to self-care issues (i.e., delayed sleep onset, early wakening, insomnia, night wakening, and the inability to obtain adequate hours of sleep).

Recommendations from the National Sleep Foundation (2006) for adolescent sleep needs include obtaining 8.5 to 9.5 hours of sleep each night. The *2006 Sleep in America Poll* by the National Sleep Foundation (2006) reports that 54% of 13-19 year-olds wake between 5:00 and 6:30 AM (average wake time of 6:17 AM) and 81% go to bed after 10:00 PM. Thus, 61% of this age group is obtaining less than the recommended amount of sleep recommended for this age. Delayed sleep onset can be attributed to external influences such as homework, employment and social opportunities (Carskadon, Acebo, & Jenni, 2004), as well as biological and physiological causes such as a delayed circadian sleep phase (Hagenauer, Perryman, Lee, & Carskadon, 2009). According to the YRBS (CDC, 2015), 68.3% of adolescents reported they did not have eight or more hours of sleep on an average school night. The MIYHS did not report on sleep behavior.

School-Based Interventions

The development and integration of healthy eating habits, physical activity, and healthy self-care behaviors are vital throughout adolescence. Schools are a critical part of the social environment that shape adolescents' eating and physical activity patterns as well as the social context in which most of their time is spent with peers. Therefore, schools can play an integral role in creating an environment for improving adolescent

healthy behaviors (Zenzen & Kridli, 2009). In addition, research indicates that a healthy lifestyle intervention program that includes several key individuals and school staff (e.g., school nurse, physical and health education teachers, and guidance counselors) increases the adolescents' adoption of healthy behaviors (Veugelers & Fitzgerald, 2005; Ward et al., 2006).

Review of Existing School-Based Interventions for Adolescents

Overview. A recent systematic search of the literature was conducted to determine the most current evidence on school-based adolescent healthy lifestyle interventions. Using a combination and/or of major heading (MH) or major subject headings (MeSH) of (*nutrition* OR *physical activity* OR *self-care*) AND *intervention* AND *high school* yielded 107 citations using PubMed, CINAHL, and ProQuest databases. When the limits of *English*, *adolescent 13-18 years*, and *published in the last 10 years* were applied, the search yielded 21 studies, with only 12 of those studies that were conducted during the school day (Bayne-Smith et al., 2004; Chatzisarantis & Hagger, 2009; Lindwall & Lindgren, 2005; Melnyk et al., 2009; Moseley & Gradisar, 2009; Neumark-Sztainer, Story, Hannan, & Rex, 2003; Spruijt-Metz et al., 2008; Stice, Rohde, Shaw, & Marti, 2012; Stice, Shaw, Burton, & Wade, 2006; Tsorbatzoudis, 2005; Vansteenkiste et al., 2004; Young, Phillips, Yu, & Haythornthwaite, 2006). Upon the critical appraisal of the published literature on lifestyle interventions in adolescents, it is noted that the studies were mainly reporting on efficacy of newly developed programs. In this examination of the literature, few published studies of theory-based adolescent lifestyle behavior school-based interventions were found. Of the 12 studies reviewed, all were designed to determine the efficacy of the newly developed intervention. All 12

studies (a) utilized self-report instruments to collect data on behaviors, (b) reported specific setting and short-term follow-up as limitations, and (c) all discussed lack of impact on behavioral variables.

Summary of existing literature. These 12 intervention studies were critically appraised to inform the development and implementation of this research study. The studies, dating from 2004-2011, are detailed in Appendix A. Two of the studies were found to have all three components of nutrition, physical activity, and self-care (Melnyk et al., 2009; Neumark-Sztainer et al., 2003); seven of the studies were found to have only physical activity components (Bayne-Smith et al., 2004; Chatzisarantis & Hagger, 2009; Lindwall & Lindgren, 2005; Spruijt-Metz et al., 2008; Tsorbatzoudis, 2005; Vansteenkiste et al., 2004; Young et al., 2006). Three of the studies focused on a self-care issue only (Chatzisarantis & Hagger, 2009; Tsorbatzoudis, 2005; Young et al., 2006), and one study had components of self-care and physical activity (Stice et al., 2012).

When more closely examining the three studies that contained the targeted three components of nutrition, physical activity, and self-care, it was found that one was a pilot study (Melnyk et al., 2009), another a feasibility study (Neumark-Sztainer et al., 2003), and the third a replication of a previous study using a larger subject and data pool (Stice et al., 2012). Two of the studies were guided by a theoretical framework. All three studies examined the short-term program impact on the study variables as well as the preliminary efficacy of the intervention. In all three studies, the intervention was delivered in a high school setting to both genders either during health class or during an alternative PE class, and the third was delivered as a personal wellness PE elective course.

All studies measured BMI as an outcome and none found any significant change in BMI during the study period.

A parental involvement component was present in one study that contained two of the three components (physical activity and self-care) (Neumark-Sztainer et al., 2003). This study was a life skills-oriented physical activity intervention, which was delivered during PE class. Although results of this study indicated improved cardiovascular fitness and a decline in reported sedentary activity for participants, there were no significant findings in other study variables.

Of the five studies focused on physical activity only, four were guided by a theoretical framework (Chatzisarantis, 2009; Spruijt-Metz et al., 2010; Tsorbatzoudis, 2005; Vansteenkiste et al., 2004). All interventions were delivered in high school PE class; two studies with only female participants (Bayne-Smith et al.; Spruijt-Metz et al., 2010). Two studies collected and evaluated BMI data (Bayne-Smith et al., 2004; Spruit-Metz et al., 2010). The other studies in this group measured self-reported physical activity behavioral changes only.

Three studies focusing on issues of self-care included sleep and eating disorder prevention (Moseley, 2008; Stice et al., 2006, 2012). Just one of these studies was guided by a theoretical framework (Moseley, 2008), and the intervention was delivered in a high school classroom setting. Both the eating disorder prevention interventions were delivered to female high school-aged and university students (Stice et al., 2006, 2012).

In total, eight of the studies were guided by a theoretical framework (Chatzisarantis & Hagger, 2009; Melnyk et al., 2009; Moseley & Gradisar, 2009; Neumark-Sztainer et al., 2003; Spruijt-Metz et al., 2008; Tsorbatzoudis, 2005;

Vansteenkiste et al., 2004; Young et al., 2006). All 12 studies utilized self-report in order to measure behavioral outcomes, with eight studies using BMI as an outcome variable, and seven studies reporting on anthropometric and/or physiologic variables. The studies ranged in duration from four 50-minute sessions delivered over four weeks (Moseley & Gradisar, 2009) to an intervention delivered in a one-hour classroom session two days per week for six months (Lindwall & Lindgren, 2005). In seven studies, the participants were all female (Bayne-Smith et al., 2004; Lindwall & Lindgren, 2005; Neumark-Sztainer et al., 2003; Spruijt-Metz et al., 2008; Stice et al., 2006, 2012; Young et al., 2006). Just two of the studies included parental involvement (Neumark-Sztainer et al., 2003; Young et al., 2006).

Strengths present in the current literature.

***Multi-component interventions*.** Research indicates that interventions to promote adolescent health and healthy behavior are most likely to show positive results when multiple intervention components grounded in a theoretical framework are used (Birnbaum, Lytle, Story, Perry, & Murray, 2002; Cole, Waldrop, Auria, & Garner, 2006; Hoelscher, Evans, Parcel, & Kelder, 2002; Kelly & Melnyk, 2008). This adolescent healthy lifestyle intervention study specifically targeted the basic human needs of autonomy, relatedness, and competence as guided by SDT in the delivery of *Bright Futures* (Hagan, Shaw, & Duncan, 2008), which are recommendations for adolescent health behaviors concerning nutrition, physical activity, and self-care. Delivery of the Adolescent Intrinsic Motivation (AIM) intervention took place in a co-educational high school 9th grade health classroom setting.

***Healthy behavior outcomes*.** Programs that have a behavioral focus tend to be more successful in producing desired intentions and behaviors (Hoelscher et al., 2002; Kelly & Melnyk, 2008). All 12 of the studies reviewed for this study had a behavioral focus, some more so than others. Knowledge-based programs do enhance participant knowledge yet have not been effective in changing intentions or behaviors (Hoelscher et al., 2002). The AIM intervention study introduced basic health recommendations to adolescents in an autonomy-supportive environment, which has been shown to encourage the adolescent to make healthy choices based on their own interest and enjoyment.

Limitations present in the current literature.

***Non-representative population groups*.** Sample sizes in the reviewed literature vary widely, with some studies focusing on specific identified adolescent populations such as females, overweight or obese, and existing body image concerns. This study represented the local school population in southern Maine. The sample for this study was high school students (age 14 to 16 years old) enrolled in a required 9th grade high school health class. The targeted age group encompasses a time of maximum high risk and unhealthy behaviors and strong peer group influence (Paperny, 2011).

***Lack of theoretical framework*.** Many of the reviewed intervention studies either have no guiding theoretical framework or use several combined theoretical frameworks, which makes the evaluation of the research findings difficult. In a systematic review of the literature by Painter, Borba, Hynes, Mays, and Glanz (2008), one third of published health behavior research used a theoretical framework to guide the development of the study and choice of measured outcomes, and a small proportion of those studies rigorously tested theory. The theoretical approach to developing interventions for

adolescents relies on relevant theories to develop an understanding of the presenting problem requiring intervention (Sidani & Braden, 2011). In addition, reliance on theory is critical for delineating the active ingredients of the intervention and distinguishing those from nonessential intervention elements (Sidani & Braden, 2011). The theoretical framework for guiding development and delivery of the AIM intervention study is SDT (Deci & Ryan, 2000), which will be discussed in detail in Chapter 2. Rigorously applied critical inputs of autonomy, competence, and relatedness theorized concepts from SDT guided the development of the AIM intervention. In addition, the tenets of an autonomy-supportive environment described and defined from SDT guided the delivery of this intervention.

Variability in dose of the intervention. Review of the 12 studies demonstrates variability in the number and length of the delivered intervention sessions as well as the duration of the intervention programs. The level at which the intervention is delivered is considered the dose (Sidani & Braden, 2011). Dose is characterized by the elements of purity or the ratio of specific to nonspecific strategies that constitutes the intervention, and amount, frequency, and duration. These elements reflect exposure to the intervention (Sidani & Braden, 2011). Overall, the recommended length and dose for adolescent interventions are for the entire intervention period to be of long enough duration to capture outcomes (Roseman, Riddell, & Hynes, 2011; Waters et al., 2011; Zenzen & Kridli, 2009). While most interventions in these studies take place at some time during the average school day in a school semester, there is a range from one-time only information videos to interventions that continue over several school years. Spruijt-Metz and colleagues (2008) demonstrated positive effects on intrinsic motivation for activities

in five to seven sessions spread over five to seven consecutive school days. Vansteenkiste and colleagues (2004) demonstrated positive findings with two sessions that were implemented during PE class. Chatzisarantis and Hagger (2009) also demonstrated positive findings in two to three sessions over five weeks in PE class. Based on these studies, the determination of dose for the AIM intervention was three intervention sessions spread over three consecutive health class sessions. Due to the block schedule in this high school, health classes met every other week.

Lack of parent and family involvement. Inclusion of parent and family involvement in the intervention has been shown to enhance the effectiveness of adolescent healthy lifestyle programs (Roseman et al., 2011; Waters et al., 2011; Zenzen & Kridli, 2009). Of the two reviewed studies that included parent involvement, one (Melnyk et al., 2009) included newsletters sent home to parents and home activities based upon the delivered intervention. The second study (Neumark-Sztainer et al., 2003) reported that parents perceived a positive impact on their child from the program along with strong satisfaction. Parent support and home activities expanded the contexts that support healthy adolescent behaviors in this intervention. The AIM intervention included home activities with parental involvement. Examples include gathering a family medical history and finding errors in nutrition, physical activity, and self-care fact sheets using reliable internet sources.

***Lack of unified approach to outcome measures*.** In an integrative review of school-based childhood obesity programs Zenzen & Kridli (2009) discussed the difficulty in evaluation of studies for quality and evidence of effectiveness of the outcomes due to the variability in theoretical underpinnings and methodological approaches. Outcomes

for this study were clearly defined and measured using psychometrically sound instruments. The Intrinsic Motivation Inventory (IMI; Deci & Ryan, 2000) was used to measure intrinsic motivation. The IMI measures adolescent interest/enjoyment (the true measure of intrinsic motivation), perceived competence, and perceived choice (positive predictors of intrinsic motivation). Behavioral self-report measures included eating breakfast, consumption of SSB, frequency and intensity of physical activity, amount of sedentary screen time, and sleep practices.

Impact on Nursing

Collaboration with a multidisciplinary school team consisting of the school nurse, health and PE teachers, and guidance counselor offers a unique opportunity to implement a theory-guided, school-based healthy lifestyle intervention program that addresses nutrition, physical activity, and self-care behaviors in adolescents. When information is presented through the AIM intervention in an autonomy-supportive style by providing a rationale for why the behavior is beneficial to the adolescent, acknowledging the feelings and emotions of the adolescent, and minimizing the pressure to perform for reasons other than their own, the adolescent can then find, and believe, that the information is personally important to him or her. Adolescent healthy lifestyle behaviors can be adopted with a real sense of volition—from one's own ability to choose (Deci, 1995).

A gap in the literature exists in that few published school-based interventions using theory-based constructs to deliver health education have been tested with high school students. This study addresses adolescent motivation to perform healthy behaviors. It also addresses a considerable gap in the science of intervention research by evaluating the feasibility and short-term effects of a theory-based intervention delivered

in a high school health class setting; an intervention designed to focus on the adolescents' motivational beliefs, which are the basis of the adolescents' decision-making regarding healthy lifestyle behavioral choices.

Summary

Adolescence is a time for expanding personal independence, developing new relationships with peers and community, and preparing for future college, employment, and community living. Adolescence also is a time for experimenting with behaviors that will form the basis for future adult habits. Evaluation of current adolescent healthy lifestyle research indicates that, due to a wide range of program components, it is impossible to tell which component most contributes to any positive effects, and therefore no unified approach exists to evaluate the evidence. In addition, much of the research testing being done in regards to school-based healthy lifestyle interventions has been conducted with elementary and middle school-aged children and not adolescents.

A review of existing school-based intervention research which focused on adolescent health behaviors was found to have been guided by cognitive behavioral theory (CBT), social cognitive theory (SCT), theory of planned behavior (TPB), social action theory (SAT), and SDT. While use of these models and theoretical frameworks has furthered the understanding of adolescent health behaviors, the use of SDT has been shown to support the utility of autonomy-supportive interventions to impact adolescent health behaviors by the indirect effects on behavior via motivational orientations (Chatzisarantis & Hagger, 2009). Autonomous motivation has been associated with enhanced learning and better adjustment in education, and maintained behavior change, more positive health status, and better mental health in medical care (Williams, 2002).

Advanced practice nurses and school nurses can work in collaboration with school staff to improve the health of adolescents and potentially provide feasible, acceptable, and efficacious healthy lifestyle adolescent interventions by using SDT intervention strategies to promote intrinsic motivation for healthy diet, physical activity, and self-care behaviors in this age group.

Specific Aims and Research Questions

Adolescents are at a critical developmental stage for physical, cognitive, social, and behavioral experimentation. Adolescence is a period of vulnerability to risk taking in their decision-making due to physical growth changes associated with puberty along with the emerging development of cognitive structures coupled with few real-life experiences to base decisions on and the susceptibility to peer influence (Steinberg, 2004). The AIM intervention builds on the strengths and addresses the limitations of previous intervention research with adolescents. This research utilizes a theoretical basis for the development of an intervention guided by theoretical principles related to three innate psychological needs for autonomy, competence, and relatedness (Ryan & Deci, 2000). This intervention provides adolescent health recommendations to adolescents in an autonomy-supportive environment, which provides rationale for why a behavior is being recommended and acknowledges feelings about doing the activity so they will feel understood, using language and style that involves minimal pressure and emphasizes choice rather than control (Deci, Eghrari, Patrick, & Leone, 1994; Deci, 1995).

To address a gap in the science of adolescent healthy lifestyle intervention research with high school-aged adolescents, the primary purpose of this proposed research is to evaluate preliminary outcomes of a school-based, theory-driven

intervention designed to promote intrinsic motivation for healthy diet, physical activity, and self-care behaviors in adolescents. Self Determination Theory (Ryan & Deci, 2000) provided a theoretical framework for the intervention and has been established to be effective in demonstrating that an autonomy-supportive environment is associated with positive health behavior outcomes (Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Ntoumanis, 2001; Vansteenkiste et al., 2004).

Research question 1. What are the preliminary effects on adolescent motivation beliefs for healthy lifestyle behaviors of a theory-based enhanced health curriculum based on the tenets of interest/enjoyment, perceived confidence, and perceived choice of 14- to 16-year-old adolescents receiving an enhanced curriculum as compared to adolescents receiving the usual health curriculum?

Research question 2. What are the preliminary effects of a theory-based, enhanced health curriculum on healthy lifestyle knowledge, nutrition, physical activity, and self-care behaviors of 14- to 16-year-old adolescents who receive the enhanced curriculum as compared to adolescents who receive the usual health curriculum?

CHAPTER 2. LITERATURE REVIEW

Overview

Although adolescents are thought to be one of the healthiest populations in the U.S., the unique physical, psychological, and developmental changes that take place in adolescence give rise to health risk factors and behaviors that can influence their short- and long-term health. Adolescence is a period of vulnerability. Developmentally, this period involves increasing independence as they become more responsible for their own habits and the initiation of adult behaviors (Steinberg, 2010). Adolescents take more risks than adults do; they are more influenced by peer pressure and live more in the present with little orientation to future consequences of their actions (Steinberg, 2004). The adolescent period also offers opportunity and challenge to healthcare professionals to assist the adolescent to develop and initiate positive health behaviors that can last into adulthood. The American Academy of Pediatrics (AAP) has developed and endorsed the *Bright Futures* guidelines (Hagan et al., 2008) for content of clinical preventive services for children and adolescents to be used in the primary care setting. A recent analysis shows the delivery of this content is low during provider visits (Irwin, Jr., Adams, Park, & Newacheck, 2009). In addition, adolescents do not seek preventive health care from primary care providers for many reasons including availability of and access to comprehensive health care as well as lack of insurance coverage, financial resources, and fears of lack of confidentiality when sensitive or legal issues are discussed (Cullen & Salganicoff, 2011; Mulye et al., 2009).

Much of the *Bright Futures* health information can be delivered in the classroom by teachers through the health education curriculum. School-based delivery of this

important information offers a unique opportunity to reach teens where they are most engaged—at school. Results of a critical appraisal of intervention research presented in Chapter 1 suggest that brief school-based programs focusing on health promotion and personal wellness can significantly improve health-related knowledge and outcomes; however, research also suggests that there is considerable variability in school-based program implementation, as well as the defining of outcome measures (Bickman et al., 2009). Theoretically informed programs are more effective in changing health behavior (Noar & Zimmerman, 2005), and theory-based interventions have been determined to be imperative for successful health behavior promotion (Lippke & Ziegelmann, 2008). A recent systematic review discovered that about one third of published health behavior research used theory to guide the research design and implementation, and a smaller portion of these studies applied theory rigorously (Painter et al., 2008).

This study developed and tested a theory-based intervention that provided health recommendations to adolescents based on *Bright Futures* guidelines within the context of high school health class. Given that behavior change can take years to establish and evaluate, developing and nurturing adolescent motivation to lead a healthy lifestyle is an approach that may provide adolescents with strategies to integrate new information on healthy behaviors before unhealthy and risky behaviors become habits. Habit formation is based on repetition of actions, which are part of everyday life. Habits reflect the cognitive, neurological, and motivational changes that occur when behavior is repeated (Wood, Tam, & Witt, 2005). Health education utilizes human motivation and voluntary commitment to foster healthy behaviors. Programs that target motivation as a major

input demonstrate success in accomplishing behavioral goals (Dunsmore & Goodson, 2006).

Theoretical History of Motivation

The construct of motivation has evolved from the drive to understand the physical aspects of behavior. Initially, theories of motivation focused on instinct, arousal, drive, and energy. Drive theories of the 1930s and 1940s examined motivation as physiological deficits or biological needs that prompted behaviors in order to maintain homeostasis, or balance. Cognitive aspects of behavior were unimportant in this view. For example, hunger is a drive; therefore a person is motivated to eat in order to restore the body's balance (Weiner, 1990). Behaviorism arose in the early 1930s in response to discontent with the prevailing psychoanalytic approach developed by Freud, which drew much of its conclusions from retrospective work with adult patients and largely ignored behavior (Vaughan & Litt, 1990). Behaviorism is concerned with developing rules from repeated observations of demonstrable behaviors (Graham, 2010). In the 1950s, through the work of Pavlov and Skinner, behavior was thought to be determined by consequences and reinforcements (Kearsley, 2010). Also in this period, Kurt Lewin developed his field theory, suggesting that motivation for behavior depends on the value that is placed on the goal, as well as the probability of achieving that goal (Smith, 2001). Later in the 1950s, John Atkinson (1957) developed a model to explain how motivation to accomplish a specific goal and avoid failure influences behavior. This line of thought and reasoning moved away from the view of consequences and reinforcements that previous models employed (Atkinson, 1957).

Starting in the 1960s, cognitive models began to look to the influence of mental processes as motivation for behaviors. Cognitive tradition sought to identify the mental processes behind the behavior, and the environmental and biological factors that influence behavior indirectly. Factors such as beliefs, emotions, and self-efficacy became variables, and motivation was linked to choice and persistence (Dunsmore & Goodson, 2006; Weiner, 1990). Albert Bandura is considered the father of cognitive theory, as his model gives a central role to the cognitive aspects of the individual, where human functioning is a dynamic interplay of personal, behavioral, and environmental influences (Pajares, 2004). Cognitive models seek to discover how motivation translates into behavior. This was an important shift in thinking for educators interested in individuals who do not perform well in the classroom, as well as health professionals interested in health behaviors of individuals. During this time, research moved from the behaviorist model in which subjects were mostly animals and researchers viewed behavior as a consequence of stimuli from the environment, to the cognitive model, in which participants are human and behavior is seen as being traced to the mental processes that influence actions (Dunsmore & Goodson, 2006; Weiner, 1990).

Review of Selected Health Promotion Models

The Health Belief Model (HBM; Rosenstock, 1974) is a cognitive approach to health behavior, which uses motivation, among other factors, to explain a person's engagement in preventive behavior. This framework is based on the assumption that once an individual is aware of a health risk, motivation for behavior is based on the costs and benefits associated with the behavior. Motivation to act (or not) is based on six constructs of the theory: (a) perceived susceptibility, (b) perceived severity, (c) perceived

benefits, (d) perceived barriers, (e) cues to action, and (f) health motivation (Armitage & Conner, 2000). Research suggests that the constructs of this theory prediction of future behavior are not relevant with the adolescent or young adult population (Brown, DiClemente, & Reynolds, 1991; Zak-Place & Stern, 2004).

The transtheoretical (or stages of change) model was developed by Prochaska and colleagues (1977). The transtheoretical model is concerned with the concept of readiness for behaviors. Change is a process that can be measured by stages: (a) precontemplation, (b) contemplation, (c) preparation, (d) action, and (e) maintenance. In this framework, motivation is not a factor, but rather the focus is on the individual's level of readiness to change behavior. However, a person's readiness to change can be interpreted as an indicator of motivation, and the level of readiness can be interpreted as the level of motivation for change.

The theory of planned behavior (TPB) began with the theory of reasoned action (TRA) and was designed to predict a person's intention to engage in a behavior (Ajzen, 1991). This model states that behavioral intentions are influenced by the attitude about the likelihood that the behavior will have on the expected outcome and the subjective evaluation of the risks and benefits; that is, if the behavior is valued and expected to produce favorable results, the person will be more motivated to conduct the behavior. While this approach has success in predicting behavior, it assumes that the person has the opportunities and resources to be successful in performing the desired behavior, regardless of the intention (Ajzen, 2006).

Social cognitive theory (SCT) was developed by Alfred Bandura (1993). This framework states that personal, behavioral, and environmental factors influence behavior

with reciprocal causality. In this view, the confidence one has in the ability to perform a behavior is the most necessary motivational factor that moves one to action. In the perspective of social cognitive theorists, specific behaviors are conducted because they are positively reinforced, and new behaviors are learned by observing the reinforcements that others receive for behavior (Dunsmore & Goodson, 2006).

After reviewing selected theories and health promotion models related to motivation, SDT supports and guides this adolescent intervention research study the best.

Theoretical Framework Using Self-Determination Theory

SDT assumes that people have the basic psychological needs of relatedness, competence, and autonomy (Deci & Ryan, 1985). Attempts to meet these needs form the basis for motivation, which is classified as intrinsic and extrinsic. This view offers a broad perspective on human behavior and acknowledges that both the role of the person and the role of their environment influence one's motivation. SDT may provide a framework to better understand adolescent motivation in regards to specific health-related behaviors by addressing developmental needs of autonomy, competence, and relatedness to others.

A review of health promotion research by Dunsmore and Goodson (2006) found contemporary motivational literature employing the concepts of extrinsic and intrinsic reinforcements without much consensus on the defining and measurable characteristics of these constructs. Accordingly, behavioral intention became equated with motivation, which became viewed as an important determinant of behavior. Current theories are based on interrelated cognitions and goal achievement, as well as reinforcements for behaviors. Of the reviewed intervention research, just 9% provided a definition of

motivation, and just 25% specifically measured motivation despite having the term *motivation* in the title or abstract, which suggests a lack of theoretical consensus in terms of conceptual definitions of motivation and its constructs.

Describing the theory and constructs. SDT (Deci & Ryan, 1985) recognizes that people engage in behaviors for many different reasons, and behavior is based on motivation. Deci and Ryan (1985) developed SDT in an attempt to explain individual differences in motivation and behavior. Actions result from the individual; however, whether the person acts out of their own internal interests (intrinsic) or out of external pressure or coercion (extrinsic) is the situation of interest. Intrinsic motivation refers to doing an activity for the inherent satisfaction of the activity itself and is theorized to be regulated by interest, enjoyment, and satisfaction. Extrinsic motivation refers to the performance of an activity in order to attain some separable outcome and is theorized to be regulated by compliance, rewards, and punishments. According to Deci (1995), it is necessary that individuals see a connection between their behavior and the desired outcome; otherwise they will lack motivation if they do not believe that their behavior will lead to something they desire. Although most activities (behaviors) are initiated with both intrinsic and extrinsic motives, research indicates that regardless of one's initial motive, intrinsic motivation is critical for adherence (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). It is hypothesized that intrinsic motivation maintains behavior change and increases positive health outcomes (Williams, 2002).

SDT identifies three basic psychological needs that are essential conditions for healthy development of an individual: (a) autonomy, (b) competence, and (c) relatedness to others. Autonomy refers to action from one's own volition and integrated values.

Competence refers to a felt sense of effectance (the ability to communicate and cause change) and confidence. Relatedness refers to having a sense of belongingness both with other individuals and one's community. Perceived competence and relatedness mediate enhanced intrinsic motivation; however, behavior must be experienced as self-determined for intrinsic motivation to be present (Ryan & Deci, 2000). The elements of autonomy support were isolated in research by Deci et al. (1994), and they propose that providing a rationale, acknowledging feelings, and conveying choice compose autonomy support. Autonomy, relatedness, and competence promote internalization of the behavior. In the case of improving health through autonomy support with regards to the delivery of AIM, the key components are (a) to provide a meaningful rationale for why a behavior is being recommended so the individual will understand the personal importance of the behavior for themselves, (b) to acknowledge the individual's feelings and perspectives so they will feel understood, and (c) to use a style that emphasizes choice and minimizes control so the individual will not feel pressured to behave (Williams, 2002). Interventions that present materials in an autonomy-supportive environment have been shown to create more intrinsic motivation for a task, and intrinsic motivation leads to adoption of healthy behavior (Williams, 2002). SDT proposes that the social environment can facilitate or hinder intrinsic motivation by supporting or impeding the innate psychological needs of people (Deci, 1995). Studies demonstrate that environments that utilize controlling expectations which encourage extrinsic motivation prevent intrinsic motivation, in comparison to environments that recognize feelings, choice, and opportunities for self-direction that enhance intrinsic motivation (Roark & Ellis, 2009).

The AIM intervention was delivered in an autonomy-supportive environment (addressing autonomy, competence, and relatedness) to promote internalization of the recommendations set forth in the components (nutrition, physical activity, self-care), which may lead to intrinsic motivation to follow the recommendations for healthy lifestyle behaviors in these areas (see Figure 1). Components for the intervention were selected from the *Bright Futures* recommendations as described previously. For nutrition, eating breakfast and avoiding sugary drinks were the recommendations that were introduced. The physical activity recommendations included 60 minutes of daily physical activity along with avoiding sedentary nonacademic screen time. Self-care recommendations consisted of improving the sleep environment and obtaining adequate sleep each night. The AIM intervention was designed to be delivered in a classroom environment using the basic tenets of autonomy, relatedness, and competence as defined by SDT. Delivery of the healthy lifestyle recommendations in this environment is theorized to influence the domains of motivation for behaviors including interest/enjoyment, perceived choice, and perceived competence, which will in turn motivate the behavior to internalize and maintain these healthy lifestyle behavior recommendations.

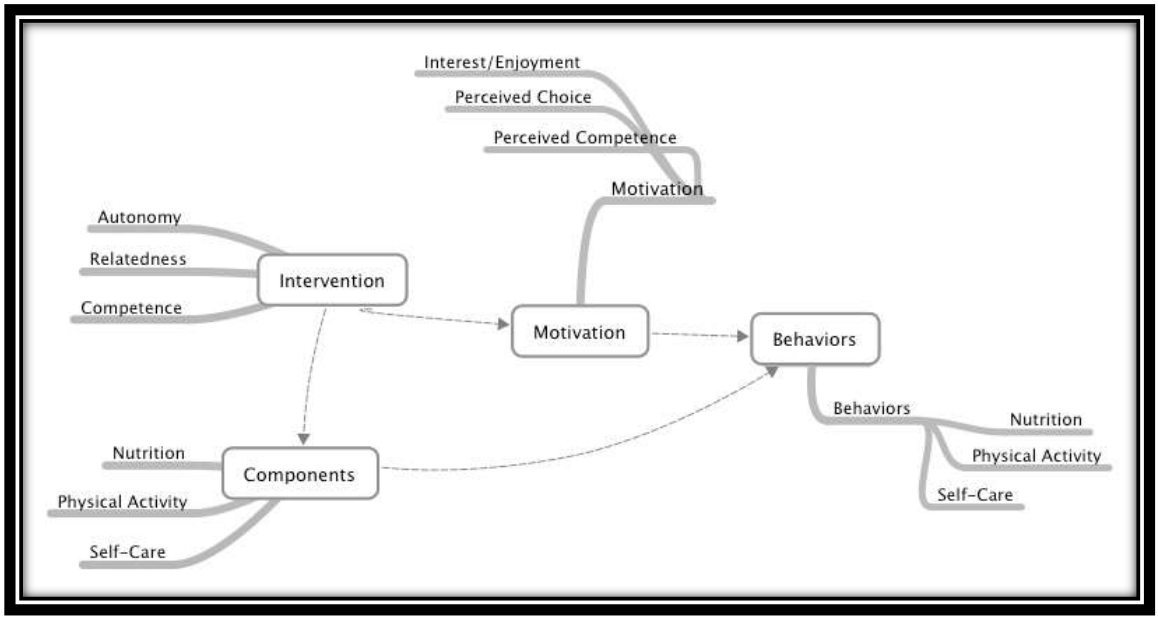


Figure 1. Conceptual framework for the AIM intervention.

Support for SDT and Intrinsic Motivation in Healthy Lifestyle Interventions

Physical activity. Research suggests that intrinsic motivation is positively associated with satisfaction, enjoyment, feelings of competence, and a desire to adopt healthy lifestyle behaviors related to physical activity. A study of male soccer players (mean age 20.38 years) examined the impact of a performance profiling intervention repeated three times over six weeks on the athletes' intrinsic motivation for the sport (Weston, Greenlees, & Thelwell, 2011). Intrinsic motivation for the sport was found to be significantly higher in the profiling group in comparison to an education only group. Intrinsic motivation was positively related to student enjoyment, perceived effort, and physical activity behaviors in a study of 286 middle school students (Zhang, 2009). A study of 292 athletes (mean age 19.53) indicated that when coaches provided an autonomy-supportive coaching style to their athletes, it positively impacted the athletes'

autonomous motivation, which showed an association of pro-social behavior toward their teammates (Hodge & Lonsdale, 2011).

Nutrition. Few studies were found that examined the role of intrinsic motivation and healthy lifestyle recommendations related to nutrition, which includes eating breakfast. Most of the nutrition intervention studies were conducted with adult populations. One such study by Silva et al. (2010) found increased weight loss and higher physical activity in a group receiving an SDT-based intervention (including the domains of eating and improving diet, along with physical activity) compared to the control group for weight control in 239 women (mean age 37.6 years). Several studies have explored children's attitudes towards breakfast as a predictor of actually eating breakfast. A pilot study of 2,495 9- to 11-year-old children by Tapper et al. (2008) found that participants who skipped breakfast showed more negative attitudes toward breakfast. Positive attitude towards eating breakfast was associated with more frequent breakfast consumption in a study by Martens, van Assema, and Brug (2005) in 12- to 14-year-old Dutch students, as well as by Unsan, Sanlier, and Danisk (2006) in 9- to 10-year-old Turkish and German students. In a study by Vierling, Standage, and Treasure (2007) of 237 students in grades 5-8 (mean age 12.11 years), autonomous motivation positively predicted both behavior and positive attitudes toward an activity. Therefore, this study will build on existing knowledge about the relationship between attitude and autonomous motivation, and expand this into the domain of nutrition, specifically consumption of breakfast and avoidance of sugary drinks in adolescents.

Self-care. No studies were found that explored the role of intrinsic motivation and healthy lifestyle behaviors related to adolescent recommendations for self-care,

specifically sleep. Adolescent sleep hygiene has not received much attention in the existing literature, yet the impact of insufficient sleep on adolescents is important, as explained in Chapter 1. The AIM intervention introduced the *Bright Futures* recommendations for adolescent sleep, as well as sleep hygiene practices that are shown to promote healthy sleep habits for adolescents. The inclusion of sleep recommendations via the AIM intervention addresses gaps in the literature and improves upon previous research in this important area by presenting this information in an autonomy-supportive context.

Support for SDT in Adolescent School-Based Healthy Lifestyle Interventions

An additional recent systematic search of the literature was conducted to determine the current evidence on school-based adolescent healthy lifestyle interventions specifically using SDT. Using a combination of MH and/or MeSH of (*nutrition* OR *physical activity* OR *self-care*) AND intervention AND *high school* yielded 107 hits. When the limits of *English*, *adolescent 13-18 years*, and *published in the last 10 years* were applied, 21 remained, with only 12 that were conducted during the school day. Of those 12, only three were found to use SDT as a theoretical framework (Chatzisarantis & Gagger, 2009; Spruijt-Metz et al., 2008; Vansteenkiste et al. 2004). These studies are outlined in Appendix A.

The appraised research outlined suggests that SDT can provide a useful framework for development and delivery of school-based interventions that positively impact adolescent motivation and behavior.

CHAPTER 3. METHODOLOGY

Study Aims

This study is designed to (a) evaluate preliminary effects of the autonomy-supportive intervention delivered in the classroom setting on adolescent motivation beliefs of study participants; and (c) evaluate preliminary effects of the intervention on nutrition, physical activity, self-care behaviors, and healthy lifestyle knowledge of study participants.

The AIM intervention builds upon the basic psychological needs of adolescents for autonomy, relatedness, and competence, presenting adolescent health recommendations in an autonomy-supportive environment. An overview of the study design, a discussion of the intervention, and the proposed outcome variables for the study, along with a discussion of validity and reliability of these measured outcomes as they relate to methodological rigor are detailed in this chapter.

Study Design

Initiation of the study commenced after approval from the Institutional Review Board (IRB) at Arizona State University and the Noble High School administration. For this pilot study, six high school health classrooms were utilized to recruit the study participants. Students were assigned to a health classroom at the beginning of the school semester by the school administration. Three classrooms received the usual health curriculum delivered by a health teacher along with the AIM intervention delivered by the principal investigator (PI). The other three classrooms received the usual health curriculum delivered by a high school health teacher. A randomized control trial design constitutes the most rigorous research design for intervention studies (Salmond, 2008).

True random sampling from the student population was not possible. However, the classrooms were assigned a treatment condition, either the AIM intervention content (treatment), or the usual health content (control) by the flip of a coin. As a small, experimental pilot study guided by SDT (see Chapter 2), this study evaluated how the main components of the AIM intervention can be delivered in a classroom setting with adolescent participants.

Clear and appropriate research design also includes clearly defined outcome variables and a standardized approach for measurement. Outcome variables for this study have been chosen using the tenets of intrinsic motivation as defined by SDT, and include the self-report measurement of three subscales of intrinsic motivation (interest/enjoyment, perceived competence, and perceived choice) regarding the performance each behavioral component, as well as behavioral outcomes. Specific behavioral outcome variables to be measured include: (a) eating breakfast, (b) avoiding the consumption of SSBs, (c) frequency and intensity of daily physical activity, (d) time spent daily in sedentary activity and nonacademic screen time, and (e) hours of sleep per day.

Setting. The study took place at Noble High School, the second largest high school in York County, Maine. Rural School Unit (RSU) #60 is situated in York County in southern Maine, a school district comprised of three towns: North Berwick, Berwick, and Lebanon. These rural towns are spread over a large geographic area with large socioeconomic diversity. Current school enrollment is 998 students, with 48% of district students enrolled in the free and reduced lunch program. The school population is racially homogenous with 98% identifying as white, non-Hispanic.

The classroom setting was a traditional room within the high school with desks and chairs for the students, a large white board in the front of the classroom, and overhead projection available. Class period was 45 minutes in duration during first or third period in the day on Thursdays. Due to the block scheduling at the high school, each class AIM intervention session met every other week, with the control class sessions also meeting the opposing week. Classroom size ranged from nine to 18 students.

Sample. The sample included students enrolled at Noble High School in North Berwick, Maine. To meet graduation requirements, all students in this school district must successfully complete two semesters of health class. The health classes are typically taken when the student is in grades 9 and 11. Occasionally a student will not successfully complete the class in grade 9, resulting in grade 10, 11, and 12 students in the grade 9 health classes. However, most of the students were in grade 9. It was expected that once students are enrolled in the course, attrition rates would be low. When students have unexcused absences from class, an intensive follow-up on the student is initiated by school personnel to locate and identify why the student is absent.

Inclusion criteria included the following: (a) enrolled in 9th grade health class for the semester; (b) 14-17 years of age, any gender, race, ethnicity, or socioeconomic status; and (c) English speaking and able to read English at the 6th grade level. No eligible student was excluded. A power analysis is not necessarily performed for sample size (Arain, Campbell, Cooper, & Lancaster, 2010). However, a power analysis was conducted for this study to determine the necessary number of participants needed to detect significant preliminary effects of the intervention. A total of 30 participants group sample size will give a power of 0.4% at 0.10 significance level for two groups. Figure 2

describes the effect of sample size on power for a given alpha level of 0.10 for 2 groups and a Root Mean Squares Effect is 0.25.

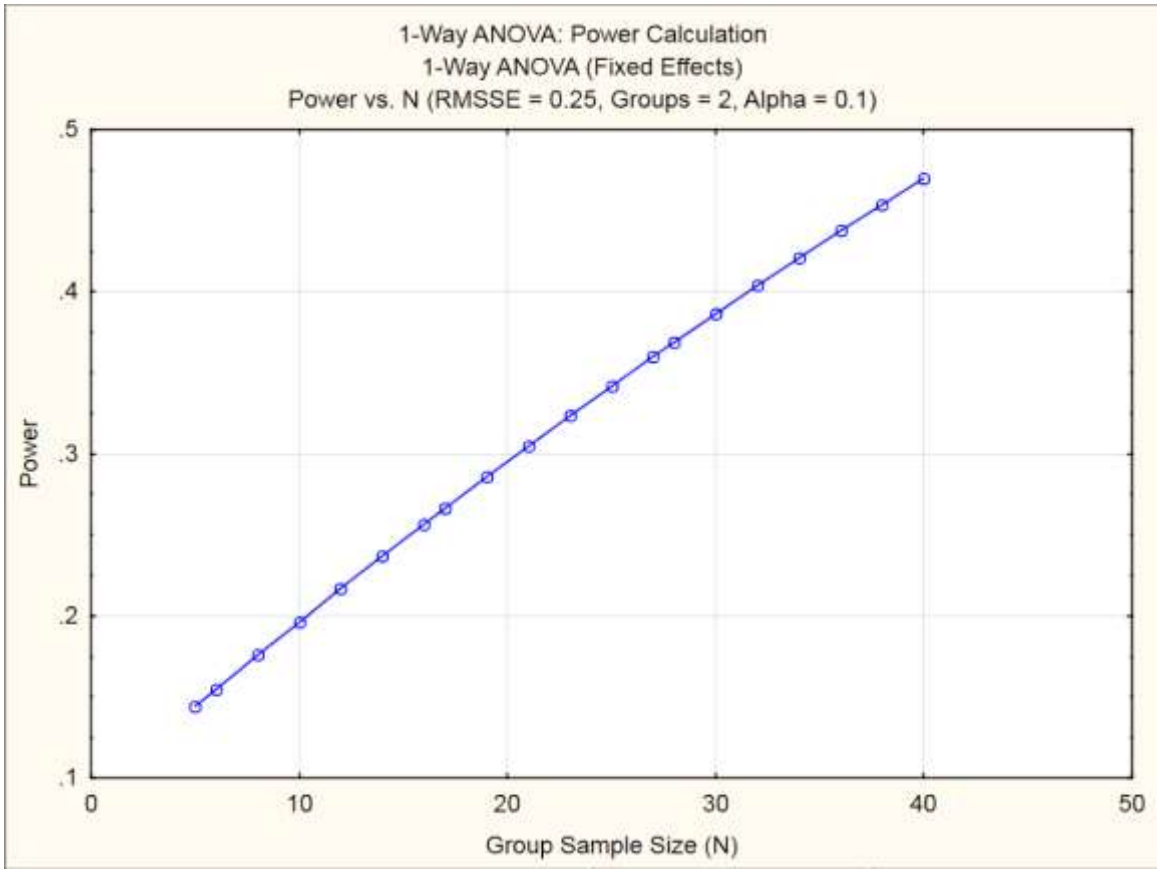


Figure 2. Power analysis.

The experimental class receiving the AIM intervention was randomly assigned by flip of a coin. The teachers of either classroom were blinded as to classroom conditions until school began. Once the AIM intervention was initiated in the experimental classrooms, school staff was no longer blinded to condition as the PI was the only interventionist for the AIM intervention.

The intervention. Key components of SDT were incorporated into the AIM intervention to create and deliver all module contents in an autonomy-supportive environment. According to Deci (1995), an autonomy-supportive environment includes (a) providing a meaningful rationale for why a behavior is being recommended so the students will understand the personal importance of the behavior for themselves, (b) acknowledging the individual's feelings and perspectives so the students will feel understood, and (c) using a delivery style that emphasizes choice and minimizes control so the students do not feel pressured or coerced to behave in specific ways. Intervention critical inputs as defined by SDT build upon three basic psychological needs of (a) autonomy, acting from one's own volition and integrated values; (b) relatedness, having a sense of belongingness both with other individuals and the community; and (c) competence, a felt sense of the ability to communicate and cause change (effectance). The AIM intervention consists of three classroom modules based on *Bright Futures* (Hagan et al., 2008) adolescent health recommendations for nutrition, physical activity, and self-care (see Appendix B). The PI also attended class with the control group classrooms for the same number of classroom sessions as a guest, visiting classes during health topics for adolescents who are not included in the primary intervention components in the AIM program modules to control the effects of time and attention. The difference between the two groups was the content of the sessions and the delivery of material. In the control group classrooms, the PI moderated an informational question and answer period but did not use the theoretical components of an autonomy-supportive environment to deliver information.

Pre-intervention assent and consent procedure. Initiation of the study began after approval from the IRB at Arizona State University and local school administration. Participant recruitment was conducted during classroom time prior to commencement of the intervention, after adolescent assent and parental consent is obtained.

All students in all six health classes were invited to take part in the study. The PI went into each health classroom at the beginning of the semester to briefly describe the study to the students. All six health classes were used in the study: three control classrooms and three treatment classrooms. Since the PI was in both the control and treatment classrooms for equal time and interactions with the students, it is anticipated that the attention control group was not influenced by the PI's presence or delivery of the AIM intervention. Letters were sent home with the students to parents or legal guardians of eligible students. A phone number was included in the explanatory letter for parents to call if they had any questions about the study or if any questions arose during any point in the study. Students who met eligibility requirements, had given assent, and submitted written parental consent were able to participate in the study. The consent explained that there may be no direct benefit to the student; however, the possible benefits of participation includes better knowledge of adolescent health recommendations and more interest in following these recommendations.

Potential study participants and their parents/legal guardians were assured that student participation was voluntary and the student was free to withdraw from the study at any time without any adverse effects to the student's grade for the class. The intervention was delivered in the health class to all students; however, only participants of the study with signed consent and assent forms completed the data collection measures.

Although students were able to withdraw from the study, students could not withdraw from the health class; therefore those students who wished to withdraw from the study still received the intervention in the AIM group classrooms but did not participate in the data collection. There were no student withdrawals during the study.

Intervention modules.

Baseline data collection (T1). All six classrooms received traditional health curriculum; however, three classrooms that were randomly assigned received, in addition, the AIM modules. In both conditions, students completed all data collection instruments. All instruments were self-report and are described in detail in the following Measures section, with the addition of a Demographics Survey completed only at Time 1. One entire class period was dedicated to introduction and instrument data collection; each instrument took no longer than 10 minutes to complete. Students not participating in the study worked on other classroom activities assigned by the teacher during the time of data collection.

Class 1, module 1, nutrition. *Bright Futures* (Hagan et al., 2008) nutrition recommendations for adolescents introduced were (a) to eat with family; (b) to eat three meals a day, especially breakfast; and (c) making healthy food choices (data was collected on breakfast consumption and SSB consumption only). This module provided a meaningful rationale for why a behavior was being recommended so students would understand the personal importance of the behavior for themselves. The class then divided into and worked in small groups to find the errors in a nutrition fact sheet that was provided. Allowing students to work together encouraged relatedness. The module concluded with exploration of the recommendations, acknowledgment of feelings and

perspectives so the student would feel understood, along with a discussion of the importance of knowing the family medical history. Students were asked to obtain a medical history from a parent or guardian, and return with the completed history before the next class. This assignment used a style that emphasized choice and minimized control, while cultivating autonomy, relatedness, and competence.

Class 2, module 2, physical activity. *Bright Futures* (Hagan et al., 2008) recommendations for adolescents to be physically active 60 minutes per day most days and limiting sedentary behaviors such as non-academic screen time to less than two hours per day were discussed. Meaningful rationales for why physical activity was being recommended were focused on so the students would understand the personal importance of the behavior for themselves. The class then divided into and worked as small groups to discuss and record barriers to daily physical activity as well as creative ways to be physically active. Finding and evaluating reliable internet sources that focus on physical activity were discussed. Emphasis was placed on acknowledging feelings and perspectives, so the students would feel understood. Using a style that emphasizes choice and minimizes control, students were asked to complete a physical activity fact sheet with a parent or adult, referencing reliable internet resources.

Class 3, module 3, self-care. *Bright Futures* (Hagan et al., 2008) recommendations for adolescents for the promotion of safety and injury prevention along with CDC recommendations for sleep were presented. Meaningful rationales for why behaviors are recommended were discussed, so the students would understand the personal importance of the behaviors for themselves. The class then divided into and worked in small groups to identify ways that students could create habits for better sleep.

This activity acknowledged the students' feelings and perspectives, so they would feel understood. Using a style that emphasized choice and minimized control, students were asked to find the errors in a sleep fact sheet.

Class 4, post-intervention data collection. This session reviewed all concepts and brought closure to the intervention and control sessions. In both groups, students completed all data collection instruments as described in the following Measures section. Each instrument took no longer than 10 minutes for the students to complete.

Content of the usual health curriculum. In the usual health curriculum control classrooms, curriculum content focused on topics such as (a) communication; (b) SMART (specific, measurable, attainable, realistic, and timely) goal setting; (c) identifying personal stressors and stress relief; (d) alternate ways of dealing with stress; (e) types of drugs and their impact on the human body; (f) addiction and the brain; (g) mental illness, anxiety, and depression; (h) suicide *lifelines*; (i) nutrition; (j) internet safety; and (k) secret signs of STDs. Each health teacher develops their own curriculum around these topics, using their own particular teaching methods and style in order to meet state health education requirements. Each teacher decides how much time the class will spend on a topic and how the information is delivered to the students. In-class homework, out-of-class homework, exams, and student presentations are the means to evaluate progression and satisfactory completion of the health course. Some threats to validity occur with this format, as it is not clear what the content of the health curriculum for each teacher contains and how it is presented by the individual teacher.

AIM intervention length. A total of three classroom sessions of 40 minutes in length were required to complete the AIM intervention. The program was designed to

deliver the AIM module contents in face-to-face classroom sessions, utilizing an entire class period for all sessions. Health teachers were present during each class for continuity and to help maintain integrity of the class. Each module was designed to be delivered in one class period, and modules were delivered in order during one school semester. According to a block schedule, classes meet every other day with a late start schedule on Thursdays. Modules were delivered by the PI every other week on Thursdays, alternating weeks for treatment and control classes. All intervention content was delivered by the PI for the treatment group; health teachers delivered traditional health curriculum on all other classroom days. Health teachers delivered traditional health curriculum to the control group, with the PI present for question and answer sessions only. The PI was a guest in the control classrooms acting as an expert in health matters for the classes devoted to depression, suicide lifelines, and sexually transmitted infections.

Intervention fidelity. Intervention fidelity is essential to validity in intervention research, and is defined as the extent to which the intervention is faithful to the pre-stated intervention model (Santacroce, Maccarelli, & Grey, 2004). Validity refers to data that are not only reliable, but also true and accurate (Fisher & Foreit, 2002). Researchers define two types of validity: (a) internal validity refers to the soundness of conclusions about the intervention's effect on an outcome that are not due to other factors, (b) external validity refers to the extent that the results of a study can be generalized to other settings or groups (Fisher & Foreit, 2002). A design with high internal validity will allow the researcher to better understand if the intervention actually makes a difference in a particular setting. The key to internal validity is the degree to which the groups are

comparable before the study. A randomization check was conducted with an independent *t*-test by group analysis on motivation belief, behavioral, and healthy behavior knowledge variables by control versus treatment groups for Time 1 (baseline). The analyses revealed no significant differences between the two groups for any individual behaviors and for interest/enjoyment beliefs overall.

Methodologic components of the technology model of intervention fidelity will be followed (Santacroce et al., 2004). Features of this model include (a) development of a manual, (b) training and supervision of staff delivering the intervention to deliver as uniformly as possible, (c) regular monitoring of intervention delivery using a measure of intervention fidelity, and (d) inclusion of the measurement in analysis (Carroll et al., 2000; Santacroce et al., 2004).

Intervention manual development lays out the theory, goals, and strategies for achieving the delivery of the intervention in the most consistent and rigorous manner. Advantages of an intervention manual include improved consistency and precise delivery, as well as faithful inclusion of key elements of the intervention (Santacroce et al., 2004).

Evaluation of fidelity is often based on observation of intervention sessions (Santacroce et al., 2004). In this study the PI delivered the AIM intervention and the school nurse performed evaluation of the fidelity of the delivery using a developed evaluation form to monitor the autonomy-supportive language (see Appendix C). The school nurse did not have access to any of the participant data. Regular monitoring of the delivery of sessions is important as it addressed critical issues of internal validity such as; if the sessions were implemented according to manual guidelines, were the sessions that were evaluated able to be distinguished from each other, and if the sessions overlap

(Carroll et al., 2000). Guided by SDT, the fidelity evaluation form monitored (a) providing a rationale through meaningful arguments that endorse the health benefits of the recommendations (e.g., the reason is because…); (b) acknowledging with empathy the students' perspectives and difficulties (e.g., asking questions to understand their wants and needs, as well as listening to the students); and (c) using language that allows a sense of choice, provides an invitation, and minimizes pressure (e.g., you can, you might, if you choose, you are asked to), versus controlling language (e.g., you should, you have to, you better, you must) (Vansteenkiste et al., 2004). Direct observation of the control classrooms using a behavioral checklist was conducted three times during the study period to monitor inadvertent use of intervention materials by classroom teachers.

Intervention fidelity becomes very important in the interpretation of the results. Since analysis of outcomes of the study relies on appropriate delivery of the intervention, it is important to maximize validity in order to demonstrate that the results of the study are the result of the intervention itself instead of due to extraneous factors.

Measures

It is important to identify a standardized approach for measuring variables (Salmond, 2008). Reliable and validated instruments were used for all outcome variables. Quantitative data will be collected during health class at Time 1 (baseline) and Time 2 (post-intervention) for motivation, behavioral, and knowledge variables. All measures can be found in Appendix C.

Motivation. The IMI (Plant & Ryan, 1985; Ryan, 1982; Ryan, Mims, & Koestner, 1983) consists of four subscales used to measure participants' subjective experience related to a target activity and can be modified slightly to fit specific activities.

Three of the subscales were used in this study: the interest/enjoyment subscale is considered the self-report measure of intrinsic motivation (*a*= .78); the perceived choice (*a*=.84) and perceived competence (*a*=.8) subscales are considered positive predictors of both self-report and behavioral measures of intrinsic motivation. The IMI was modified for each behavioral outcome (eating breakfast, consuming SSBs, physical activity, sedentary time, and sleep habits) (see Appendix C). Alpha coefficient analyses were not run on the adapted scales.

Behavioral measures. *Bright Futures* outcomes were measured on one instrument for all behavioral measures using a Likert-type scale (see Appendix C). This instrument was created using Likert-type scale questions based on the CDC YRBS questions and the Patient-Centered Assessment and Counseling for Exercise Plus Nutrition (PACE+) Adolescent Physical Activity Measure as described below. Content validity for this has been obtained from adolescent experts and discussed below.

Nutrition. Because this study mainly measured eating breakfast and SSB consumption and no other dietary markers, the brief Likert-type scale question based on the CDC (2015) YRBS format was used. The frequency of adolescents eating breakfast has been assessed in previous studies using one question: How many times a week (including weekdays and weekends) do you eat breakfast (Berkey, Rockett, Gillman, Field, & Colditz, 2003; Croezen et al., 2009; Keshki-Rahkonen, Kaprio, Rissanen, Virkkunen, & Rose, 2003; Keshki-Rahkonen, Viken, Kaprio, Rissanen, & Rose, 2004)? Response categories range from 0 to 7 days per week on a Likert-type scale. The consumption of SSBs in children and adolescents has been assessed in previous studies using methods similar to those used in the CDC's YRBS (Park et al., 2011). Other

studies extracted questions regarding SSBs as a secondary analysis from a longer dietary recall instrument that had been collected for previous larger study (Berkey et al., 2004; Forshee, Anderson, & Storey, 2004; Gillis & Bar-Or, 2003).

Physical activity. The Patient-Centered Assessment and Counseling for Exercise Plus Nutrition (PACE+) Adolescent Physical Activity Measure (Prochaska et al., 2001) is a brief physical activity screening measure for use with adolescents in primary care settings (see Appendix C). This measure was found to be reliable (intraclass correlation = .77) and has demonstrated significant correlation with accelerometer data (Prochaska et al., 2001). Because this study primarily measured time spent in physical and sedentary activities and no other markers, the brief Likert-type scale question based on the CDC (2015) YRBS format was used, including separate questions for physical activity and sedentary behaviors.

Sleep. As this study primarily measured hours spent in night sleep and no other sleep markers, the brief Likert-type scale question based on the CDC (2015) YRBS format was used.

***Healthy lifestyle knowledge*.** In order to establish content validity for the Healthy Behavior Knowledge instrument we first identified the overall content to be represented as related to healthy eating, physical activity, and sleep habits. Items were then randomly chosen from reliable sources that accurately represented the information in all areas. The instrument was then reviewed by the school nurses, the health teachers, and a university academic committee.

A brief 20-item questionnaire containing questions was developed. Participants respond yes, no, or I don't know to the questions such as: "Being active can give you

more energy," "Your brain rests during sleep," "Eating sugar causes diabetes." Correct responses were summed for the total knowledge score.

Data processing and management. Participant information files were assigned an identification number (the school student ID number) which was used on all data. A master codebook was established electronically on a dedicated password protected laptop. All files and the dedicated laptop were stored separately in locked cabinets in the PI's office. Completed data collection forms were reviewed immediately for missing information before the students left the classroom; the students then had the opportunity to complete the missing question or indicate they prefer not to answer the question. Data were entered by the PI into SPSS predictive analytic software (SPSS, version 20) and verified for accuracy. Consistent codes were used to indicate that a value is missing in a data field. All data were checked against raw data forms for verification and double entered. We also used aggregate functions to be sure there were no duplicate entries looking at participant number and standard deviations across all combinations of variables. The data were protected by computer virus and hacking protection, password protection of systems and files, with frequent backup and archiving of information. A master dataset, which assembled all the data, was then entered into Statistica by StatSoft version 12 (2015), from which all analyses were conducted.

A Chi-square analysis was run on all demographic data at Time 1 for internal validity, to assess for significant differences between the groups. A randomization check was conducted at Time 1 with an independent *t*-test by group analysis on motivation belief and all behavioral variables as well as healthy lifestyle knowledge scores by control versus treatment groups. To test our hypothesis that there would be a

significantly greater increase on intrinsic motivation belief scores between Time 1 and Time 2 for the treatment group compared to the control group ANOVA models were used. This method assessed for a main effect, that participants within each group reported different levels of motivation beliefs at each time point. This method also tested for a main effect, detecting if participants at each time point reported different levels of motivation beliefs within each group. This assessed for an interaction effect, to detect any differences in means on the groups which would result in a difference in means for motivation belief scores between Time 1 and Time 2 that varied depending on which group the participant was in.

CHAPTER 4. DATA COLLECTION AND ANALYSIS

Results

Sample description. Students meeting inclusion criteria were identified and recruited during spring semester 2014 from 9th grade health class rosters at Noble High School. Delivery of the AIM and control sessions was completed by June 13, 2014. The total number of classroom sessions for both groups was five, including two sessions for data collection and three sessions of intervention (the AIM intervention for the treatment group and guest sessions for the control group). No students withdrew from the study after the study began.

Demographic characteristics of study participants are summarized in Table 2. Treatment and control participants at baseline were compared by x^2 analysis. There were no significant differences between the treatment and control group participants for age, race, and grade; most participants were white and in the 9th grade. However, compared with control participants, there was a significant difference in gender (x^2=5.51, p=.06), indicating more male participants than female in the treatment group. There were no significant differences in healthy behavior knowledge or any of the behavioral variables.

A significant difference also was noted between the control and treatment groups for free/reduced lunch participation (x^2=5.21, p=.02), showing a greater number of students who participate in this program in the treatment group. For this study overall, the number of participants who self-reported receiving free or reduced lunch is less than the school average (32% versus 42.3%). However, this may be because the participating students may not know if they receive food assistance. Each student presents identical payment cards for lunch, and it is quite possible the students do not know whether their

parent deposits money onto the card or if they receive food assistance through the Supplemental Nutrition Assistance Program (SNAP). Interestingly, 8% of participants reported food insecurity due to finances. The majority of participants (70%) report themselves as being in good or very good health.

Table 2

Characteristics of Participants at Baseline by Group

Characteristic	Total N(%)	Control N(%)	Treatment N(%)	X^2	*df*	*p*=
Total:	63(100)	24(38)	39(62)			
Gender:				5.51	2	.06
Male	37(59)	11(46)	26(66)	NS		
Female	21(33)	13(54)	8(21)	NS		
Trans	1(1)	0	1(3)	NS		
Blank	4(7)	0	4(10)	NS		
Age:						
14	26(41)	11(46)	15(39)	NS		
15	26(41)	10(42)	16(41)	NS		
16	8(13)	3(12)	5(13)	NS		
Blank	3(5)	0	3(7)	NS		
Race:						
White	55(87)	21(87)	34(87)	NS		
Black	2(3)	1(4)	1(3)	NS		
American	1(2)	0	1(3)	NS		
Indian	1(2)	1(4)	0	NS		
Asian	1(2)	1(4)	0	NS		
Hispanic	3(4)	0	3(7)	NS		
blank						
Teacher:						
1	16(24)	5(21)	11(28)	NS		
2	23(38)	5(21)	18(46)	NS		
3	24(38)	14(58)	10(26)	NS		
Grade:						
9	55(87)	22(92)	33(84)	NS		
10	7(11)	2(7)	5(13)	NS		
11	1(2)	0	1(3)	NS		

Table 2, continued.

Characteristic	Total N(%)	Control N(%)	Treatment N(%)	X^2	*df*	*p*=
Free/reduced lunch:				5.21	1	.02
Yes	20(32)	4(17)	16(41)	NS		
No	40(63)	20(83)	20(51)	NS		
Blank	3(5)	0	3(8)	NS		
Would like to weigh more:	13(20)	6(25)	7(18)	NS		
Yes	45(72)	17(71)	28(72)	NS		
No	5(8)	1(4)	5(10)	NS		
blank						
Would like to weigh less:	27(43)	11(46)	16(41)	NS		
Yes	31(49)	12(50)	19(49)	NS		
No	5(8)	1(4)	4(10)	NS		
Blank						
Would like to stay the same weight:						
Yes	24(38)	8(33)	16(41)	NS		
No	33(52)	15(63)	18(46)	NS		
Blank	6(10)	1(4)	5(13)	NS		
Ever tried to lose weight:	27(43)	10(42)	17(44)	NS		
Yes	30(47)	12(50)	18(46)	NS		
No	6(10)	2(8)	4(10)	NS		
Blank						
Describe your health:	6(9)	1(4)	5(13)	NS		
Excellent	25(40)	11(46)	14(36)	NS		
Very good	19(30)	10(42)	9(23)	NS		
Good	7(11)	0	7(18)	NS		
Fair	1(2)	1(4)	0	NS		
Poor	5(8)	1(4)	4(10)	NS		
Blank						
In the past month not had enough food to eat due to finances:	5(8)	3(13)	2(5)	NS		
Yes	55(87)	21(87)	34(87)	NS		
No	3(5)		3(8)	NS		
Blank						

Preliminary analysis. The data were double entered and frequencies were checked for data errors. A randomization check was conducted with an independent *t*-test by group analysis on motivation belief variables by control versus treatment groups for Time 1 (baseline). Results for Time 1 as presented in Table 3 indicate that there were no significant differences in baseline scores between the two groups for interest/ enjoyment, which, most importantly, is the true measure of internal motivation according to Deci and Ryan (1985). There are some differences for perceived choice; however, perceived choice is a predictor of intrinsic motivation and, therefore, not considered as significant individually as a true measure of internal motivation.

Table 3

Motivation Measures for Baseline (Time 1); Control Compared to Treatment Groups

	Control		Treatment				
variable	Mean	SD	Mean	SD	*t*	*df*	*p*
Int/Enj*							
BF	16.41	4.57	18.64	5.71	-1.57	59	0.12
SSB	14.09	3.89	14.72	4.71	-0.54	60	0.59
PA	20.04	5.13	19.92	5.63	0.08	60	0.93
ST	14.00	4.35	14.77	4.95	-0.62	60	0.54
Sleep	20.96	3.61	21.08	4.65	-0.11	60	0.92
Total	17.11	5.18	17.83	5.74	-1.10	307	0.27
P Choice*							
BF	22.36	4.32	21.08	4.62	1.07	59	0.29
SSB	22.43	4.44	20.92	5.47	1.12	60	0.26
PA	22.87	4.26	20.44	5.46	1.83	60	0.07
ST	22.96	3.39	20.05	5.22	2.65	59.34	0.01
Sleep	21.22	4.28	18.56	5.23	2.06	60	0.04
Total	22.37	4.12	20.21	5.23	3.77	307	0.00
P Comp*							
BF	10.27	3.37	10.97	3.84	-0.72	59	0.48
SSB	9.39	3.92	9.41	3.26	-0.02	60	0.98
PA	12.48	3.25	12.05	3.65	0.46	60	0.64
ST	8.26	3.12	8.90	3.98	-0.66	60	0.51
Sleep	11.13	3.09	11.08	3.33	0.063	60	0.95
Total	10.31	3.61	10.48	3.77	-0.40	307	0.69

Note. *Int/Enj= Interest/Enjoyment, P Choice=Perceived Choice, P Comp= Perceived Competence BF=eating breakfast, SSB= avoiding sugary drinks, PA= physical activity, ST= avoiding screen time, Sleep= getting enough sleep, Total= total of all behaviors

Summary of the research findings are presented in Tables 3-6, as well as in the text. This study was designed to evaluate the short-term preliminary efficacy of an intervention delivered in an autonomy-supportive classroom setting on adolescent intrinsic motivational beliefs, as well as on behavioral components and healthy lifestyle

knowledge. The motivation belief outcome variables utilized to determine intervention effectiveness for this study consisted of three subscales of intrinsic motivation (interest enjoyment, perceived competence, and perceived choice) and were modified for each behavioral component. Specific behavioral outcome variable measures were (a) eating breakfast, (b) consumption of SSBs, (c) frequency of daily physical activity, (d) time spent daily in sedentary activity, and (e) hours of sleep per day. Healthy lifestyle knowledge scores were measured. All analyses were conducted with Statistica v12 (StatSoft Inc., 2015). A total of 30 participants group sample size will give a power of 0.4% at 0.10 significance level for two groups. Therefore an alpha level of 0.10 was used for all statistical tests.

Research question 1 results. What are the effects on adolescent motivation beliefs of a theory-based enhanced health curriculum based on the motivational beliefs of interest/enjoyment, perceived confidence, and perceived choice of 14- to 16-year-old adolescents receiving an enhanced curriculum as compared to adolescents receiving the usual health curriculum?

The preliminary effects on adolescent motivation beliefs were examined by evaluating the three subscales of the IMI. The interest/enjoyment subscale is considered the self-report measure of intrinsic motivation; the perceived choice and perceived competence subscales are considered positive predictors of both self-report behavioral measures of intrinsic motivation. In assessing the effect of the intervention on motivation outcomes, the main effects were two time points (Time 1 baseline and Time 2 post-intervention), and group assignment (control and treatment). The means and standard deviations for motivation as a function of group and time are presented in Table 4. Some

main effects for group were noted; however, interaction between group and time was the primary focus for this study. The interaction of group assignment and time indicates the effect of the intervention from baseline to post-intervention of the treatment group as compared with the control group.

ANOVA models were used to test the hypothesis that motivation scores were a function of Group (control vs. treatment) and Time (1 vs. 2); results are presented in Table 4. For this pilot study there was not sufficient power to include covariates (for example, the noted difference in gender between groups) in the models. There were no significant main effects for time. There were significant main effects for group for interest/enjoyments in eating breakfast (F=7.93, p=0.01), avoiding sugary drinks (F=3.04, p=0.08), and total for all behaviors (F=9.91, p=0.00). There were significant main effects for group for perceived competence in physical activity (F=4.61, p=0.03) and getting enough sleep (f=4.49, p=0.00). There were no significant interaction effects; however there were several interactions that trend toward significance in interest/enjoyment including screen time (F=2.25, p=0.13), sleep (F=2.58, p=0.11), and total for all behaviors (F=2.24, p=0.13).

Table 4

AVOVA Results and Effect of the Intervention on Motivation Outcomes

Behavior	Belief	Control		Treatment			Time Main Effect		Group Main Effect		Interaction Effect	
		M(SD) T1	M(SD) T2	M(SD) T1	M(SD)T2		F	*p*	F	*p*	F	*p*
Breakfast	Int/Enj	16.40 (4.57)	16.14 (5.19)	18.64 (5.71)	19.38	(4.86)	0.06	0.81	7.93	0.01	0.27	0.60
	Comp	14.10 (3.90)	14.41 (4.16)	14.72 (4.71)	16.56	(4.08)	1.6	0.21	2.23	0.14	0.22	0.64
	Choice	20.04 (5.13)	21.50 (3.65)	19.92 (5.63)	20.41	(4.68)	1.67	0.20	1.86	0.18	0.09	0.77
Sugary drinks	Int/Enj	14.00 (4.35)	13.91 (3.44)	14.77 (4.95)	17.17	(4.49)	1.84	0.18	3.04	0.08	0.91	0.34
	Comp	20.96 (3.61)	18.68 (4.31)	21.08 (4.65)	21.33	(4.02)	3.37	0.07	0.00	0.98	0.00	0.96
	Choice	17.11 (5.18)	16.93 (5.00)	17.83 (5.74)	18.95	(4.76)	0.01	0.93	2.36	0.13	0.01	0.94
Physical activity	Int/Enj	22.36 (4.32)	23.14 (3.64)	21.08 (4.62)	22.31	(3.68)	1.11	0.29	0.43	0.51	0.28	0.60
	Comp	22.43 (4.44)	22.45 (4.24)	20.92 (5.47)	21.08	(5.26)	0.15	0.70	0.67	0.42	0.02	0.88
	Choice	22.87 (4.26)	23.23 (4.20)	20.44 (5.46)	21.85	(4.52)	0.99	0.32	4.61	0.03	0.35	0.55
Screen time	Int/Enj	22.96 (3.39)	22.55 (4.44)	20.05 (5.22)	17.20	(4.75)	1.93	0.17	5.88	0.02	2.25	0.14
	Comp	21.22 (4.28)	21.27 (4.83)	18.56 (5.23)	20.13	(4.57)	1.24	0.27	1.361	0.25	0.03	0.86
	Choice	22.368 (4.12)	22.53 (4.27)	20.21 (5.23)	21.16	(4.61)	0.00	1.00	8.32	0.00	0.23	0.63
Sleep	Int/Enj	10.27 (3.37)	10.82 (3.28)	10.97 (3.84)	12.15	(3.71)	1.64	0.20	3.09	0.08	2.58	0.11
	Comp	9.39 (3.92)	10.64 (3.55)	9.41 (3.26)	10.59	(3.53)	0.00	0.98	1.03	0.31	1.21	0.27
	Choice	12.48 (3.25)	12.82 (3.26)	12.05 (3.65)	12.21	(3.29)	0.82	0.37	4.49	0.04	0.71	0.40
Total for all	Int/Enj	8.26 (3.12)	8.86 (2.51)	8.90 (3.98)	9.73	(3.54)	1.67	0.20	7.93	0.01	0.27	0.60
	Comp	11.13 (3.09)	10.4 (3.11)	11.08 (3.36)	11.77	(3.86)	1.84	0.18	2.23	0.14	0.21	0.64
	Choice	10.31 (3.61)	10.71 (3.35)	10.48 (3.77)	11.27	(3.69)	3.37	0.07	1.86	0.18	0.09	0.77

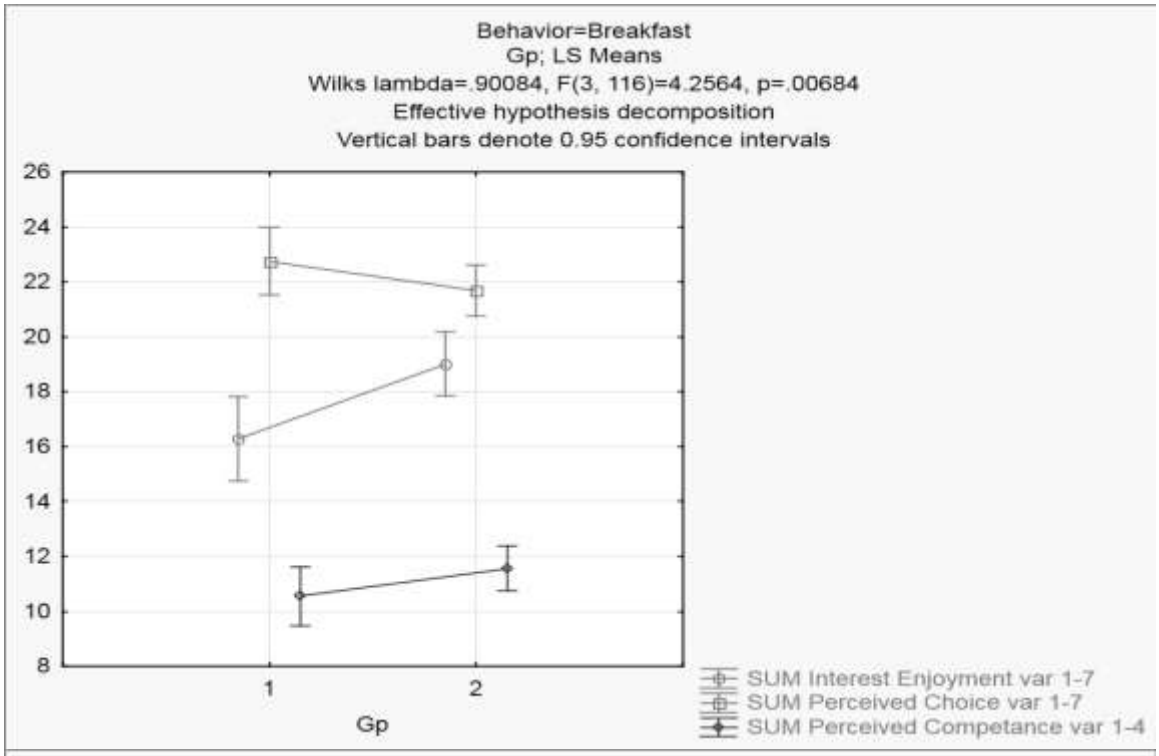
To explore the nature of the marginally significant interaction effects, independent *t*-tests were conducted at Time 2 (post-intervention) to compare the treatment and control groups (see Table 5). To answer our research question asking what are the effects on adolescent motivation of a theory-based enhanced health curriculum based on the motivational beliefs of interest/enjoyment, perceived confidence, and perceived choice of 14- to 16-year-old adolescents receiving an enhanced curriculum as compared to adolescents receiving the usual health curriculum, results indicate significant differences in scores by group for interest/enjoyment in the areas of eating breakfast (t=-2.45, p=0.017), avoiding screen time (t=-2.97, p=0.004), and getting adequate sleep (t=-2.41, p=0.0005). For each of these variables the post-test means were significantly higher in the treatment group compared to the control group. Results also indicate a significant difference in the scores for perceived choice in avoiding screen time (F=1.70, p=0.09) and overall scores (t=2.56, p=.01). The post-test means for perceived choice were higher in the control group than the treatment group. Figure 3 displays these results.

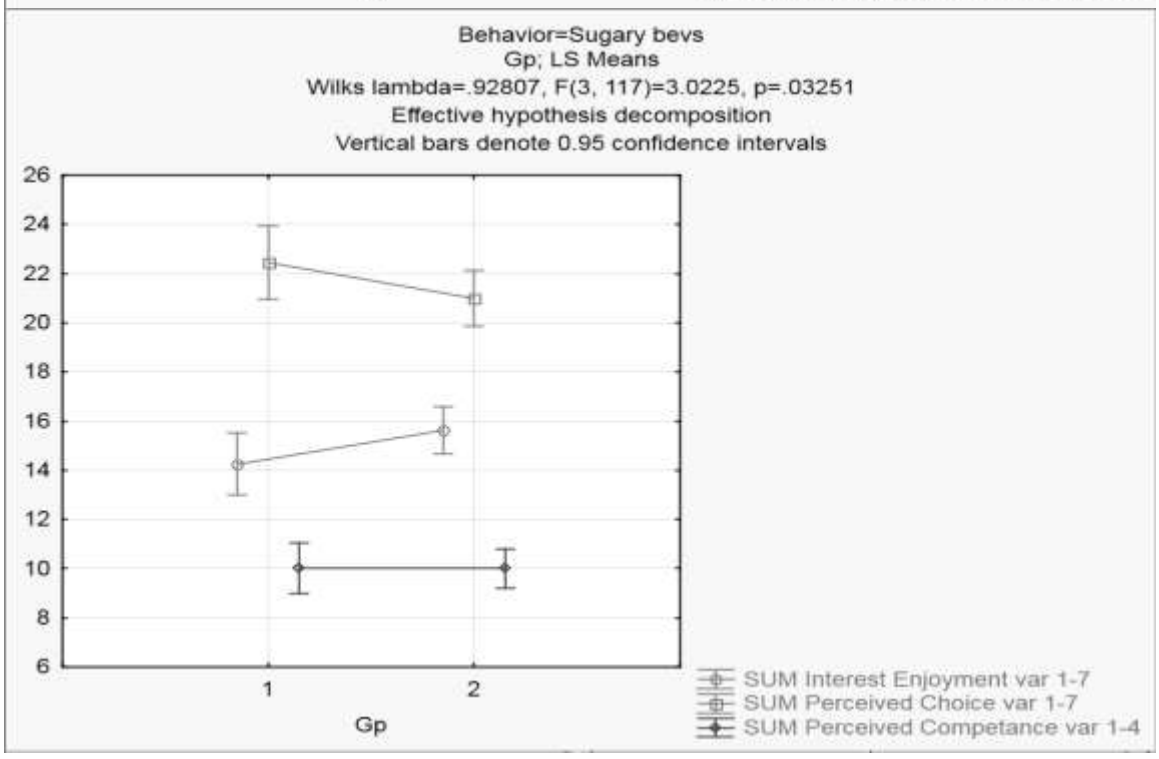
Table 5

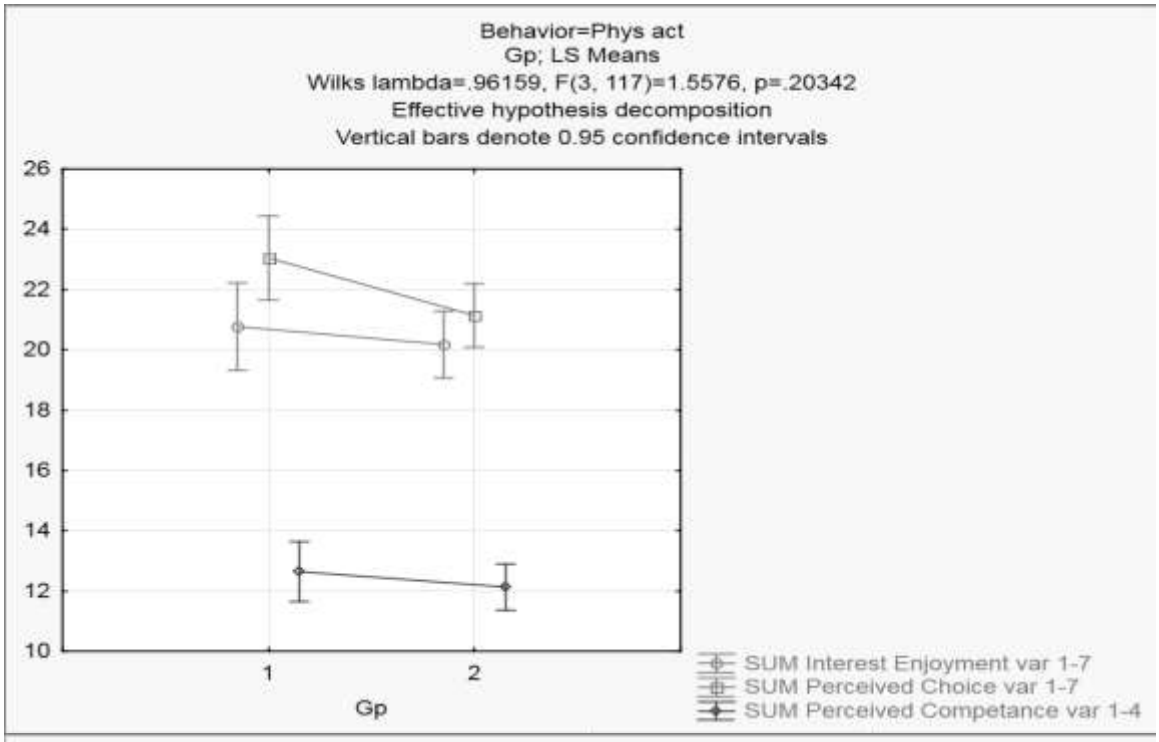
Independent Sample t-test; Motivation for Time 2 Control Compared to Treatment Groups

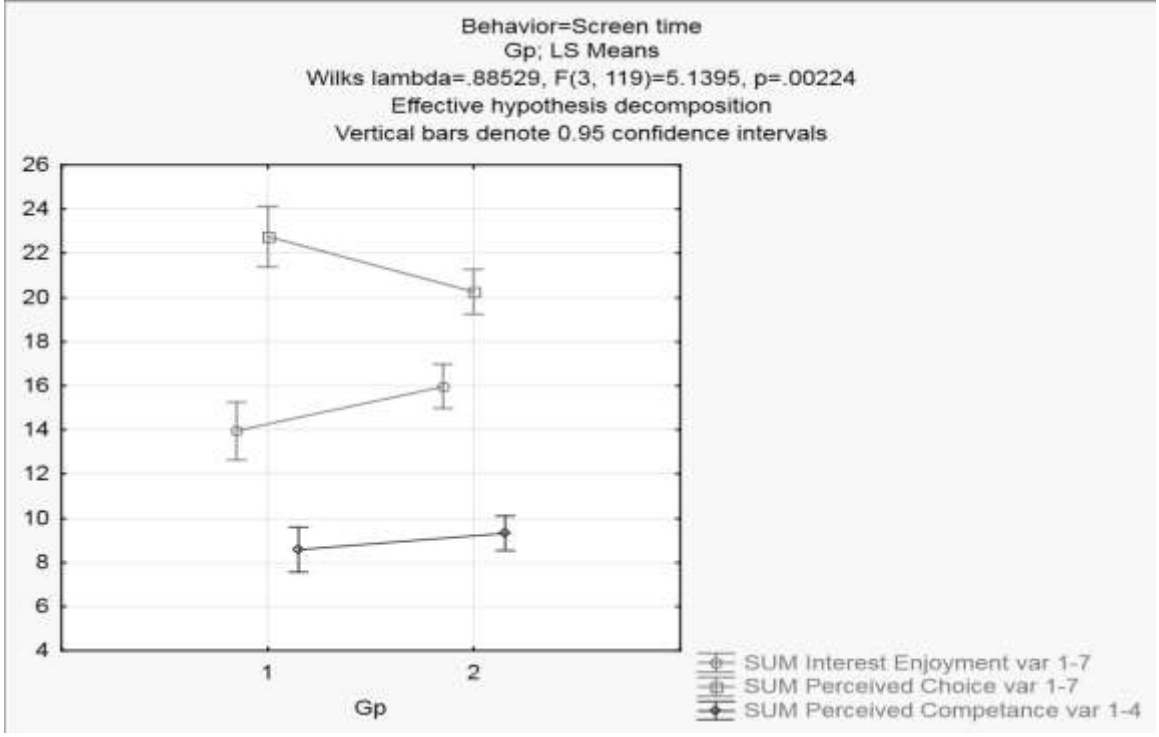
	Control		Treatment				
variable	Mean	SD	Mean	SD	*t*	*df*	*p*
Int/Enj*							
BF	16.14	5.19	19.38	4.86	-2.45	59	0.02
SSB	14.41	4.16	16.56	4.08	-1.97	59	0.05
PA	21.50	3.65	20.41	4.68	0.94	59	0.35
ST	13.91	3.44	17.17	4.49	-2.77	61	0.00
Sleep	18.68	4.31	21.33	4.02	-2.41	59	0.02
Total	16.93	5.00	18.95	4.76	-3.51	305	0.00
P Choice*							
BF	23.14	3.64	22.31	3.68	0.85	59	0.40
SSB	22.45	4.24	21.08	5.26	1.05	59	0.30
PA	23.23	4.20	21.85	4.52	1.18	59	0.24
ST	22.55	4.44	20.46	4.75	1.70	61	0.09
Sleep	21.27	4.83	20.13	4.57	0.92	59	0.36
Total	22.53	4.26	21.16	4.61	2.56	305	0.010
P Comp*							
BF	10.82	3.28	12.15	3.71	-1.41	59	0.16
SSB	10.64	3.55	10.59	3.53	0.05	59	0.96
PA	12.82	3.26	12.21	3.29	0.70	59	0.49
ST	8.86	2.51	9.73	3.54	-1.0	61	0.31
Sleep	10.41	3.11	11.77	3.87	-1.4	59	0.16
Total	10.71	3.35	11.27	3.69	-1.3	305	0.18

Note. *Int/Enj= Interest/Enjoyment, P Choice=Perceived Choice, P Comp= Perceived Competence BF=eating breakfast, SSB= avoiding sugary drinks, PA= physical activity, ST= avoiding screen time, Sleep= getting enough sleep, Total= total of all behaviors


Behavior=Breakfast
Gp; LS Means
Wilks lambda=.90084, F(3, 116)=4.2564, p=.00684
Effective hypothesis decomposition
Vertical bars denote 0.95 confidence intervals
26
24
22
20
18
16
14
12
10
8
1
2
Gp
SUM Interest Enjoyment var 1-7
SUM Perceived Choice var 1-7
SUM Perceived Competance var 1-4


Behavior=Sugary bevs
Gp; LS Means
Wilks lambda=.92807, F(3, 117)=3.0225, p=.03251
Effective hypothesis decomposition
Vertical bars denote 0.95 confidence intervals
26
24
22
20
18
16
14
12
10
8
6
1
2
Gp
SUM Interest Enjoyment var 1-7
SUM Perceived Choice var 1-7
SUM Perceived Competance var 1-4


Behavior=Phys act
Gp; LS Means
Wilks lambda=.96159, F(3, 117)=1.5576, p=.20342
Effective hypothesis decomposition
Vertical bars denote 0.95 confidence intervals
26
24
22
20
18
16
14
12
10
1
2
Gp
SUM Interest Enjoyment var 1-7
SUM Perceived Choice var 1-7
SUM Perceived Competance var 1-4


Behavior=Screen time
Gp; LS Means
Wilks lambda=.88529, F(3, 119)=5.1395, p=.00224
Effective hypothesis decomposition
Vertical bars denote 0.95 confidence intervals
26
24
22
20
18
16
14
12
10
8
6
4
1
2
Gp
SUM Interest Enjoyment var 1-7
SUM Perceived Choice var 1-7
SUM Perceived Competance var 1-4

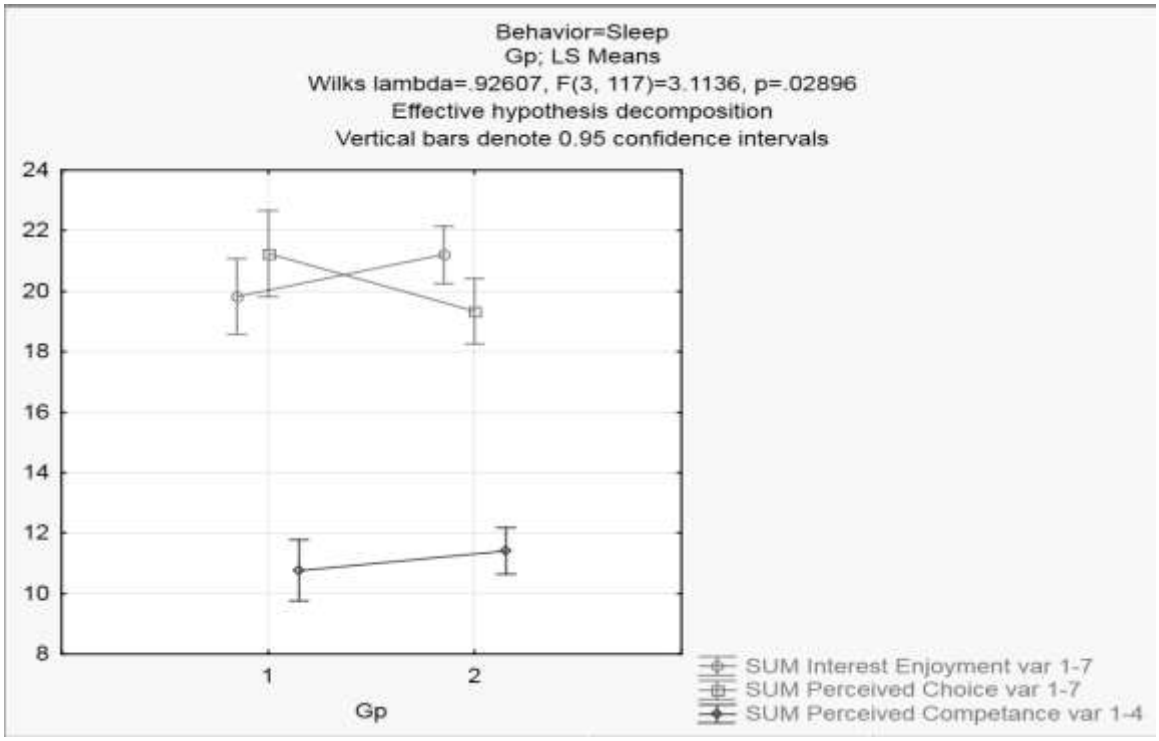


Figure 3. Motivation belief scores for behaviors by group.

To further explore the nature of the marginally significant interaction effects, paired-sample *t*-tests were conducted to compare means at Time 1 and Time 2 for the treatment and control groups separately. For the control group, results showed no significant difference in any of the overall motivation belief variables of interest/enjoyment (t=0.89, p=0.38), perceived choice (t=0.07, p=0.94), or perceived competence (t=-1.29, p=0.20). There was one specific behavior where a significant difference was found in interest/enjoyment from Time 1 to Time 2, which was in getting adequate sleep (t=2.01, p=0.06). There were no other motivational beliefs that showed a significant difference in the control group from Time 1 to Time 2.

Results for the treatment group are presented in Table 6. In contrast, several significant differences were found. Within interest/enjoyment overall there was a significant difference between Time 1 and Time 2 (t=-3.14, p=<0.01), which appears to have been driven mostly by avoiding screen time (t=-2.75, p=0.01) and avoiding sugary drinks (t=-2.39, p=0.02). Also, from Time 1 to Time 2, a significant difference was found in perceived choice overall (t=-2.45, p=0.02), driven primarily by eating breakfast (t=-1.77, p=0.08) and increasing physical activity (t=-1.73, p=0.09). In perceived competence overall we found a significant difference again (t=-3.16, p=<0.01), driven by eating breakfast (t=-2.06, p=0.05) and avoiding sugary drinks (t=-2.34, p=0.02). These findings, showing that Time 2 has significantly higher averages than Time 1 when analyzed in a paired formats, substantiate the hypothesis that there would be a difference in group in that Time 2 scores would be higher than Time 1 scores for group 2. These results indicate an effect between Time 1 and Time 2, suggesting a significant positive impact of the intervention.

Table 6

Time 1 to Time 2 Paired t-test Summary for the Treatment Group

	T1		T2				
Variable	Mean	SD	Mean	SD	*t*	*df*	*p*
Int/Enj*							
BF	18.64	5.71	19.38	4.86	-0.97	38	0.34
SSB	14.72	4.71	16.56	4.08	-2.46	38	0.02
PA	19.92	5.63	20.41	4.68	-0.74	38	0.46
ST	14.77	4.95	17.15	4.54	-2.76	38	0.01
Sleep	21.08	4.65	21.33	4.02	-0.26	38	0.80
Total	17.83	5.74	18.97	4.77	-3.13	194	<0.01
P Choice*							
BF	21.07	4.62	22.31	3.68	-1.78	38	0.08
SSB	20.92	5.47	21.08	5.26	-0.19	38	0.85
PA	20.44	5.46	21.85	4.52	-1.73	38	0.09
ST	20.05	5.22	20.41	4.83	-0.36	38	0.72
Sleep	18.56	5.23	20.13	4.57	-1.61	38	0.12
Total	20.21	5.23	21.15	4.63	-2.45	194	0.02
P Comp*							
BF	10.97	3.84	12.15	3.71	-2.06	38	0.05
SSB	9.41	3.26	10.59	3.53	-2.34	38	0.02
PA	12.05	3.65	12.20	3.29	-0.38	38	0.70
ST	8.90	3.98	9.74	3.61	-1.18	38	0.25
Sleep	11.08	3.33	11.77	3.86	-1.08	38	0.29
Total	10.48	3.77	11.29	3.70	-3.16	194	<0.01

Note. *Int/Enj= Interest/Enjoyment, P Choice=Perceived Choice, P Comp= Perceived Competence BF=eating breakfast, SSB= avoiding sugary drinks, PA= physical activity, ST= avoiding screen time, Sleep= getting enough sleep, Total= total of all behaviors

Research question 2 results. What are the preliminary effects of a theory-based, enhanced health curriculum on healthy lifestyle knowledge, nutrition, physical activity, and self-care behaviors of 14- to 16-year-old adolescents who receive the enhanced curriculum as compared to adolescents who receive the usual health curriculum?

A Chi-square test was conducted by group to assess whether healthy behavior knowledge increased for the study participants. Results show no significant difference in healthy lifestyle behavior knowledge scores from Time 1 to Time 2 for the control group.

However, significant differences in healthy lifestyle behavior knowledge were observed from Time 1 to Time 2 for the treatment group, as demonstrated by the chi-square results (x^2=36.9, p<0.001).

A Chi-square analysis of lifestyle measures was conducted to assess for reported behavior changes by group from Time 1 to Time 2 (see Table 6). Results for the control group showed a significant change from Time 1 to Time 2 in getting eight or more hours of sleep on an average school night (x^2=24.4, p=<0.01). No other significant behavior changes for the control group were revealed. In contrast, the treatment group reported significant changes in lifestyle behaviors from Time 1 to Time 2 in several areas. Significantly more students in the treatment group at Time 2 reported eating breakfast (x^2=4.7, p=0.029), avoiding drinking sugary drinks (x^2=3.11,p=0.077), and participating in at least 60 minutes of physical activity for at least one day (x^2=3.39, p=0.065) in the previous seven days before the survey. Also, significantly more students in the treatment group from Time 1 to Time 2 reported getting eight or more hours of sleep (x^2=18.5, p=<0.01).

Table 7

Behavioral Measures for Time 1 and Time 2 by Group

	Control			Treatment		
Question	n(%) Time 1	n(%) Time 2	$X^2(p)$	n(%) Time 1	n(%) Time 2	$X^2(p)$
Did not eat breakfast *	1(4)	0	NS	6(17)	1(3)	4.7(0.03)
Drank a sugary drink *	23(92)	23(92)	NS	33(94)	27(68)	3.11(0.08)
Drank a soda or pop *	21(84)	23(92)	NS	34(97)	24(60)	NS
Did not participate in at least 60 minutes of physical activity on at least 1 day* (doing any activity that increased their heart rate and made them out of breath some of the time)	2(8)	0	NS	3(14)	0	3.39(0.07)
Were not physically active for at least 60 minutes per day on 5 or more days *	11(44)	10(45)	NS	17(49)	19(48)	NS
Were not physically active at least 60 minutes per day on all 7 days *	18(72)	13(59)	NS	23(66)	25(63)	NS
Played video or computer games or used a computer 3 or more hours per day for something that was not school work on an average school day	11(44)	9(41)	NS	19(86)	20(50)	NS
Watched television 3 or more hours per day on an average school day	19(76)	15(68)	NS	5(23)	16(40)	6.88(0.01)
Did not have 8 or more hours of sleep on an average school night	19(76)	1(5)	24.4(0.00)	20(91)	4(10)	18.5(0.00)
Healthy Lifestyle Knowledge % correct	64.8%	69.1%	NS	63.8%	79.6%	36.9(<.001)

Note. * During the past 7 days before the survey.
** No data reported.

CHAPTER 5. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

Discussion

The purpose of this study was to determine the effects on adolescent motivation of the theory-based AIM enhanced health curriculum, which is based on the motivational beliefs of interest/enjoyment, perceived confidence, and perceived choice. SDT was used to structure and guide the development of this enhanced curriculum. Adolescents 14- to 16-years-old who received an enhanced curriculum (AIM) were compared to adolescents who received the usual health curriculum during a typical high school health class. Elements defined by SDT (addressing autonomy, competence, and relatedness) were incorporated into the delivery of healthy lifestyle intervention. The AIM program addressed five specific areas of healthy lifestyle behavior: (a) eating breakfast, (b) avoiding sugary drinks, (c) daily physical activity, (d) avoiding sedentary screen time, and (e) getting adequate sleep. The AIM intervention was developed to address the students' feelings of autonomy, relatedness, and competence as defined by SDT, which has been shown to promote the internalization of the healthy lifestyle recommendations such as those set forth in the AIM intervention. SDT holds that intrinsic motivation is associated with feelings of satisfaction, enjoyment, competence, and the desire to persist in the targeted behaviors. It was hypothesized that the intervention would increase the students' motivational beliefs, healthy lifestyle knowledge, and the associated healthy lifestyle behaviors.

A series of chi-square and ANOVA analyses were used to test the study's hypotheses. To further explore interactions that approached significance paired *t*-tests were conducted on Time 1 versus Time 2 by group. Results of these analyses are

presented in Chapter 4 and discussed below. In addition, strengths, limitations, and implications of the study also are discussed as well as suggestions for future research.

Effects of AIM on the motivational beliefs. The preliminary effects on the motivational beliefs of students in the treatment group were examined by evaluating the Time 1 and Time 2 student scores of the IMI for each behavior specifically and for the total scores of the combined behaviors. For this study, intrinsic motivation was measured specifically as interest/enjoyment which was self-reported by the student on the IMI. The IMI was adapted to each of the five specific healthy lifestyle behaviors included in the AIM curriculum. Based on the propositions of SDT, it was hypothesized that interest/enjoyment for students in the treatment group would increase from Time 1 to Time 2 in the context of the healthy lifestyle behaviors included in the study, both individually and in total.

A 2X2 ANOVA was conducted to evaluate the effects Time 1 (baseline) and Time 2 (post-intervention) on motivation scores between the control and treatment groups. The ANOVA indicated marginally significant interaction effects, which were further explored with paired analysis. The results of these analyses indicate an effect between Time 1 and Time 2 on motivational beliefs, suggesting a significant impact of the intervention.

The preliminary effects on motivational beliefs of students in this study who received the enhanced AIM curriculum support the hypothesis in that students reported a statistically significant increase in motivational beliefs pertaining to interest and enjoyment for all behaviors combined, as well as for avoiding sugary drinks and avoiding screen time specifically. The predictors of intrinsic motivation are perceived choice and

perceived competence. With both predictors, significant differences were found from Time 1 to Time 2 for the students who received the AIM curriculum. Providing choice allowed the participants to explore why they would be motivated to follow healthy lifestyle recommendations and evaluate the benefits for themselves. The perceived choice to do so would be up to the student. Perceived competence alone does not promote intrinsic motivation. The participant needs to feel competent and autonomous for intrinsic motivation to be maintained (Deci, 1995).

These statistically significant increases in motivational beliefs support the use of SDT to guide the development of strategies to facilitate adolescent motivational beliefs in adopting healthy lifestyle behaviors. It is suggested that when there is greater interest and enjoyment in a behavior, individuals are more likely to internalize and integrate that behavior, which may lead to intrinsic motivation to follow the recommendations for healthy lifestyle behaviors in these areas (Spruijt-Metz et al., 2008). By using SDT to guide strategies, healthcare providers and educators who create a learning environment for adolescent health education can help adolescents to learn how behaviors affect their health as well as to encourage adolescents to adopt and behave in healthier ways.

Effects of AIM on nutrition, physical activity, and self-care behavior of students. Results of this study suggest that the AIM intervention, guided by SDT, enhanced the 9th grade health curriculum and increased the motivational beliefs as well as healthy lifestyle knowledge and behaviors in adolescents. Specific lifestyle behaviors that were measured included: (a) eating breakfast, (b) avoiding sugary drinks, (c) daily physical activity, (d) avoiding sedentary screen time, and (e) getting enough sleep. These healthy lifestyle behaviors were chosen because these outcomes can be compared to data

on adolescents in the U.S. from the YRBS and for Maine from the MIYHS. Healthy Lifestyle Behaviors Knowledge was also examined at Time 1 and Time 2.

Chi-square analyses were conducted on behavioral lifestyle measures of this study. The control group showed a significant increase in the number of students who reported getting eight or more hours of sleep from Time 1 to Time 2; however, no other significant changes were found in the other behaviors in the control group. In contrast, the analyses for the treatment group found significant differences in several of the lifestyle behaviors measured from Time 1 to Time 2. The number of students who reported not eating breakfast decreased significantly, as well as the number of students reporting drinking a sugary drink. The number of students who reported not participating in 60 minutes of physical activity for at least one day in the seven days prior to the survey decreased, and the number of students who reported getting eight or more hours of sleep increased. These findings support the hypothesis that delivery of a theory-based enhanced health curriculum that addresses the basic psychological needs of adolescents for autonomy, relatedness, and competence will result in students being more willing to engage in less interesting healthy lifestyle behaviors. These behavior changes are quite remarkable given the short duration of the study period.

In the treatment group a significant increase in time watching TV was found at Time 2. The Time 2 measures were collected during the final few weeks of school, and this may have more to do with classes coming to an end and the students having more leisure time.

Significant differences in healthy lifestyle behavior knowledge were observed in the treatment group, who attained more correct answers and higher scores at Time 2,

indicating improvement in healthy lifestyle knowledge. There were no significant changes in the control group scores. This suggests that the delivery of health information may have more influence on the specific content of the healthy behavior recommendations as compared to the usual delivery of the information alone in the typical health curriculum. Also, the typical curriculum may not go as deeply into the specific behavior recommendations that were introduced in the AIM intervention.

The SDT model of health behavior suggests that when relevant health information is presented in an autonomy-supportive manner, the participants will become more autonomously motivated to accept the message and change their lifestyle behaviors (Williams, Cox, Kouides, & Deci, 1999). The results of this study demonstrate that autonomy-supportive teaching practices (providing a rationale, acknowledging feelings, and conveying choice) can be associated with positive outcomes influencing motivation beliefs, as well as certain healthy lifestyle behaviors and healthy lifestyle knowledge. This adds to the growing body of research demonstrating the use of SDT associated with positive outcome results (Williams, 2002).

In autonomy-supportive contexts, the instructor (interventionist) takes the student's perspectives into account, provides relevant information and allows opportunities for choice, refrains from the use of pressures and contingencies to motivate behavior, and encourages the students to accept more responsibility for their behaviors (Deci et al., 1994; Williams, 2002). By asking what the students want to achieve, listening and encouraging questions from the students, providing understandable responses, and suspending judgment on current or previous behaviors, the instructor creates an interpersonal climate that supports the students' needs for autonomy,

relatedness, and competence. Satisfaction of these needs are predicted to facilitate greater internalization of the healthy lifestyle recommendations, resulting in more healthy lifestyle behaviors which in turn may result in improved health outcomes. For the students, this study provides support for the hypothesis that autonomy-supported healthy lifestyle behavior messages delivered in the AIM intervention can have a positive effect on adolescent motivation beliefs, healthy lifestyle behaviors, and healthy lifestyle knowledge scores. For the high school health curricula and teachers, this study provides support for the hypothesis that classrooms that provide an autonomy-supportive learning environment by presenting material in a way that facilitates the students' feelings of relatedness, competence, and autonomy with respect to the relevant behaviors' capacity to provide genuine opportunities for success for their students to internalize and chose healthy lifestyle behaviors.

For nursing, this study demonstrates a way to introduce adolescents to positive health behaviors that will help them move into adulthood with healthy lifestyle habits. For healthcare providers, as reported by Williams (2002), there is a growing number of studies conducted that have examined health issues utilizing the SDT model whose results indicate that when medical educators and healthcare providers are autonomy-supportive, their students and patients are more likely to become more autonomous and competent, which leads to more positive education and health outcomes.

Limitations. The study sample was drawn using a convenience sample of modest size from one high school in southern Maine. It is unknown to what extent results of this study will generalize to the population of adolescents in the U.S. Analyses indicated that adolescents in this study did not differ in their reported health behaviors from other

adolescents with similar age in Maine or in the U.S., yet they may have other characteristics that make them unique and may limit the generalizability to the larger population. Participants were mostly in the same grade at the same high school, and most of them were white. Results of this study may not generalize to adolescents of other age and ethnicity.

This research relied primarily on self-report measures. For this reason, conclusions about the relationships remain tentative. It is possible that the use of self-report instruments obscured effects. Self-report data is a simple and inexpensive method of measuring data; it is quick and easy to administer. However, self-reporting data can cause inaccuracies by recall bias, social desirability bias, and errors in self-observation.

The lack of long-term follow-up in this study is a limitation. Testing this intervention in a larger random sampling of schools within the state, or even in more than one state would be useful in determining the longer-term effects of the intervention.

Although most of the intervention studies reviewed and critically appraised anthropometric measures, none found any significant changes in BMI. Due to the short duration of this study, it was decided to not collect anthropometric information. In a study with longer term follow up it would be important to collect and analyze anthropometric measurements to track any changes that might occur over time.

Threats to internal validity include history, in that any other event could have occurred between Time 1 and Time 2 that the groups experienced differently. In this case the groups may differ with respect to reactions to a historical event that occurred during the study period, such as the delivery of the health curriculum could have differed between teachers. A maturation threat could occur due to the different rates of normal

growth and ongoing development between Time 1 and Time 2, the groups could have been maturing at different rates during the study period. The classes were randomly selected but the students in each class were not randomly assigned so selection bias could have been present.

Strengths. The AIM adolescent healthy lifestyle intervention study specifically targeted the basic human needs of autonomy, relatedness, and competence as guided by SDT in the delivery of *Bright Futures* (Hagan et al., 2008) healthy lifestyle recommendations. Research indicates that interventions to promote adolescent health and healthy behavior are most likely to show positive results when multiple intervention components grounded in a theoretical framework are used (Birnbaum et al., 2002; Cole et al., 2006; Hoelscher et al., 2002; Kelly & Melnyk, 2008). The AIM intervention study introduced basic health recommendations to adolescents in an autonomy-supportive environment, which has been shown to encourage adolescents to make healthy behavior choices based on their own interest and enjoyment.

This study extended the science of adolescent healthy lifestyle intervention research in several ways. Delivery of the intervention and data for this study were collected in the classroom setting and participants were students in a 9^{th} grade health class, where academic and health education merge. It was demonstrated that the AIM intervention was able to link health education with healthy lifestyle knowledge and behavior changes using the tenets of SDT to guide the delivery of health-related information, assessing self-report measures for intrinsic motivation along with the specific behaviors included in the intervention.

Programs that have a behavioral focus tend to be more successful in producing desired intentions and behaviors (Hoelscher et al., 2002; Kelly & Melnyk, 2008). Of the literature reviewed for this study, all discussed lack of impact on behavioral variables. Even though the AIM intervention was of short duration (three classroom periods), the information provided was beneficial, as demonstrated by significant improvements in healthy behavior knowledge and an increase in behavioral variables of eating breakfast, avoiding sugary drinks, and getting enough sleep. These findings support the hypothesis that delivery of a theory-based enhanced health curriculum based on the motivational beliefs of interest/enjoyment, perceived confidence, and perceived choice of 14- to 16-year-old adolescents receiving an enhanced curriculum will increase the motivational orientation and internalization of health recommendations significantly more over time in the treatment group compared to the control group.

Parental involvement in children's education has been positively associated with autonomous motivation (Guay, Ratelle, & Chanal, 2008). As previously discussed, inclusion of parent and family involvement in adolescent healthy lifestyle interventions has been shown to enhance program effectiveness (Zenzen & Kridli, 2009). The AIM intervention included home activities with parental involvement, which was well received by the adolescents and their families, adding support to this important component.

Implications for future research. To the best of our knowledge this is one of the first studies that adapted an adolescent healthy lifestyle intervention, guided by SDT, to a high school health class. The AIM intervention was developed around specific healthy lifestyle behaviors using the SDT framework to deliver the content, which can be adapted to any healthy lifestyle behavior. Adolescent health education teachers as well as

all adolescent health education providers can adapt this method to deliver health related materials to adolescents, based on the theoretical framework of SDT, to encourage motivation for healthy lifestyle behaviors to be intrinsically driven. Additional studies with more statistical power and long-term follow-up would be important to examine if the positive results of a short-term intervention would last over time.

One of the issues with using time during health classes for a guest interventionist is that the health teachers are giving up class time that would normally be devoted to introducing traditional curriculum material. In future studies, allowing the health teacher to choose the behavioral variables will allow the intervention to assist the health teacher to cover topics specific to their individual curriculums. In this district, each teacher develops their own curriculum and does not spend the same amount of time on individual topics. For this study, the health teachers as a group decided on the health behavior variables. If the teacher was allowed to choose the topics individually, the intervention may fit better into each teacher's individual curriculum.

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APPENDIX A

EVIDENCE TABLES

PRIOR ADOLESCENT SCHOOL-BASED INTERVENTION STUDIES CONTAINING NUTRITION AND/OR PHYSICAL ACTIVITY AND/OR SELF-CARE COMPONENTS

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
Bayne-Smith, Fardy, Azzollini, Magel, Schmitz, & Agin. (2004). Queens County, NYC, NY, USA No theory noted. RCT	**Purpose:** To assess the effects of a SB intervention program on cardiovascular disease risk factors in urban girls. **Sample**: Multiethnic urban girls 14-19yo, N=442. **Setting:** One HS, during PE class. **Data collection**: Two weeks pre- and 2 weeks post- the 12 week intervention. **Components**: N, PA, SC. **Instruments**: Were developed for the PATH program, validity and reliability were not reported; heart health knowledge was a 50-item multiple choice test; physical activity was a checklist with 19 forms of physical activity and students reported performance of activities; N and diet was a checklist indicating the students' food choices. Anthropometric	**Intervention**: PATH curriculum delivered as a personal wellness course that integrated vigorous exercise, health and N education, and behavior modification, 30 minute classes, 5 days a week; 5-10 minute lecture/ discussion and 20-25 minutes of vigorous activity, for 12 weeks. **Control:** Traditional PE class. **Outcome measures**: BMI, % body fat, resting systolic and diastolic BP, estimated oxygen uptake, serum cholesterol, heart health knowledge, self-perception of health, non-school related physical activity, dietary habits, breakfast eating habits.	**Findings**: *Slightly higher and significant differences in self-perceptions of health (6.2 vs 5.8, -<.05), no other significant differences between the control and treatment groups in heart health knowledge, non-school related PA, or dietary habits. *Significant differences in mean changes between groups for physiologic measure of % body fat (-0.8, p<.05), systolic (-2.3p<.05), and diastolic (-3.4,p<.05) BP. *No significant differences in other measures. No significant changes in serum cholesterol, BMI, or oxygen uptake between C and I groups.	**Strengths**: *Wide range of program compo-nents *Has a behavioral focus **Limita-tions**: *Non-representa-tive sample *Lack of theoretical framework *No unified approach to outcome measures *Lack of parent/ family component *Lack of impact on many target variables

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	measures included height and weight obtained on a balance beam scale, BMI using traditional calculations, skin fold thickness using calipers on 2 sites, resting heart rate and BP measured mechanically.			
Chatzisarantis & Hagger. (2009). England Self-Determination Theory Cluster randomized design.	**Purpose:** Compare effectiveness of two SB interventions: 1) autonomy-supportive classroom environment providing rationale, feedback, choice and acknowledgement associated with PE class vs. 2)less autonomy-supportive classroom environment providing only rationale and feedback. **Sample:** N=215, 14-16 yo **Setting:** Ten HS, delivered by trained PE teachers during PE class. **Data collection**: pre-, post-, and 10 weeks follow-up intervention. **Components**: PA.	**Intervention:** Manipulation of the classroom environment providing rationale, feedback, choice, and acknowledgement. Manipulation lasted 5 weeks for both interventions. After intervention participants were prompted to engage in leisure-time physical activities for 5 weeks. Unclear hours per day and days per week of intervention dose. **Control:** Less autonomy-supportive condition providing rationale and feedback only. **Outcome measures**: PA behavior, perceptions of autonomy support, and motivational orientations.	**Findings:** *Adolescents perceived teachers who adopted autonomy-supportive interpersonal style as more autonomy-supportive and reported a more autonomous motivational orientation from baseline to follow-up ($t(213)=3.41$, =<.005, d=0.43). *In the C group perceptions related to autonomy support and motivational styles did not change over time. *Adolescents in the I group from baseline to follow-up 1; exercised more frequently ($F(1,101)=24.48$, p<.05, $n^2=0.18$), perceived their teachers as more autonomous supportive	**Strengths:** *Has a behavioral focus **Limitations:** *****Lack of parent/ family component

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	Instruments: Learning Climate Questionnaire (Williams, Saizow, Ross, & Deci, 1997) internal consistency *a*=0.89; Autonomous Motivational Orientations (Ryan & Connell, 1989) internal consistencies pre- *a*=0.75and at post- *a*=0.77; Leisure time physical activity using LTEQ (Godin & Shepard, 1985), internal consistency *a*=0.93.		($F(1,101)=61.40$, $p<.05$, $n^2=0.34$), and reported a more autonomous motivational orientation ($F(1,101)=22.40$, $p<.05$, n^2 0.20). *Model 2 hypothesized direct effects of perceived autonomy support on self-reported PA. Direct effects of the intervention on autonomous motivation (d=0.71) and perceptions of autonomy support (d=0.72) were positive and significant, revealing that the intervention was successful in enhancing perceptions of autonomy support and autonomous motivation styles. *Statistically significant effect of treatment on intentions ($t(213)=5.60$, $p<.05$, d=0.73). *C group (when rationale and feedback were not communicated in the context of autonomy) perception related to autonomy support and motivational styles did not change over time.	

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
Lindwall & Lindgren. (2005). Sweden No theory noted. Experimen-tal design.	**Purpose:** To examine the effects of a 6-month exercise SB intervention program on physical self-perceptions and social physique anxiety of non-physically active adolescent Swedish girls. **Sample**: N=110 girls **Setting:** Seven schools (#C and #I not stated), during PE class, by PE teachers. **Data collection**: Pre- and post-intervention. **Components**: PA. **Instruments**: Physical self-perception profile (PSPP) (Fox, 1997; Fox & Corbin, 1989), measures 5 sub-domains; internal consistency values pre-post for: 1) sport competence =0.76-0.74, 2) physical conditioning=0.62-0.65, 3) bodily attractiveness=0.85-0.84, physical strength=0.74-0.77, and physical self-	**Intervention**: Empowerment based exercise intervention program, twice a week for 6 months, 45 minutes of exercise and 15 minutes of healthy lifestyle discussion. **Control:** Traditional PE class. **Outcome measures**: Physical self-perceptions in six domains; sport competence, physical conditioning, bodily attractiveness, physical strength, and physical self-worth. Social physique anxiety, height, weight, bicycle ergometer to predict submaximal oxygen uptake as a measure of physical fitness.	**Findings**: *Using intent to treat analysis yielded no significant improvements in the physical self-perception profiles or the social physique anxiety between groups, no changes in physiological variables. *Follow-up ANOVA showed significant interaction effects for sport competence ($F(1,60)=3.90$, $p<.05$), physical conditioning ($F(1,60)=7.45$, $p<.05$), and physical self-worth ($F(1,60)=4.36$, $p<.05$), indicating that I group increased more than C group on these subscales. *Compared to C group, participants in I group showed lower scores on the social physique anxiety scale ($F(1,59)=6.41$, $p<.05$).	**Strengths**: *Has a behavioral focus **Limita-tions**: *Non-representa-tive sample *Lack of theoretical framework *Lack of parent/ family component

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	worth=0.86-0.85. Social physique anxiety scale (SPA) (Hart et al., 1989).			
Melnyk, Jacobson, Kelly, O'Haver, Small, & Mays. (2009). South-western USA Cognitive Behavioral Theory RCT	**Purpose:** To determine short-term preliminary efficacy of a SB intervention with adolescent mental health, healthy lifestyle beliefs and choices, and physical health. **Sample**: N=19, 14-16 yo, Hispanic. **Setting**: One school, during health class, delivered by members of the research team. **Data collection:** Pre- and post-intervention. **Components:** N, PA, SC. **Instruments**: Healthy Lifestyle Beliefs Scale (Cronbach's alpha .90 with this sample). Nutrition Knowledge (Cronbach's alpha .88 with this sample), Healthy Lifestyle Choices Scale (Cronbach's alpha .85 with this sample), Beck Youth Inventory, 2nd ed. (Harcourt assessment, well established reliability/validity),	**Intervention**: COPE TEEN delivers educational info on healthy lifestyle and practicing role playing cognitive behavioral skills building, 15 sessions, 2-3 days a week during health class. **Control**: Attention control group receives instructions on various health topics. **Outcome measures**: depressive symptoms, anxiety symptoms, beliefs about various facets of maintaining a healthy lifestyle, nutrition knowledge, healthy lifestyle choices, BMI.	**Findings**: *Students in I group reported less depressed (small effect size -.32) and less anxious (medium effect size -.56) at post- vs attention control group. *Students in I (small effect size .48) and C (moderate effect size .41) groups showed similar change in commitment to making healthy choices.	**Strengths**: *Wide range of program compo-nents *Has a behavioral focus **Limita-tions**: *Non-representa-tive sample *Lack of unified approach to outcome measures *Lack of parent/ family component *Lack of impact on many target variables

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	Tanita scale, measuring tape.			
Moseley & Gradisar. (2009). Adelaide, South Australia Cognitive behavior framework RCT	**Purpose:** To evaluate the effectiveness of a SB intervention in increasing sleep knowledge and improving adolescent sleep problems. **Sample**: N=81, 15-16 yo **Setting**: Two HS 11th grade psychology classes, delivered by member of the research team. **Data Collection**: Pre-, post-, and 6 weeks follow-up intervention. Collected online. **Components**: SC. **Instruments**: Sleep Patterns Questionnaire (Gradisar, Terrill, Johnston, & Douglas, 2008) not reported; Pediatric Daytime Sleepiness Scale (PDSS)(Drake, Nickel, Burduvali, Roth, Jefferson, & Badia, 2003) Cronbach alpha .64; Depression Anxiety Stress Scale, depression subscale (DASS) (Lovibond &	**Intervention**: Improving Adolescent Well-Being: Day and Night, four 50 minute sessions, over 4 weeks. Sleep content was embedded within the wider context of well-being. **Control**: Traditional psychology class. **Outcome measures**: Sleep measures; go to bed time, total sleep time, sleep onset latency school nights, out of bed time, discrepant school/ weekend out of bed. Daytime measures; PDSS measures daytime sleepiness, DASS-depression subscale measures mood. Qualitative measures: student feedback on; 1) perceived learning experiences, 2) most beneficial aspects of the program, and 3) suggestions for future improvements of the program.	**Findings**: *Sleep knowledge increased for the treatment group (t_{37}=3.45, p=.001), no significant effects on other target sleep variables or depressed mood compared to control. *For adolescents with delayed sleep time (DST) there was a significant interaction for reducing the discrepancy between school day and weekend out of bed times at post- (medium effect size .36), which was not significant at 6 week follow-up.	**Strengths**: *Has a behavioral focus **Limita-tions**: *Lack of parent/ family component. *Lack of impact on many target variables

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	Lovibond, 1995) Cronbach alpha .85; well-being knowledge questionnaire. Behavior Intentions Questionnaire (BIQ) (stages of change/ transtheoretical model).			
Neumark-Sztainer, Story, Hannan, & Rex. (2003). Twin Cities area, Minnesota Social Cognitive Theory RCT	**Purpose:** To test the feasibility, acceptability, and short-term impact on PA, eating patterns, self-perceptions, and BMI of a SB program for obesity prevention in adolescent girls. **Sample**: N=201, 9th and 10th grade girls, overweight or at risk for low physical activity. **Setting**: 6 schools 3 C, 3 I), alternative PE class, delivered by school staff and research team members. **Data Collection:** Pre-, post-, and 8-month follow-up intervention. **Components**: N, PA, SC. **Instruments**: 1) individual interviews with PE teachers and principals from	**Intervention**: New Moves, 5 days a week for 16 weeks, providing class environment where larger girls could feel comfortable being physically active to avoid negative weight related stigmatization. **Control**: Traditional PE class. **Outcome measures**: Change in PA stage, PA, sedentary activity, fruit/vegetable intake, soda intake, breakfast intake, fast food intake, healthy weight control, unhealthy weight control, binge eating, BMI, self-acceptance, athletic competence, physical appearance, self-worth, media internalization, benefits of PA, benefits of healthful eating, enjoyment of PA, self-efficacy to be physically active, parent support, peer	**Findings**: *Significant progress in stage of change for PA in the I group (+11.11, p=.004). *No significant differences for the majority of outcome variables.	**Strengths**: *Wide range of program compo-nents *Includes parent/ family component *Has a behavioral focus **Limita-tions**: *Non-representa-tive sample *Lack unified approach to outcome measures *Lack of impact on many target variables

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	intervention schools re program satisfaction and sustainability (N=6, 100% response rate), 2) mailed surveys to parents of the intervention girl toward the end of the program (N=67, response rate 70%), 3) process evaluation surveys with intervention girls at end of program (N=79, 89% response rate), 4) individual in-depth interviews conducted with a sample of 30 intervention girls following program completion, 5) baseline, post-(16 weeks), and 8-month follow-up physical measures (height, weight, BMI standard calculation): behavioral; PA stage of change test re-test .87, PA test re-test .8), sedentary activity test re-test .80, fruit/ vegetable intake test-retest .49, soda intake test re-test .57, breakfast test-retest .89, fast food test-retest .85, weight control behaviors test re-test .83 unhealthy, .69 healthy, binge eating test re-test .72:	support, staff support.		

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	personal; BMI test re-test .99, self-acceptance Cronbach *a*=.68, athletic competence Cronbach *a*=.82, physical appearance Cronbach *a*=.88, self-worth Cronbach *a*=.85, media internalization Cronbach *a*= .84, benefits PA Cronbach *a*=.73, benefits healthful eating Cronbach *a*=.77, enjoyment of PA Cronbach *a*= .82, self-efficacy to be PA Cronbach *a*=.84: and socio-environmental; parent support Cronbach *a*=.70, peer support Cronbach *a*= .70, staff support Cronbach *a*=.79.			
Spruijt-Metz, Nguyen-Michel, Goran, Chou, & Huang. (2008). Southern CA, USA Self-Determina-tion Theory and the Theory of Meanings of Behavior	**Purpose:** To develop, implement, and test a theory-based SB classroom media intervention to increase PA and decrease sedentary behaviors. **Sample:** Predominantly (73%) Latina middle school girls, N=459. **Setting:** Seven schools (4 I, 3 C), during PE class by Royer Studios.	**Intervention:** Get Moving!, a media-based PA intervention, delivered to students during 5-7 in class sessions for 5-7 consecutive school days. **Control:** Traditional PE class. **Outcome measures**: Meanings of PA, four factors; personal, social, functional, fantasy. Motivation for PA, four types of motivation; external,	**Findings:** *The intervention significantly increased intrinsic motivation (*B*+/-SE=0.11+/- 0.05, p<0.05) *No significant effects on other aspects of motivation or meanings of PA. *The intervention had a significant effect on decreasing time spent in sedentary behaviors (*B*+/-SE=-.0.27+/-0.14, p<0.05). *No	**Strengths:** *Has a behavioral focus **Limita-tions:** *Non-representa-tive sample *Lack of parent / family component

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
RCT	**Data collection:** Baseline 3 months prior to intervention, follow-up 3 months after intervention. **Components**: PA. **Instruments**: Modified previous day PA recall (PDPAR), states validated. Meanings of PA scale (MPAS), states shows good reliability and validity. Exercise self-regulation questionnaire (Ryan & Connell, 1989), Cronbach's *a* .76 in this sample. Weight an bioelectrical impedance for body fat % on a Tanita TBF300/A analyzer, height with Seca rod, BMI using CDC calculation.	introjected, identified, intrinsic. Height, weight, body fat %.	significant effects on PA, BMI or %body fat.	
Stice, Rohde, Shaw, & Marti. (2012). Oregon, USA No theory noted. RCT	**Purpose:** To evaluate the efficacy of eating disorder symptom and unhealthy weight gain prevention program. **Sample**: N=398, 18 yo, female, at high risk based on body image concerns. **Setting**: University workshop, delivered by clinical graduate students.	**Intervention**: Healthy Weight 2, four weekly 1-hour group sessions with 6-10 participants. **Control**: Educational brochure distributed. **Outcome measures**: Eating disorder symptoms, BMI, body dissatisfaction, depressive symptoms, dieting, dietary intake,	**Findings**: *Treatment group with greater reduction in eating disorder symptoms at post- (*d=0.03*, *p*=.003) but not 6-month follow-up *Smaller increase in BMI at post- (d=0.21, *p*=. 05) but not 6-month follow-up *Increased exercise at post-, reduced dieting at	**Strengths**: *Has a behavioral focus **Limita-tions**: *Non-representa-tive sample *Lack of guiding theoretical framework

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	Data collection: Pre-, post-, and 6-month follow-up intervention. **Components**: SC. **Instruments**: Eating Disorder Diagnostic Interview (Stice, Shaw, Burton, & Wade, 2006) test re-test .95 and internal consistency *a*=.84; Block Food Frequency Questionnaire (Block, Hartman, & Naughton, 1990) test re-test .69; Dutch Restrained Eating Scale (van Strien, Grijters, van Staveren, Defares, & Deurenberg, 1986) internal consistency *a*=.95; Paffenbarger Activity Questionnaire (Paffenberg, Wing, & Hyde, 1978) test re-test .72; Body Dissatisfaction Scale (Berscheid, Walster, & Bohrnstedt, 1973) internal consistency a=.94 , test re-test .90; Schedule for Affective Disorders and Schizophrenia for School-Age Children (Kaufman, Firmaher, Brent, Rao, & Ryan, 1996) internal consistency a=.75,	PA.	post- and 6-month follow-up, reduced body dissatisfaction at post-. *No significant effect for depressive symptoms or caloric intake.	*Lack of parent/ family component

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	test re-test .93; Perceived Sociocultural Pressure Scale (Stice, Marti, & Durant, 2011) internal validity a=.88, test re-test .93.			
Stice, Shaw, Burton, & Wade. (2006). Texas, USA No theory noted. 4-arm RCT	**Purpose:** To test the effectiveness of dissonance and healthy weight programs on eating disorder risk factors, bulimic symptoms, risk for obesity onset, psychosocial functioning, and service utilization. **Sample**: N=481, 14-19 yo girls with body image concerns. **Setting**: University workshop, delivered by researcher team member and a graduate student. **Data collection**: Pre-, post-, 6-month, and 12-month follow-up intervention. **Components**: SC. **Instruments**: Ideal-Body Stereotype Scale Revised (Stice, Fisher, & Martinez, 2004) internal consistency a=.94, test re-test= .80); Satisfaction and	**Intervention**: Four-arm: dissonance and healthy weight interventions were 3 weekly 1-hour group sessions; expressive writing intervention was 3 weekly 45-minute individual writing sessions; control group was assessment only. **Control**: Assessment only. **Outcome measures**: Thin ideal internalization, body dissatisfaction, dieting, negative affect, bulimic symptoms for each of the 4 groups.	**Findings**: *Dissonance I group compared to C group showed significantly greater decreases in: - thin idealization pre- to post- (r=.38, p<.001), 6-month follow-up (r=.29, p<.001) and 1-year follow-up (r=.13, p<.05) -body dissatisfaction pre- to post-(r=.35, p<.001) and 6-month follow-up (r=.28, p<.001) -dieting pre- to post-(r=.27, p<.001), 6-month follow-up (r=.17, p<.01), and 1-year follow-up (r=.17, p<.01) -negative affect pre- to post- (r=.24, p<.001) and 6-month follow-up (r=.12, p<.05) -bulimic symptoms pre- to post- (r=.17, p<.05), 6-month follow-up (r=.18, p<.01), and 1-year follow-up (r=.20, p<.001). *Healthy weight I	**Strengths**: *Has a behavioral focus **Limitations**: *Non-representative sample *Lack of guiding theoretical framework *Lack of parent/ family component

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	Dissatisfaction With Body Parts Scale (Berscheid, Walter, & Bohrnstedt, 1973) internal consistency a=.94, test re-test .90); Dutch Restrained Eating Scale (DRES, van Strien, Grijters, van Staveren, Defares, & Deurenberg, 1986) internal consistency *a*=.95, test re-test =.82; Sadness, Guilt, and Fear/Anxiety subscales from the Positive Affect and Negative Affect Scale Revised (Watson & Clark, 1992) internal consistency a=.95, test re-test= .78; Eating Disorder Examination (Fairburn & Cooper, 1993) internal consistency a=.92, test re-test =.90; height with stadiometer, BMI calculated; Social Adjustment Scale (adapted) (SAS) (Weissman & Bothwell, 1976) internal consistency a=.77, test re-test= .83); health service and mental health service utilization questions, test re-test=.82, and .89.		group compared to C group showed significantly greater reduction in: -thin ideal internalization pre- to –post- (r=.22, p<.001),6-month follow-up (r=.21, p<.001) and 1-year follow-up (r=.20, p<.001) -body dissatisfaction pre- to post- (r=,19, p<.001), 6-month follow-up (r=.25, p<.001) -dieting at 6-month follow-up (r=.11, p<.05), and 1-year follow-up (r=.11, p<.05) -negative affect pre- to post- (r=.12, p<.05), and bulimic symptoms at 6-month follow-up (r=.16, p<.01) and 1-year follow-up (r=.15, p<.01).	

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
Tsorbat-zoudis. (2005). Greece Ajzen's Theory of Planned Behavior RCT	**Purpose:** To examine the effectiveness of an intervention program targeting the cognitive, emotional, and behavioral components of attitudes towards exercise in the context of PE class. **Sample**: N=366, 14 yo **Setting**: 4 HS (2 I, 2 C), during PE class, delivered by PE teachers. **Data collection**: Pre-, post-, and 16-18 weeks follow-up intervention. **Components**: PA. **Instruments**: Developed for this study using Likert-type and Thurstone scaling, using Ajzen's suggestions (2002) for item formulation (psychometric properties a>.67). Baecke Questionnaire of Habitual Activity (Baecke et al., 1982).	**Intervention**: 36 lessons over 12 weeks, three 45-minute lectures, posters placed in classroom, PE teacher recommendations and out of school sports leaflet. **Control**: Traditional PE class. **Outcome measures**: Intention, attitudes toward behavior, subjective norms, perceived behavioral control, role identity, attitude strength, exercise habits.	**Findings**: *Significant changes between control and treatment groups on; attitudes toward exercise ($F_{1,294}$= 12.34, p<.001), perceived behavioral control ($F_{1,294}$= 17.02, p<.001), more positive intentions ($F_{1,359}$=15.78, p<.001), and self-reported exercise habits ($F_{1,294}$=6.92, p<.001). *No significant mean differences were found on subjective norms, attitude strength, or role identity.	**Strengths**: *Has a behavioral focus **Limita-tions**: *Lack of unified approach to outcome measures *Lack of parent/ family component *Lack of impact on target variables
Vansteen-kiste, Simons, Soenens, & Lens. (2004).	**Purpose:** To identify the contextual antecedents of motivation, effort expenditure, and performance during	**Intervention**: 2 sessions: at the beginning of #1PE class different framing instructions were given to students	**Findings**: *Participants in the autonomy-supportive condition engaged in a more volitional and	**Strengths**: *Has a behavioral focus **Limita-**

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
Belgium Self-Determina-tion Theory (SDT) and Future Time Perspective Theory (FTPT). RCT, 4x2 design, type goal condition	PE lessons, and perseverance at the activity afterward, using FTPT and SDT. **Sample**: Adolescents 10,11,12th grade. N=501, randomly placed into one of 8 conditions (n=60-72 per condition). **Setting**: High school PE class, by trained PE teachers. **Data collection:** Baseline and 3-5 days post-. **Components**: PA. **Instruments**: Perceived Autonomy (*a*=.97); Behavioral Regulation in Exercise Questionnaire (BREQ; Mullen, Markland, & Ingledew, 1997) external a=.93, introjected a=.82, identified a=.88, intrinsic a=.95; Effort (a=.98); Graded performance by PE teacher; Free-Choice Persistence, a voluntary demonstration by the student of physical activity; Sport Club Membership, becoming a member of the physical	**Control**: No framing All students received PE instructions for an activity. **Outcome measures**: Intrinsic regulation, identified regulation, interjected regulation, external regulation, effort, performance, persistence, club membership.	willing manner in the activity than those involved in the controlling conditions (*t*(499)= 73.45, p<.001). *Future intrinsic goal framing led to: *more effort expenditure compared to control group (*t*(493)=9.37, p<.001) *reduced eternal task regulation (*t*(493)=5.33, p<.001) *enhanced participant identified regulation (*t*(493)=3.41, p<.001) *enhanced participant intrinsic regulation (*t*(493)= 6.41, p<.001). *Future intrinsic goal framing in comparison to control resulted in: - better test performance (t(493)=3.00, p<.001), - higher persistence at time 2 (t(493)= 6.98, p<.001), and time 3 (t(493)= 11.63, p<.001) - more club membership affiliation (t(493)= 5.77, p<.001). *Future extrinsic goal framing compared to when no future goal was	**tions**: *Lack of parent/ family component,

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	activity club voluntarily.		provided: - undermined effort expenditure compared to control group (t(493)=-9.22, p<.001) - promoted external regulation (t(493)= 2.71, p<.001) - reduced identified regulation (t(493)=-4.73, p<.001) - reduced intrinsic regulation ((t(493)= -6.19, p<.001) regulation *Autonomy-supportive contexts vs controlling contexts led to: - more effort expenditure (t(493)= 17.88, p<.001) - reduced external regulation (t(493)=-31.23, p<.001) - diminished introjected regulation (t(493)=-3.68, p<.001). *Autonomy support positively predicted: - identified regulation (t(493)= 8.81, p<.001) - intrinsic regulation (t(493)=10.87, p<.001). *Participants in autonomy-supportive conditions had: - higher performance scores (t(493)=9.32, p<.001) - more participants	

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
			persisted at time 1(t(493)=10.34, p<.001), time 2 (t(493)=9.06, p<.001), and time 3 (t(493)=7.71, p<.001).	
Young, Phillips, Yu, & Haythorn-thwaite. (2006). Baltimore MD, USA Social Action Theory RCT	**Purpose:** To evaluate the effects of a life-skills oriented PA intervention for increasing overall PA in adolescents. **Sample**: N=221 girls, 9th grade, 83% black. **Setting**: One high school, during PE class, delivered by a teacher hired for the project. **Data collection**: Pre-(September) and post-intervention (April/May). **Components**: PA, SC. **Instruments**: 7-day Physical Activity Recall (Sallis, Haskell, & Ho, 1985) test re-test .59 for 8th grade and .81 for 11th grade; submaximal 3-stage step test (none listed); sedentary behavior questions adapted from a questionnaire used in a previous study	**Intervention**: In PE class, 5 days a week, for 8 months. Lecture, discussion, group work, homework, and physical activity, not specified how much time devoted to each. **Control**: Traditional PE class. **Outcome measures**: Estimated daily energy expenditure, cardiorespiratory fitness, sedentary activities, height, weight, hip circumference, blood pressure, serum cholesterol.	**Findings**: *I group spent significantly more time walking or active (46.9%) than C(30.5%) (p<.001). *I group declined in television/video game/internet use by 5.3% (*p*=.03), with no change in C group. *I group reporting 3 or more hours/day in at least 1 sedentary activity declined 8.1% and remained the same in C group (*p*=.06).	**Strengths**: *Includes parent/ family component *Has a behavioral focus **Limita-tions**: *Non-representa-tive sample *Lack of impact on target variables.

Author/ Location/ Theory/ Design	Purpose/Sample/ Setting	Intervention/ Outcomes	Significant Findings	Strengths/ Limitations
	(none reported); Dinamap blood pressure monitor.			

PRIOR ADOLESCENT SCHOOL-BASED INTERVENTION STUDIES
USING SELF-DETERMINATION THEORY FRAMEWORK

Study Validity/ Reliability	Behavior Examined/ Population Studied	Measurement/ Indicators	Intervention Dose/Data Collection	Significant Findings	Results
Chatzisaran-tis & Hagger. (2009). Validity: No Reliability: Cronbach alpha	• Physical activity intentions • leisure time physical activity behavior • 215 par-ticipants • 14-16 years old • 49% male	• Teacher autonomy support • Motivation-al orientation for physical education • Autonomy index • Behavioral intentions • Leisure time physical activity	• 10 schools • 5 weeks long • During 45-minute PE class • Baseline, at 5 weeks post-, and at 10 weeks post-interven-tion.	• Students in the autono-my-supportive group reported stronger intentions to exercise during leisure time than students in the control group. • Students in the autonomy-supportive group reported more frequent leisure time activity than students in the control group.	• Teacher use of autonomy support changes self-reported intention and participa-tion in leisure time physical activity. • SDT tenets can be incur-porated into existing educa-tional curricu-lum delivery and show positive results.
Spruijt-Metz et al. (2008). Validity: No Reliability: Cronbach alpha	• Physical activity • Sedentary behavior • 459 girls • 12 years old • 73% Latina	• Physical activity • Meanings of physical activity • Motivation	• 7 schools • 5-7 consecu-tive school days • During 2-hour double period PE class	• Reduced time spent on sedentary behavior. • Increased intrinsic motivation for physical activity.	• The intervene-tion increased intrinsic motiva-tion, which was signifi-cantly and

Study Validity/ Reliability	Behavior Examined/ Population Studied	Measurement/ Indicators	Intervention Dose/Data Collection	Significant Findings	Results
			• 3 months pre- and 3 months post-inter-vention		negative-ly related to the decrease in sedentary behavior.
Vansteen-kiste et al. (2004). Validity: No Reliability: Cronbach alpha	• Tai-bo exercise • 501 partici-pants • 10th, 11th, and12th grade students • 54% male	• Perceived autonomy for exercise activity • Self-regulation (motivation) to exercise • Effort put into exercise • Teacher graded performance • Free-choice persistence to exercise • Sport club membership	• One school • During one PE class • After instruc-tion at 1st class, and 3-5 days later	• Presenting goals in an autono-mous supportive resulted in the same motiva-tional and behavioral benefits as future intrinsic goal framing	• Framing the exercise activity in terms health and physical fitness had a positive effect on effort, autono-mous motiva-tion, perfor-mance, long-term persis-tence and sport club members hip. • Framing the exercise activity in terms of physical appear-ance and attract-tiveness under-mined the same

Study Validity/ Reliability	Behavior Examined/ Population Studied	Measurement/ Indicators	Intervention Dose/Data Collection	Significant Findings	Results
					outcomes. • Future intrinsic goal framing led to autono-mously driven perseve-rance at the activity.

APPENDIX B

INTERVENTION MATERIALS

NUTRITION FACT OR FICTION QUESTIONS (Grade Level 6) KEY

1. Fact or Fiction? Snacking may keep me from becoming hungry and overeating at mealtime.

Fact. Healthful snacking, including carbohydrates and protein, like whole grain crackers with low-fat cheese or fat-free yogurt with fresh fruit, can help your body stay fueled so you will be less inclined to overeat at your next meal. But don't overdo it on the shacks, keep your portions small.

2. Fact or Fiction? Eating too many carbohydrates causes weight gain.

Fact: Eating too many calories from ANY source, carbohydrates fat or protein, combined with an inactive lifestyle, will likely cause you to gain weight. Make at least half your grains whole. Choose 100% whole-grain breads, cereals, crackers, rice and pasta. And, get 60 minutes of physical activity most days of the week.

3. Fact or Fiction? Vegetarian diets are healthful.

Fact: A well-planned healthful vegetarian eating plan emphasizes fruits, vegetables, whole grains and fat-free or low-fat dairy or dairy alternatives and is low in saturated fats trans fats, cholesterol, salt and added sugars. Depending on the type of vegetarian diet, protein sources may include eggs, milk, cheese, yogurt, soy-based products, grain foods such as bread, cereal pasta and rice beans and nuts. With planning, most people including children, can healthfully follow a vegetarian diet.

4. Fact or Fiction? Breakfast provides you with the energy and nutirents that lead to increased concentration.

Fact: Studies show that eating breakfast is associated with increased concentration, better academic and classroom performance.Students who eat breakfast had fewer headaches and stomachaches, and are less likely to be late or absent from class.

5. Fact or Fiction? Eating breakfast will make you more tired during the day.

Fiction: Studies show that people who eat nothing at breakfast did the worst on memory tests and had the highest levels of fatigue at noon. They also scored lower on mental skills tests, showing that skipping breakfast can have effects on memory and energy levels.

Fiction: In almost all cases, there is little nutritional difference between frozen or canned and fresh. In fact, canned or frozen produce is generally processed at its peak, so it may contain more nutrients than fresh produce. On the other hand, canned or frozen produce may contain added sugar or salt. Read food labels when purchasing these items.

6. Fact or Fiction? Eating sugar causes diabetes.

Fiction: Eating sugar won't cause you to develop diabetes. If you have diabetes, eating sugar will make it more difficult to control the disease. Since foods that are high in sugar also are often high in calories, over-eating those foods can lead to weight gain. Being obese and inactive increases your risk for diabetes. Cut back on extra calories by choosing foods and drinks with little or no added sugars.

7. Fact or Fiction? I should limit my daily salt intake to about one teaspoon.

Fact: According to the 2005 Dietary Guidelines for Americans, most people's daily sodium intake should be 2,300 milligrams or less. That is about the amount of sodium in one teaspoon of salt. Research shows that limiting sodium to less than 2,300 milligrams per day may reduce your risk of high blood pressure. Keep in mind that most of the sodium we eat comes from processed foods, so check the Nutrition Facts food label for information on the amount of sodium contained in a serving of your favorite foods.

8. Fact or Fiction? Eating breakfast has nothing to do with maintaining a healthy weight.

Fiction: Eating breakfast helps maintain a healthy weight because it sets you up to eat well throughout the day. Skipping breakfast makes snacking and eating a larger meal in the evening more likely, which can result in weight gain.

9. Fact or Fiction? I will gain about 10 pounds a year by eating an extra 100 calories a day.

Fact: One hundred more calories a day eaten over what is used up in physical activity adds up to about one pound of weight gain each month. On the other hand look at it this way: You can lose 10 pounds in a year by cutting 100 calories per day and increasing your physical activity. Try to get at least 60 minutes of activity most days of the week.

10. Fact or Fiction? In a healthy eating plan, all the foods I eat should be low in fat.

Fiction: Your goal should be to eat fewer foods that are high in solid fats. That doesn't mean every single food you eat must be low in fat. Select lean cuts of meats or poultry and fat-free milk yogurt and cheese. Look for foods that are low in saturated fats, trans fats, and cholesterol. Switch from solid fat to oils such as olive and canola when preparing food.

PHYSICAL ACTIVITY FACT OR FICTION (Reading Level Grade 7) KEY

1. Fact or Fiction? Lift weights quickly to increase the "burn".

Fiction: When you blaze through each move, you often use momentum instead of your muscles. You also increase your risk of injury. Do the same weight repetitions but more slowly, try counting to three while you contract your muscle and count to three while you lower.

2. Fact or Fiction? Stretch your muscles before you run.

Fiction: There are no studies that say stretching before running prevents injuries. It is important to warm up before running fast and hard by jogging slowly for 5-10 minutes. After running do a comfortable stretching of your muscles, holding each gentle stretch for 30-60 seconds.

3. Fact or Fiction? Doing some physical activity is better than doing none.

Fact: Inactive people can start with small amounts of physical activity and gradually increase the duration, frequency, and intensity of the physical activity over time.

4. Fact or Fiction? Cardio burns more calories than strength training.

Fiction: Studies have shown that strength training is superior to cardio in burning calories. One University of Southern Maine study showed participants burned as many calories doing 30 minutes of weight training as they did running at a 6-minute mile pace for the same amount of time. Weight training also boosts your metabolism and burns calories AFTER your work-out, and builds muscle that will further increase your calorie burning in the long run.

5. Fact or Fiction? You can reduce cellulite through exercise.

Fact: Although exercise will not prevent cellulite, it can help reduce the appearance of cellulite. Cellulite is fat, so calorie burning activities and the right nutrition can make your skin look smoother. Weight gain can make cellulite worse.

6. Fact or Fiction? Skinny people are healthier than overweight people.

Fiction: The key to good health is not just your weight. Measurements like resting heart rate, blood pressure, and cholesterol measure health. In a recent study 20% of people had excessive levels of internal fat around their organs, and this type of fat is higher in people who do not exercise, whether they are thin or overweight. Overweight, but active, is better than thin, but inactive.

7. Fact or Fiction? Exercise immediately improves your ability to learn.

Fact: In a study at the University of Muenster in Germany, participants who ran sprints learned new words 20% faster than those who did no physical exercise. Brain cells become more flexible and ready to make connections after physical exercise. Physical activity also increases production of stem cells that develop new brain cells.

8. Fact or Fiction? Both moderate and vigorous intensity physical activity convey health benefits.

Fact: Intensity refers to the effort at which the activity is being performed. The intensity of different forms of physical activity varies between people, depending on the individual's level of fitness. Moderate physical activity can include; brisk walking, dancing, or household chores. Vigorous physical activity can include; running, fast cycling, fast swimming, or moving heavy loads.

9. Fact or Fiction? People between the ages of 5-17 years should do at least 60 minutes of physical activity each day, during the course of the day.

Fact: The 60 minutes of exercise does not have to be done all at once. It can be spread out over the entire day.

10. Fact or Fiction? Morning is the best time of day for physical activity.

Fiction: Studies have shown that the body can adapt to top performance at any time. The best time of day for physical activity is the time that you are actually able to do it.

SLEEP FACT OR FICTION (Grade Level 5) KEY

1. Fact or Fiction? Health problems have no relation to the amount and quality of a person's sleep.

Fiction: Not getting enough sleep can cause you to eat too much or unhealthy foods like sweets and fried foods that lead to weight gain. More and more scientific studies are showing relations between poor quality sleep and/or lack of sleep with a variety of diseases, including high blood pressure, diabetes, and depression. For example, insufficient sleep can hurt the body's ability to use insulin, which can lead to the development of more severe diabetes. People with poorly controlled diabetes have improvement of blood sugar control when treated for the sleep apnea. People with high blood pressure also show improvement when their sleep apnea is treated. In addition, too little sleep may decrease growth hormone secretion, which has been linked to obesity.

2. Fact or Fiction? Adults need less sleep than teens.

Fiction: The average adult needs a total sleep time of 7-9 hours per day, teens need 8.5 to 9.5 hours of sleep each night. While sleep patterns usually change as we age, the amount of sleep we need does not. Older adults may sleep less at night due to frequent night waking, but their need for sleep is no less than that of younger adults.

3. Fact or Fiction? Snoring can be harmful.

Fact: Aside from bothering other people, snoring alone is not harmful. However, snoring can be a sign of sleep apnea, a sleep disorder that is associated with significant medical problems such as cardiovascular disease and diabetes. Sleep apnea is characterized by episodes of reduced or no airflow throughout the night. People with sleep apnea may remember waking up frequently during the night gasping for breath.

4. Fact or Fiction? You can get "used to" getting less sleep.

Fiction: Getting fewer hours of sleep on one night will eventually need to be replenished with additional sleep in the following nights. Our body does not seem to get used to less sleep than it needs.

5. Fact or Fiction? Teens need more sleep than adults.

Fact: Teens need 8.5-9.5 hours of sleep each night, compared to an average of 7-9 hours each night for most adults. In addition, the internal biological clocks of teenagers can keep them awake later in the evening and can interfere with waking up in the morning.

6. Fact or Fiction? Insomnia is characterized only by difficulty falling asleep.

Fiction: One or more of the following four symptoms are usually associated with insomnia; 1) difficulty falling asleep, 2) waking up too early and not being able to get back to sleep, 3) frequent awakenings, and 4) waking up feeling unrefreshed.

7. Fact or Fiction? Daytime sleepiness means a person is not getting enough sleep.

Fiction: While excessive daytime sleepiness often occurs if you don't get enough sleep, it can also occur even after a good night's sleep. Such sleepiness can be a sign of an underlying medical condition or sleep disorder such as narcolepsy or sleep apnea.

8. Fact or Fiction? Your brain rests during sleep.

Fiction: The body rests during sleep, not the brain. The brain remains active, gets recharged, and still controls many body functions, including breathing, during sleep.

9. Fact or Fiction? If you wake up in the middle of the night and can't fall back to sleep you should get out of bed and do something.

Fact: If you wake up in the night and can't fall back to sleep within 15-20 minutes, get out of bed and do something relaxing. Do not sit in bed and watch the clock. Experts recommend going into another room to read or listen to music. Return to bed only when you feel tired.

10. Fact or Fiction? Getting too little sleep may negatively influence weight.

Fact: How much a person sleeps at night can impact their weight. This is because the amount of sleep a person gets can affect certain hormones, specifically the hormones leptin and ghrelin that affect appetite. Leptin and ghrelin work in a kind of check and balance system to control feelings of hunger and fullness. Ghrelin is produced in the gastrointestinal tract and stimulates appetite. Leptin in produced in fat cells and signals the brain when you are full. When you don't get enough sleep leptin levels are driven down, which means you don't feel as full after you eat, and ghrelin levels are increase, stimulating your appetite so you want more food. The two combined set the stage for overeating, which may lead to weight gain.

FAMILY MEDICAL HISTORY QUESTIONNAIRE

Mother's Family

Has anyone in the family (parents, grandparents, brothers, sisters, aunts, uncles) ever had:

Condition	Yes	No	I Don't Know	Who?
Allergies (please list)	Y	N	IDK	
Asthma	Y	N	IDK	
Lung Disease	Y	N	IDK	
HIV/AIDS	Y	N	IDK	
Suicide Attempts	Y	N	IDK	
Heart Disease	Y	N	IDK	
High Blood Pressure	Y	N	IDK	
Stroke	Y	N	IDK	
High Cholesterol	Y	N	IDK	
Blood Disorder	Y	N	IDK	
Diabetes	Y	N	IDK	
Seizures	Y	N	IDK	
Mental Illness	Y	N	IDK	
Cancer	Y	N	IDK	
Birth Defects	Y	N	IDK	
Hearing Loss	Y	N	IDK	
Speech Problems	Y	N	IDK	
Kidney Disease	Y	N	IDK	
Alcoholism	Y	N	IDK	
Drug Use	Y	N	IDK	
Liver Disease	Y	N	IDK	
Hepatitis	Y	N	IDK	
Thyroid /Disease	Y	N	IDK	
Learning Problems	Y	N	IDK	
Attention Deficit Disorder	Y	N	IDK	
Family Violence	Y	N	IDK	
Migraine Headaches	Y	N	IDK	
Arthritis	Y	N	IDK	
Other (please describe)	Y	N	IDK	

FAMILY MEDICAL HISTORY QUESTIONNAIRE

Father's Family

Has anyone in the family (parents, grandparents, brothers, sisters, aunts, uncles) ever had:

Condition	Yes	No	I Don't Know	Who?
Allergies (please list)	Y	N	IDK	
Asthma	Y	N	IDK	
Lung Disease	Y	N	IDK	
HIV/AIDS	Y	N	IDK	
Suicide Attempts	Y	N	IDK	
Heart Disease	Y	N	IDK	
High Blood Pressure	Y	N	IDK	
Stroke	Y	N	IDK	
High Cholesterol	Y	N	IDK	
Blood Disorder	Y	N	IDK	
Diabetes	Y	N	IDK	
Seizures	Y	N	IDK	
Mental Illness	Y	N	IDK	
Cancer	Y	N	IDK	
Birth Defects	Y	N	IDK	
Hearing Loss	Y	N	IDK	
Speech Problems	Y	N	IDK	
Kidney Disease	Y	N	IDK	
Alcoholism	Y	N	IDK	
Drug Use	Y	N	IDK	
Liver Disease	Y	N	IDK	
Hepatitis	Y	N	IDK	
Thyroid /Disease	Y	N	IDK	
Learning Problems	Y	N	IDK	
Attention Deficit Disorder	Y	N	IDK	
Family Violence	Y	N	IDK	
Migraine Headaches	Y	N	IDK	
Arthritis	Y	N	IDK	
Other (please describe)	Y	N	IDK	

APPENDIX C

INSTRUMENTS

INTRINSIC MOTIVATION INVENTORY

THE POST-EXPERIMENTAL INTRINSIC MOTIVATION INVENTORY (Below are listed all 45 items that can be used depending on which are needed.)

For each of the following statements, please indicate how true it is for you, using the following scale:

1	2	3	4	5	6	7
not true at all			somewhat true			very true

Interest/Enjoyment
I enjoyed doing this activity very much
This activity was fun to do.
I thought this was a boring activity. (R)
This activity did not hold my attention at all.(R)
I would describe this activity as very interesting.
I thought this activity was quite enjoyable.
While I was doing this activity, I was thinking about how much I enjoyed it.

Perceived Competence
I think I am pretty good at this activity.
I think I did pretty well at this activity, compared to other students. After working at this activity for awhile, I felt pretty competent.
I am satisfied with my performance at this task.
I was pretty skilled at this activity.
This was an activity that I couldn't do very well.(R)

Perceived Choice
I believe I had some choice about doing this activity.
I felt like it was not my own choice to do this task.(R) I didn't really have a choice about doing this task! (R) I felt like I had to do this.(R)
I did this activity because I had no choice.(R)
I did this activity because I wanted to.
I did this activity because I had to.(R)

Constructing the IMI for your study. First, decide which of the variables (factors) you want to use, based on what theoretical questions you are addressing. Then, use the items from those factors, randomly ordered. If you use the value/usefulness items, you will need to complete the three items as appropriate. In other words, if you were studying whether the person believes an activity is useful for improving concentration, or becoming a better basketball player, or whatever, then fill in the blanks with that information. If you do not want to refer to a particular outcome, then just truncate the items with its being useful, helpful, or important.

Scoring information for the IMI. To score this instrument, you must first reverse score the items for which an (R) is shown after them. To do that, subtract the item response from 8, and use the resulting number as the item score. Then, calculate subscale scores by averaging across all of the items on that subscale. The subscale scores are then used in the analyses of relevant questions.

REVISED INTRINSIC MOTIVATION INVENTORY

Directions: For each of the state-ments below, please circle the number that best describes how true it is for you, using the following scale:	**Eating Breakfast:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Avoid Drinking Sugary Drinks:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Doing Physical Activity:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Avoid Spending Time in Front of a Screen (TV, Com-puter, etc.):** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Getting Enough Sleep:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**
Definitions:	**The following statements refer to eating breakfast. Think about all foods that you might eat for breakfast such as, dry cereal, milk, hot cereal (oatmeal, cream of wheat), breads (bagel, pancake, etc.), eggs, bacon, or sausage.**	**The following statements refer to sugary drinks. Think about all beverages that are sweetened with sugar such as fruit flavored drinks, tea and coffee drinks, sweetened milk, soy, and nut drinks, sport and energy drinks.**	**The following statements refer physical activity for a total of at least 60 minutes per day. (Time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)**	**The following statements refer to time you spend in front of a screen, such as playing video or computer games or using a computer for something that is not school work. (Count time you spent on things such as Xbox, PlayStation, an iPod or iPad or other tablet, a smartphone, YouTube, Facebook or other social networking tools, and the internet.)**	**The following statements refer to getting enough sleep as getting 8.5-9.5 hours of sleep at night.**
1. I enjoy doing this very much:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2. I think I am pretty good at this:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
3. I believe I have some	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Directions: For each of the statements below, please circle the number that best describes how true it is for you, using the following scale:	**Eating Breakfast:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Avoid Drinking Sugary Drinks:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Doing Physical Activity:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Avoid Spending Time in Front of a Screen (TV, Computer, etc.):** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Getting Enough Sleep:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**
choice about:					
4. This is fun to do:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5. I think I do pretty well at this, compared to others:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
6. I feel like it is not my own choice to do this:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
7. I think this is very boring to do:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
8.After doing this, I feel sure I can do this:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
9. I don't really have a choice about doing this:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
10. Doing this did not hold my attention at all:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
11. I am satisfied about doing this:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
12. I feel like I have to do this:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
13. I would describe doing this as very	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Directions: For each of the statements below, please circle the number that best describes how true it is for you, using the following scale:	**Eating Breakfast:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Avoid Drinking Sugary Drinks:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Doing Physical Activity:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Avoid Spending Time in Front of a Screen (TV, Computer, etc.):** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**	**Getting Enough Sleep:** **1= Not at all true** **2= Somewhat true** **3= True** **4= Very true**
interesting:					
14. I do this because I have no choice:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
15. I think doing this is enjoyable:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
16. I do this because I want to:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
17. While doing this I think about how much I enjoy it:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
18. I do this because I have to:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

BEHAVIORAL MEASURES

Please circle the answer that best describes you.

The following 3 questions asks about beverages you drank in the past 7 days. Think about all beverages that are sweetened with sugar (including high-fructose corn syrup) such as fruit flavored drinks, tea and coffee drinks, sweetened milk, soy, and nut drinks, sport and energy drinks, all carbonated beverages that are not diet sodas. Be sure to include drinks you had at home, at school, at restaurants, or anywhere else.

1. During the past 7 days, how many times did you drink a sugar sweetened beverage drink?
    1. 1-3 times during the past 7 days
    2. 4-6 times during the past 7 days
    3. 1 time per day
    4. 2 times per day
    5. 3 times per day
    6. 4 or more times per day
    7. I did not drink any sugar sweetened beverage drinks during the past 7 days

2. During the past 7 days, how many times did you drink a can, bottle, or glass of soda or pop, such as Coke, Pepsi, or Sprite? Do not include diet soda or diet pop.
    1. 1-3 times during the past 7 days
    2. 4-6 times during the past 7 days
    3. 1 time per day
    4. 2 times per day
    5. 3 times per day
    6. 4 or more times per day
    7. I did not drink any soda or pop during the past 7 days

3. During the past 7 days, on how many days did you eat breakfast?
    1. 1 day
    2. 2 days
    3. 3 days
    4. 4 days
    5. 5 days
    6. 6 days
    7. 7 days
    8. I did not eat breakfast during the past 7 days

The next 6 questions ask about physical activity. Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. Physical activity can be done in sports, playing with friends, or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, soccer, basketball, football, and surfing.

Add up all the time you spend in physical activity each day (don't include your physical education or gym class).

4. Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?
    1. 1 day
    2. 2 days
    3. 3 days
    4. 4 days
    5. 5 days
    6. 6 days
    7. 7 days
    8. 0 days

5. Over a typical or usual week, on how many days are you physically active for a total of at least 60 minutes per day?
    1. 1 day
    2. 2 days
    3. 3 days
    4. 4 days
    5. 5 days
    6. 6 days
    7. 7 days
    8. 0 days

6. On an average school day, how many hours do you watch TV?
    1. 1 hour or less per day
    2. 2 hours per day
    3. 3 hours per day
    4. 4 hours per day
    5. 5 or more hours per day
    6. I do not watch TV on an average school day

7. On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Count time you spent on things such as Xbox, PlayStation, an iPod or iPad or other tablet, a smartphone, YouTube, Facebook or other social networking tools, and the internet.)
    1. 1 hour or less per day
    2. 2 hours per day
    3. 3 hours per day
    4. 4 hours per day
    5. 5 or more hours per day
    6. I do not use a computer, except for school work, on an average school day

8. Are you enrolled in a physical education (PE) class this semester?
    1. Healthy Paths
    2. Personal Fitness
    3. Fitness Class
    4. Multiple Pathways
    5. Adapted PE
    6. I do not have PE class this semester

9. During the past 12 months, on how many sports teams did you play? (Count any teams run by your school or community groups.)
    1. 1 team
    2. 2 teams
    3. 3 or more teams
    4. 0 teams

The next two questions ask about body weight.

10. How do you describe your weight?
    1. Very underweight
    2. Slightly underweight
    3. About the right weight
    4. Slightly overweight
    5. Very overweight

11. Do you want to lose weight?
    1. Yes
    2. No

12. Do you want to gain weight?
    1. Yes
    2. No

13. Do you want to stay the same weight?
    1. Yes
    2. No

14. Do you want to do nothing about your weight?
    1. Yes
    2. No

15. On an average school night, how many hours of sleep do you get?
    1. 4 or less hours
    2. 5 hours
    3. 6 hours
    4. 7 hours
    5. 8 hours
    6. 9 hours
    7. 10 or more hours

KNOWLEDGE MEASURE

What do you know about healthy eating, physical activity, and sleep?

Directions: Please circle your one best answer to the following statements.	**KEY**	**Yes**	**No**	**I Don't Know**
1. Breakfast provides you with the energy and nutrients that lead to increased concentration in the classroom.	**1**	**Y**	**N**	**IDK**
2. Being active can give you more energy.	**1**	**Y**	**N**	**IDK**
3. Sugary drinks are good for you.	**2**	**Y**	**N**	**IDK**
4. Studies show that breakfast can be important in maintaining a healthy weight.	**1**	**Y**	**N**	**IDK**
5. Exercise improves your ability to learn.	**1**	**Y**	**N**	**IDK**
6. Health problems have no relation to the amount and quality of a persons' sleep.	**2**	**Y**	**N**	**IDK**
7. I need 60 minutes of physical activity every day.	**1**	**Y**	**N**	**IDK**
8. Kids who spend 4 or more hours a day in front of a screen are more likely to be overweight.	**1**	**Y**	**N**	**IDK**
9. Ounce for ounce, fruit drinks are just as high in calories and added sugar as soda.	**1**	**Y**	**N**	**IDK**
10. Eating breakfast will make you tired during the day.	**2**	**Y**	**N**	**IDK**
11. Your brain rests during sleep.	**1**	**Y**	**N**	**IDK**
12. Watching TV for 3 hours is a healthy choice.	**2**	**Y**	**N**	**IDK**
13. Teens need more sleep than adults	**2**	**Y**	**N**	**IDK**
14. A full calorie 8-ounce iced tea, sport drink or flavored water has 3 to 5 teaspoons of sugar in it.	**1**	**Y**	**N**	**IDK**
15. Doing some physical activity is better than doing none.	**1**	**Y**	**N**	**IDK**
16. Physical activity helps reduce stress and worries.	**1**	**Y**	**N**	**IDK**
17. Eating sugar causes diabetes.	**2**	**Y**	**N**	**IDK**
18. Daytime sleepiness means a person is not getting enough sleep.	**2**	**Y**	**N**	**IDK**
19. 60 minutes of exercise does not have to be done all at once, it can be spread out over the entire day.	**1**	**Y**	**N**	**IDK**
20. Snacking may keep me from becoming hungry and overeating at mealtime.	**1**	**Y**	**N**	**IDK**

DEMOGRAPHICS QUESTIONS

Student Demographic Survey

Please circle the answer that best describes you and your family.

1. What is your gender?
    1. Male
    2. Female
    3. Transgender
2. How old are you?
    1. 12
    2. 13
    3. 14
    4. 15
    5. 16
    6. 17
    7. 18
3. What grade are you in?
    1. 9
    2. 10
    3. 11
    4. 12
4. How would you describe yourself? (circle the one that best describes you)
    1. White, non-Hispanic
    2. Black, non-Hispanic
    3. American Indian/Alaskan Native
    4. Asian/Pacific Islander
    5. Hispanic
    6. Other

5. What is your mother's occupation?

6. What is your father's occupation?

7. Including yourself, how many people live in your household?

8. Including yourself, how many children under 18 years old live in your household?

9. Do you think your mother is overweight?
    1. Yes
    2. No
10. Do you think your father is overweight?
    1. Yes
    2. No
11. Would you like to weigh more?
    1. Yes
    2. No
12. Would you like to weigh less?
    1. Yes
    2. No
13. Would you like to stay the same weight?
    1. Yes
    2. No
14. Have you ever tried to lose weight?
    a. Yes
    b. No

15. How would you describe your health?
    1. Excellent
    2. Very good
    3. Good
    4. Fair
    5. Poor
16. What health problems do you have? (circle all that apply)
    1. None
    2. Asthma
    3. Allergies
    4. Diabetes
    5. Digestive problems (for example vomiting, diarrhea, or constipation)
    6. Depression
    7. Anxiety
    8. High blood pressure
    9. Other (please list)
17. Do you receive free or reduced lunch at school?
    1. Yes
    2. No
18. In the past month have you or your family not had enough to eat due to financial problems?
    1. Yes
    2. No

PACE+ ADOLESCENT PHYSICAL ACTIVITY MEASURE

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time.

Physical activity can be done in sports, playing with friends, or walking to school.

Some examples of physical activity are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, soccer, basketball. Football, and surfing.

Add up all the time you spend in physical activity each day (don't include your physical education or gym class).

1. Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?
    1. 0 days
    2. 1 day
    3. 2 days
    4. 3 days
    5. 4 days
    6. 5 days
    7. 6 days
    8. 7 days

2. Over a typical or usual week, on how many days are you physically active for a total of at least 60 minutes per day?
    1. 0 days
    2. 1 day
    3. 2 days
    4. 3 days
    5. 4 days
    6. 5 days
    7. 6 days
    8. 7 days

Physical Activity Fact or Fiction (Reading Level Grade 7) KEY

1. Fact or Fiction? Lift weights quickly to increase the "burn."

Fiction: When you blaze through each move, you often use momentum instead of your muscles. You also increase your risk of injury. Do the same weight repetitions but more slowly, try counting to three while you contract your muscle and count to three while you lower.

2. Fact or Fiction? Stretch your muscles before you run.

Fiction: There are no studies that say stretching before running prevents injuries. It is important to warm up before running fast and hard by jogging slowly for 5-10 minutes. After running do a comfortable stretching of your muscles, holding each gentle stretch for 30-60 seconds.

3. Fact or Fiction? Doing some physical activity is better than doing none.

Fact: Inactive people can start with small amounts of physical activity and gradually increase the duration, frequency, and intensity of the physical activity over time.

4. Fact or Fiction? Cardio burns more calories than strength training.

Fiction: Studies have shown that strength training is superior to cardio in burning calories. One University of Southern Maine study showed participants burned as many calories doing 30 minutes of weight training as they did running at a 6-minute mile pace for the same amount of time. Weight training also boosts your metabolism and burns calories AFTER your workout, and builds muscle that will further increase your calorie burning in the long run.

5. Fact or Fiction? You can reduce cellulite through exercise.

Fact: Although exercise will not prevent cellulite, it can help reduce the appearance of cellulite. Cellulite is fat, so calorie burning activities and the right nutrition can make your skin look smoother. Weight gain can make cellulite worse.

6. Fact or Fiction? Skinny people are healthier than overweight people.

Fiction: The key to good health is not just your weight. Measurements like resting heart rate, blood pressure, and cholesterol measure health. In a recent study 20% of people had excessive levels of internal fat around their organs, and this type of fat is higher in people who do not exercise, whether they are thin or overweight. Overweight, but active, is better than thin, but inactive.

7. Fact or Fiction? Exercise immediately improves your ability to learn.

Fact: In a study at the University of Muenster in Germany, participants who ran sprints learned new words 20% faster than those who did no physical exercise. Brain cells become more flexible and ready to make connections after physical exercise. Physical activity also increases production of stem cells that develop new brain cells.

8. Fact or Fiction? Both moderate and vigorous intensity physical activity convey health benefits.

Fact: Intensity refers to the effort at which the activity is being performed. The intensity of different forms of physical activity varies between people, depending on the individual's level of fitness. Moderate physical activity can include; brisk walking, dancing, or household chores. Vigorous physical activity can include; running, fast cycling, fast swimming, or moving heavy loads.

9. Fact or Fiction? People between the ages of 5-17 years should do at least 60 minutes of physical activity each day, during the course of the day.

Fact: The 60 minutes of exercise does not have to be done all at once. It can be spread out over the entire day.

10. Fact or Fiction? Morning is the best time of day for physical activity.

Fiction: Studies have shown that the body can adapt to top performance at any time. The best time of day for physical activity is the time that you are actually able to do it.