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Motivating adolescents to chat for health (match): improving nutrition and physical activity in urban youth

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MOTIVATING ADOLESCENTS TO CHAT FOR HEALTH (MATCH): IMPROVING NUTRITION AND PHYSICAL ACTIVITY IN URBAN YOUTH

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CHAPTER 1

INTRODUCTION

The current study was designed to examine the efficacy of a one-session intervention that I developed specifically for use in primary care settings to motivate adolescents at risk for obesity to evaluate and improve their health behaviors. Specifically, I recruited 100 urban adolescents from the Children's Hospital of Michigan Adolescent Medicine Clinic in Detroit. These participants were randomly assigned to one of two conditions: a) A 15-20 minute intervention called Motivating Adolescents To Chat for Health (MATCH) with the adolescent and a facilitator, or b) a goal-only group who was invited to receive the full MATCH intervention at follow-up. Health behaviors and individual characteristics (e.g., autonomous motivation, self-efficacy) were assessed at baseline and health behaviors were re-assessed at follow-up 1 month later. As described in the following sections, the intervention brings together elements of life-span developmental psychology, motivational interviewing, self-determination theory, the theory of planned behavior, and social cognitive theory into a unique synthesis hypothesized to encourage health behavior change during a brief intervention.

Adolescence and Decision Making

Adolescence represents a unique period of development that is filled with both opportunities and challenges. Health patterns that are established in adolescence are often carried into adulthood. Risk factors that correlate with significant health problems and contribute to the leading causes of mortality and morbidity among youth and adults include substance use, sexual behaviors such as unprotected sex, lack of physical exercise, and poor diet (CDC, 2009; Ozer, Park, Paul, Brindis, & Irwin, 2003). During

the past 25 years, prevalence of adolescents who are obese or overweight has increased considerably (NHANES, 2002), and obesity has been linked to significant health problems (e.g., heart disease, stroke, diabetes, osteoarthritis, depression; Ozer et al., 2003). Hence, intervening early and encouraging the development of positive health behaviors is especially necessary in order to help guide adolescents toward creating healthier futures.

Adolescence, an optimal time to encourage behavior change, is a period of significant physiological, psychological, and social transitions. For instance, there are gains in reasoning and perspective taking skills, peer relationships and autonomy become increasingly important, and hormonal and physical changes occur. During this stage of development, individuals have an opportunity to develop a sense of identity (Erikson, 1968). Abstract thinking allows for new thoughts related to identity (e.g. "Is my health important to me?" "What kinds of physical activities do I prefer?").

This important transitional period involves making choices that can affect short-term and long-term health. Adolescents' ability to plan ahead, consider consequences, and control impulses is still developing (Buchanan, Eccles, & Becker, 1992; Steinberg, 2007). Adolescents engage in more risky behavior than children and adults (Steinberg, 2007). Often, adolescents think of social consequences of their decisions rather than health consequences (Steinberg, 2005). This style of reasoning can lead to risk-taking behaviors such as cigarette and substance use (Brown, Lewinsohn, Seeley, & Wagner, 1996; Johnston, O'Malley, & Bachman, 2004) and unprotected sex (Lehrer, Shrier, & Gortmaker 2006). Risk taking has been defined as a behavior that increases an individual's level of pleasurable psychophysiological arousal and may result in unknown positive or negative consequences (Cicchetti, Barnett, Rabideau, & Toth, 1991). Risk

taking behaviors have the potential to negatively influence the adolescent's life trajectory, especially when engaging in risk taking behaviors at a young age. For example, research shows that earlier age of first alcohol use is associated with heavier drinking and more negative consequences of drinking (Palmer, Corbin, & Cronce, 2010). Moreover, the Centers for Disease Control and Prevention reported that health-risk behaviors, which contribute to the leading causes of mortality and morbidity among youth and adults, are often established during youth. Therefore, the current study intervened during adolescence in order to promote positive health behaviors so that patterns of poor health behaviors do not continue into adulthood. Using a strength-based approach, the intervention aimed to highlight adolescents' positive qualities and draw on their natural motivations (Lerner, Almerigi, Theokas, & Lerner, 2005; Roth & Brooks-Gunn, 2003).

Multiple Systems & Development

The development of individual differences in health behaviors is likely to be a function of both individual internal bio-psychological factors as well as the social environmental contexts in which each person is immersed. It is important to examine the contributions of interacting contexts, and multiple systems (Bronfenbrenner, 1979; Wilcox, 2003). Researchers found that relationships with family members and behaviors of influential others (e.g., peer, household member) are related to health behaviors such as adolescent smoking (Wen, Van Duker, & Olson, 2009). Moreover, interventions that target multiple systems by addressing barriers at the individual, family, and extra-familial level (e.g., peers, school, community) have been shown to significantly improve weight loss (Naar-King & Ellis, et al., 2009) and diabetes management (Naar-King, Ellis, Idalski, Frey, & Cunningham, 2007) in urban adolescents.

Cicchetti and colleagues (1991) argued that a model of biological, psychological,

and social risk and protective factors that continually transact throughout development was needed to explain a person's decisions to take risks that had the potential to help or harm their future outcomes. Risk factors that are of public health concern and are related to behavioral, mental, and physical health problems in addition to risk-taking behaviors include poverty, neighborhood disadvantage, community violence, and racial discrimination (Copeland-Linder, Lambert, Chen, & Ialongo, 2010; Leventhal and Brooks-Gunn 2000; Mcloyd, 1998; Pastor & Reuben, 2002; Simpson, Scott, Henderson, & Manderscheid, 2004). Risk factors play a role on interpersonal, perceptual, emotional, and behavioral functioning in addition to values, expectations for normative behaviors, and expectations for the future (Lorion and Saltzman 1993). A hopeful sense for the future based on personal competence, coping ability, purpose and meaning in life can facilitate positive development and successful transition into adulthood (Miller & Powers, 1988; Nurmi 1991). Even in impoverished, urban communities, youth with protective factors such as kinship social support and family involvement have been shown to have better-developed future orientations with a sense of control over future outcomes, and they may be partially shielded from the deleterious effects of stress (McCabe & Barnett, 2000; McCabe, Clark, & Barnett, 1999). For these reasons, this study focuses on protective factors that are likely to have a positive or protective role in promoting the development of positive health behaviors.

It may be especially important to provide interventions that address health behaviors to adolescents from ethnic minority groups or to those with fewer resources, as ethnic minority youth have been shown to have higher unmet health needs as compared to Non-Hispanic Whites (Yeh, McCabe, Hough, Dupuis, & Hazan, 2003). Urban African American adolescents can be considered a high-risk group for poor health outcomes, but

it is important to remember that they have diverse experiences and family compositions (Myers, 1982; Wilson, 1986). Moreover, even when African American teens are affected by factors such as neighborhood disadvantage (Schulz, Williams, Israel, & Becker, 2000), economic hardship, and limited resources, many if not most adolescents remain resilient when faced with stressful life events.

For example, in African American families, strong kinship bonds and social support, parental warmth and responsiveness, the fluidity of household and family roles, high achievement orientation, the central role of spirituality and religion, racial biculturalism, positive self-esteem, and development of ethnic awareness often buffer youth against the negative effects of urban violence and neighborhood disadvantage (Littlejohn, Blake, & Darling, 1993; McCabe et al., 1999). One study, Go Girls, used the church as a setting for an intervention with the primary aim to develop and test a culturally tailored intervention program for overweight African American adolescents ages 12-16 and their parents (Resnicow, Taylor, Baskin, & McCarty, 2005). By building on strengths and values in African American adolescents and parents, families can feel empowered and become more cohesive (Nicolas et al., 2008). Breland-Noble, Bell, and Nicolas (2006) emphasized the importance of delivering interventions that are consistent with a person's culture and context. Thus, the current study was designed with these recommendations in mind.

Risky Health Behaviors

Results from the 2009 national Youth Risk Behavior Survey demonstrated that numerous high school students report engaging in negative behaviors related to substance use, sexual activity, and nutrition and physical activity that increase their likelihood of health problems and death (CDC, 2009). Because the study intervention takes place in

Detroit and is composed of a primarily African American sample, Ancillary Table 1 (see appendix) presents these specific rates with confidence intervals as well as the overall rates within the United States for high school students. In regards to eating and exercise, African Americans as well as teens from Detroit report eating slightly more servings of fruits and vegetables than the general population, but these two groups are also more likely to report being overweight or obese. They are also less likely to report attending physical education classes, less likely to report engaging in 60 minutes of exercise in a week, and more likely to report watching 3 or more hours of television a day. This sedentary lifestyle is important to address as engaging in regular physical activity may help to control body weight, develop a healthy cardiovascular system, and improve psychological well-being (Biddle, Gorely, & Stensel, 2004; Harsha, 1995).

Models of Behavior Change

There are a variety of models that have been used to explain health behaviors and decision-making. The motivational interviewing perspective suggests that people are intrinsically motivated to change (e.g., "I want to feel healthier"), and they are also ambivalent about changing their unhealthy behavior (e.g., "I want to lose weight but I want to eat my favorite junk food"). Recognizing the discrepancy between current behaviors and personal goals or values can help to motivate change. In order for change to occur, the individual must recognize that there is a problem that needs changing, have a desire to change, and feel hopeful that change is possible (Miller & Rollnick, 2002).

Another perspective, the theory of planned behavior (Ajzen & Madden, 1986), explains that motivation or intention to do a behavior combined with perceived behavioral control (e.g., "It will be easy for me ride my bike after school"), similar to self-efficacy (Bandura, 1977), help predict whether individuals will engage in specific

health behaviors. In fact, a meta-analysis demonstrated that changes in intention had a larger effect on health behaviors when participants were rated as possessing more control over the behavior (Webb & Sheeran, 2006).

While the theory of planned behavior explains the process in which motivations are converted into intentions and behaviors, it does not sufficiently examine the quality of the motivations, environmental factors affecting motivation, or the importance of maximizing psychological needs that enhance the initiation and maintenance of behavior change. However, self-determination theory, a leading theory of human motivation, complements the theory of planned behavior and focuses on supporting intrinsic tendencies to act in effective and healthy ways. Self-determination theory proposes that health behavior change involves a biopsychosocial process (Williams & Deci, 1996). The theory specifies that the psychological needs of autonomy, competence, and relatedness (Deci & Ryan, 2000; Ryan, 1995) can support motivation to change behaviors.

Autonomous motivation occurs when individuals on their own endorse or identify with the value of a behavior or health practice (e.g., "Working out is important and beneficial for my health and lifestyle…is consistent with my life goals") and they may perceive the behavior as being a part of their larger self (Ryan, Patrick, Deci, & Williams, 2008). Practitioners can elicit motivation for self-determination by providing relevant information and meaningful rationales for change as well as exploring resistances and barriers to change. In studies with adults, autonomous or self-determined motivation has been shown to positively affect behavioral engagement (Chatzisarantis, Hagger, Biddle, Smith, & Wang, 2003) and has been associated with positive health, behavioral, and psychological outcomes (Kennedy, Goggin, Nollen, 2004; Williams, Grow, Freedman, Ryan, & Deci, 1996; Williams, McGregor, et al., 2005).

In contrast to self-determination, controlled regulation is imposed upon the child and refers to behavior that is performed in order to obtain a reward, to avoid negative consequences, or to avoid feeling guilty (e.g., The reason I would eat healthy is because others would be upset with me if I ate junk food…. because I want others to approve of me.). Applying external pressures (e.g., guilt, disapproval, external rewards) or external control is likely to detract from a sense of agency or choice (Deci & Ryan, 2000). Moreover, amotivation represents the absence of motivation (e.g., I really don't think about it). Amotivated individuals do not behave in a purposeful manner nor do they experience a meaningful relation between actions and identity. Controlled regulation and amotivation have been linked to poor health outcomes (Williams, 2002; Williams, Deci, & Ryan, 1998). Based on this line of research, the intervention was designed to enhance adolescents' feelings of self-determination in making health behavior decisions and to minimize the use of strategies that undermine autonomous motivation.

Once autonomy is established such that the individual is volitionally engaged and willing to act, it is important to develop competence (e.g., Williams, McGregor, Zeldman, Freedman, Elder, & Deci, 2005). When individuals feel competent (e.g., I now feel capable of maintaining a healthy diet), they are better able to attain goals and they feel satisfaction or pride when engaging in the challenging but important health behaviors. Individuals who are provided with skills (e.g., learn how to choose healthy foods, learn assertiveness skills), information (e.g., education about calorie intake, exercise routines), and tools for change (e.g., using a calendar to keep track of progress, engage in positive self talk when feeling hopeless) are more likely to develop competence.

Finally, environments with involved, supportive others facilitate feelings of

relatedness, which is the sense of being cared for and connected to others (Ryan & Lynch, 1989). Associated with relatedness is the important concept of autonomy support. Autonomy can be supported by facilitators or other loved ones by understanding and acknowledging an individual's perspectives, providing unconditional positive regard, and supporting choice (e.g., "She tries to understand how I see my diet before suggesting any changes;" Ryan & Deci, 2008). Williams and colleagues (Williams, Cox, Kouides, & Deci, 1999) demonstrated the influence of perceived autonomy support on smoking behaviors in teens. Adolescents from a suburban high school, regardless of baseline smoking behaviors, were randomly assigned to one of two presentations given by physicians about smoking, and both provided information about health risks. One presentation instructed adolescents to refrain from smoking ("Fear and Demand" condition) while the other presentation reinforced that it was the adolescent's choice whether or not they smoked ("It's Your Choice" condition). Although the "It's Your Choice" intervention did not decrease smoking behaviors more than the "Fear and Demand" condition, the perception of the presenter's autonomy support predicted autonomous motivation as well as decreased smoking. It appears that perceived autonomy support and autonomous motivation may be important factors influencing behavior change. However, few interventions (Williams, Cox, Hedberg, & Deci, 2000; Williams et al., 1999) have examined these variables in adolescents, with the majority of studies focusing on adults.

Research supports the integration of the theory of planned behavior and self-determination theory, as a meta-analysis provided support for integrating the approaches to explain health-related behavior (Hagger, & Chatzisarantis, 2009). Results of a path analysis indicated that perceived autonomy support was a significant predictor of self-

determined motivation. Mediated by attitudes and perceived behavioral control, self-determined motivation significantly predicted intentions to engage in positive health behaviors. Taking into consideration research on motivational interviewing, the theory of planned behavior, and self-determination theory, the intervention designed in the current study provides a supportive environment in which to promote autonomous motivation and competence in adolescent participants.

According to social cognitive theory, the beliefs that individuals have about their own capabilities are essential elements involved in personal control and agency. Self-efficacy, the belief that one is able to perform a particular action (Bandura, 1977), is similar to the concept of behavioral control or competence. Self-efficacy influences the effort needed to continue striving despite barriers and setbacks that may undermine motivation. For example, a teen's ability to increase physical activity will be shaped by his or her belief that he or she can accomplish that goal. In order to encourage behavior change and goal attainment, it appears that enhancing self-efficacy is advantageous. Research shows that skills training (Bandura, 1977; DeVellis & DeVellis, 2001), action plans (Gollwitzer, 1999; Sheeran, Webb, & Gollwitzer, 2005), and social support (Povey, Conner, Sparks, James, & Shepherd, 2000) help to translate intentions into actual behaviors. Therefore, the intervention was designed to help adolescents think through decisions, acquire knowledge, and practice refusal strategies. Additionally, the adolescent's distinct needs and perspectives guided the discussion.

Parent Influence

According to Armsden and Greenberg (1987), communication, trust, and validation are key components that contribute to a positive parent-adolescent relationship. Communication (e.g., "I like to get my mother's opinion on things I'm concerned about")

and trust (e.g., "My mother accepts me as I am") can help create strong emotional bonds between parents and children (Collins & Repinsky, 1994; Segrin & Flora, 2005). Failures in validation results in alienation (e.g., Talking over my problems with my mother makes me feel ashamed or foolish) and is related to avoidance and rejection. Adolescents who view parents as rejecting, unsupportive, or invalidating may feel emotionally disconnected from the family, be less willing to utilize parental resources, and develop a negative self-image (Ryan & Lynch, 1989).

Parents can support maturity, accountability, and healthy choices when using discipline, supervision, and consequences in the context of an autonomy supportive, warm relationship (Baumrind, 1991). Parent-adolescent relationship quality, monitoring, and communication can affect adolescent health decisions. Research suggests that when parents provide companionship at mealtime, establish a positive atmosphere, and model appropriate food-related behaviors, their children tend to have improved dietary quality (Stanek, Abbott, & Cramer, 1990). Increased frequency of a family dinner among 9- to 14-year-old children was associated with healthful dietary patterns (Gillman, Rifas-Shiman, & Frazier, Rockett, Camargo, Field, Berkey, & Graham, 2000). Additionally, in a sample of low-income African American adolescents and their mothers, it was shown that mothers who are current smokers, who give adolescents more pocket money, and who are not involved in food selection have adolescents who are more likely to resemble the mother's undesirable eating habits (e.g., high-energy, high-fat, and high-snack intakes; Wang, Li, & Caballero, 2009). Interestingly, Larson and colleagues showed that when parents involve their adolescents in meal preparation, adolescents are more likely to eat fruits and vegetables and less likely to have high fat intake (Larson, Story, Eisenberg, & Neumark-Sztainer, 2006). Because parental support appears to play a role in

adolescent health behaviors, the study explores how these important relationship factors affect healthy decision-making.

Barriers to Treatment

Initiating and engaging in treatment for physical or mental health concerns can seem challenging to adolescents. Teens may not seek help because of stigma associated with help seeking (Corrigan, 2004), they may not know where to go for help (Klein, McNulty, & Flatau, 1998), they may have fears about confidentiality (Dubow, Lovko, & Kausch, 1990), or they may feel unable to relate to the person implementing the service (D'Amico, 2005). Kazdin, Holland, and Crowley (1997) demonstrated that barriers to treatment participation included financial, transportation, motivation, and administrative barriers. Commonly cited barriers to receiving treatment for African Americans include poverty, inadequate insurance coverage, access to transportation, access to childcare, cultural mistrust of mental health professionals, lack of knowledge of the mental health profession, perceived racism, discrimination, and stigma related to mental illness (Diala, et al., 2001; Merritt-Davis & Keshavan, 2006; Snowden, 1999). It is necessary to decrease barriers so that youth feel that they can more easily access prevention and intervention services. One way to decrease barriers is to provide interventions in settings where adolescents typically attend. Primary health care settings have great potential for filling this critical gap as a large percentage of teens visit a primary care clinician each year (Gans, McManus, & Newacheck 1991). In fact, research shows that a collaborative interdisciplinary model that integrates mental health services within medical settings improves psychosocial adjustment by increasing access to services and providing early identification and treatment of concerns (Naar-King, Siegel, Smyth, & Simpson, 2003). However, pediatric health care practitioners report low confidence in their ability to

counsel overweight children or adolescents, and they question the efficacy of behavioral counseling due in part to their perception that patients have low motivation and poor behavioral adherence (Kolagotla & Adams, 2004; Perrin, Flower, Garrett, & Ammerman, 2005; Story et al., 2002). For example, one study demonstrated that only 30% of pediatricians felt their efficacy for obesity counseling was good to excellent, and only 10% felt that obesity counseling was effective (Kolagotla & Adams, 2004). Therefore, more research on the efficacy of brief goal-oriented, motivational interventions in the health care setting is necessary and increased training of physicians may be necessary. In the context of the primary care setting, a brief intervention can readily be incorporated into usual care, for example, as a referral to on-site staff. For these reasons, the current study occurred in a primary care setting where youth are accustomed to talking about health behaviors.

Other barriers to improving health behaviors involve social and environmental contexts. Adolescents from urban settings may have limited access to low cost nutritious foods and recreational facilities. For example, in poor, urban settings there are many fast food restaurants but few modern supermarkets where volume pricing is available, so food is often purchased from small neighborhood shops, typically at higher prices (Babey et al., 2008; Encyclopedia of Public Health, 2002). Also, the lack of safe outdoor areas restricts outdoor activity, potentially discouraging natural physical exercise that youth might be more likely to engage in outside (Gomez, Johnson, Selva, & Sallis, 2004; Molnar, Gortmaker, Bull, & Buka, 2004). Hence, when adolescents engage in the interventions, the facilitator considers each adolescent's particular context (e.g., access to school sports, transportation, neighborhood) when promoting positive behavior changes.

Single-Session Interventions

Single-session therapeutic interventions in an integrated setting would be most ideal for families, as they are cost-effective and convenient. The aforementioned barriers to treatment utilization including transportation issues, time constraints, and child-care would be less problematic, as single-session interventions do not require a weekly commitment. Both the World Health Organization (1996) and the US Institute of Medicine (1990) have stated that brief interventions are an efficacious strategy. Patrick et al. (2001) demonstrated the feasibility of a primary care–based interactive health communication intervention (PACE+) to improve physical activity and dietary behaviors among adolescents. All patients completed a computerized assessment with feedback about health behaviors, created tailored action plans to change behavior (e.g., desired benefits of change; specific goals and strategies; identification of a social supporter; and anticipated barriers), and discussed the plans with a health care provider. All outcomes except vigorous physical activity improved over time. Interestingly, when PACE+ with the computerized risk assessment and individualized behavior plan (30 minutes of exposure) was delivered in a school setting and evaluated over 3 months (Prochaska & Sallis, 2004), there were no significant changes for physical activity among girls. Among boys, activity increased by 2–9 minutes/week, significantly greater than that for the control group whose physical activity declined on average by approximately 30 minutes/week. The MATCH intervention utilizes the goal-setting and action plan components of the PACE+ intervention in a primary care setting, but gears the intervention toward minority adolescents and encourages personal choice and intrinsic motivation.

Boekeloo et al. (1999) implemented a single-session intervention based on social cognitive theory and the theory of planned behavior. While in a clinic setting, health care

providers and teens engaged in communication about risk-reduction. Teens were aged 12-15 and mostly of minority status receiving a general health care examination. The intervention group adolescents listened to an audiotape and answered 11 risk-related questions. The physician used the teen's answer sheets and pamphlets to discuss sexual behavior choices and to increase awareness of adolescents' sexual risks, skills (e.g., avoid risky sexual situations), and self-efficacy (e.g., feel able to resist peer pressure). Physicians also provided brochures about skills and community resources brochure, as well as brochures for parents regarding how to discuss sex and drug risks with their adolescents. Teens in the intervention group reported significantly more discussion with the physician about topics regarding sexuality compared to the control group adolescents who received their general health examination without the added intervention components. Immediately after the general health visit, intervention adolescents were more likely than controls to understand HIV transmission and to believe that the physician thought they should use condoms, that they should use condoms, and that they could refuse sex with a partner who refused condom use. However, perceived HIV susceptibility, condom use self-efficacy, and beliefs about abstinence did not differ between groups at the exit interview. At three-month follow-up, more sexually active intervention group teens reported condom use than the control group. At nine months, there were no group differences in sexual behavior; however, at 9-month follow-up, fewer intervention adolescents than controls reported STD diagnoses, genital signs of possible STDs, STD treatments, or pregnancies in the last 6 months. It appears that adolescents can benefit from discussing behaviors with a professional who provides relevant information and supports self-efficacy. Accordingly, the facilitators providing the MATCH interventions explored behaviors, provided information and resources, and

promoted personal choice and confidence.

Motivational Interviewing

Motivational interviewing, an empirically supported intervention with a large evidentiary base for improving health outcomes, can occur in a brief time period (1– 4 encounters; Miller & Rollnick, 2002). Motivational interviewing, a client-centered, goal-directed counseling approach, elicits patients' intrinsic motivation and commitment for change. Principles include expressing empathy, supporting self-efficacy, rolling with resistance, developing discrepancy, and resolving ambivalence. Miller, Zweben, DiClemente, and Rychtarik (1992) explain, "Motivation for change occurs when people perceive a discrepancy between where they are and where they want to be." When the patient communicates that they are ready to change their behavior, the provider can share medical information and advice, and they can collaborate to create a change plan.

Although motivational interviewing is not based on a theory or school of psychotherapy, self-determination theory provides a meaningful framework for understanding how and why motivational interviewing works (Markland, Ryan, Tobin, & Rollnick, 2005). Motivational interviewing can be understood as providing an autonomy-supportive atmosphere, which helps clients discover internal motivation. Motivational interviewing can support the three basic psychological needs specified by self-determination theory which are autonomy (through nondirective inquiry and reflection), competence (through provision of information), and relatedness (through a relationship characterized by unconditional positive regard). Supporting the connection between self-determination theory and motivational interviewing, Foote et al. (1999) demonstrated that patients randomly assigned to receive motivational interviewing group treatment for substance use experienced the setting as more autonomy supportive than those assigned

to a usual-care group who received milieu group therapy with no specified content or style. Perceived autonomy support was related to treatment engagement and attendance.

Previous studies have examined the efficacy of the Family Check-Up, a brief, 3-session intervention based on motivational interviewing that includes parents and children (Dishion & Kavanagh, 2003). The Family Check-up is modeled on the Drinker's Check-Up (Miller & Rollnick, 2002) which has been effective in initiating treatment, and in reducing long-term alcohol use, alcohol-related problems, and health consequences of drinking (Bien, Miller, & Tonigan, 1993; Miller, Sovereign, & Krege, 1988). The Family Check-Up model, which provides individualized feedback, has been used to target parenting and relationship factors related to the development of behavior problems in early adolescence. The Family Check-Up has demonstrated benefits related to substance use, depressive symptoms, academic achievement, and school attendance (Connell, Dishion, Yasui, & Kavanagh, 2007; Stormshak, Connel, & Dishion, 2009).

Brief interventions incorporating motivational interviewing have been shown to be effective in various health settings. Clinician use of motivational interviewing for health screening and counseling purposes during routine care visits has had positive affects on physical activity and nutrition (Olson, Gaffney, Lee, & Starr, 2008; Resnicow, Davis, & Rollnick, 2006). For example, Olson and colleagues had teens from a rural setting utilize a personal digital assistant (PDA)–based screener, providing the clinician with information about the teens' health risks and motivation to change. Increases in milk intake and exercise were shown. Greater interest in changing and more specific action plans related to nutrition and/or physical activity was associated with greater improvement. Although Olson et al. demonstrated positive outcomes related to nutrition and physical activity, the study lacked random assignment and examination of treatment

fidelity. In addition, approximately 1/3 of participants failed to complete follow-up assessments, and only participants with complete data were included in analyses. Hence, more experimentally rigorous examinations of motivational interventions for adolescents in health care settings in addition to interventions that flexibly include assessment and treatment of various health behaviors would add greatly to the literature.

Several one-session interventions with motivational interviewing have been used in medical settings. For example, interventions in emergency room settings have been shown to decrease adolescent drinking and other risk behaviors, such as smoking and driving after drinking (Barnett, Monti, & Wood, 2001; Monti, Colby, Barnett, Spirito, Rohsenow, & Myers, 1999). Moreover, in a primary care setting, a brief motivational interviewing intervention targeted teens at risk of substance use consequences (D'Amico, Miles, Stern, & Meredith, 2008).

The Current Study

The MATCH intervention integrates aspects of life-span developmental psychology, motivational interviewing, the theory of planned behavior, self-determination theory, and social cognitive theory. The intervention aimed to help teens evaluate their current health behaviors, develop a series of steps to meet their goals, and anticipate barriers to behavior change plans. One hundred adolescents and their primary caregivers were recruited. Although parents were asked to participate by completing questionnaires, adolescents were still eligible if their parent did not wish to participate. Adolescents were randomly assigned to one of two conditions: 1) Motivating Adolescents To Chat for Health (MATCH) or 2) the goal-only group without the more extensive intervention. MATCH involves the adolescent and facilitator. Adolescents assigned to the goal-only condition completed the same baseline and 1-month follow-up

questionnaires as the MATCH condition and worked with a health coach for a couple minutes to determine their health goal. At the time of follow-up, they were invited to receive MATCH with a facilitator which was not a part of the study; however, there were no specific requests to receive the full intervention.

Primary Hypotheses

Hypothesis 1. Adolescents receiving MATCH would show greater behavior change than those in the goal-only condition.

Hypothesis 2. Adolescents who report greater autonomous motivation, competence, self-efficacy, and autonomy support regarding health behavior would report more improvement on health behaviors at follow-up.

Hypothesis 3. It was hypothesized that greater perceived problem recognition, importance of change, motivation for change, and behavioral intentions would be related to improvement in health behaviors.

Hypothesis 4. Autonomy support, self-efficacy, and competence were expected to moderate the relationship between autonomous motivation and behavior change such that greater autonomy support, self-efficacy, and competence would strengthen the relation between autonomous motivation and behavior change.

Secondary Hypotheses

Hypothesis 5. Exploratory analyses would be conducted to examine the relations among self-efficacy, competence, autonomous motivation, autonomy support, and behavior change.

Hypothesis 6. The relations between parental relationship quality and health behaviors at follow-up would also be explored.

CHAPTER 2

METHOD

Participants

A total of 100 adolescents between the ages of 14 and 17 years participated in the study. Participants were predominantly girls (n = 75), 15.41 years old on average (SD = 1.10), and the majority identified as African American (n = 89). Two participants identified as Caucasian, 3 were Hispanic/Latino, 6 identified as mixed race, and 1 identified as other. Average weight was 170 lbs (SD = 56.61) and ranged from 94 to 325 lbs. Average height was 5' 5" and ranged from 4' 5" to 6' 2". BMI was calculated using the height and weight reported by the participants with the following formula: [weight (lb)/height (in.) 2] × 703. Seventy-one of the 100 participants reported both height and weight, so the average BMI was based on those 71 participants. The Centers for Disease Control and Prevention has suggested that a BMI of 18.5–25 kg/m^2 may indicate optimal weight, and a number above 25 may indicate that the person is overweight. Average BMI was 28.92 (SD = 8.57) which is considered overweight, and BMI ranged from 18 to 50.10. Moreover, 33.8% of participants were considered obese (BMI $\geq$ 30), 27% were overweight (BMI $\geq$ 25), one participant was considered underweight ($\leq$ 18.5), and the rest were within the normal range. In terms of education, 8 students were in middle school (7^{th} or 8^{th} grade), 23 were in 9^{th} grade, 29 were in 10^{th} grade, 26 were in 11^{th} grade, 9 were in 12^{th} grade, 4 graduated from high school, and 1 was not in school. Thirty-three percent had parents who reported they were married. In terms of socioeconomic status, the education and occupation of the parent involved in the study was used to calculate a Hollingshead SES rating. The average Hollingshead rating was 31.84 (SD = 11.77) and

ranged from 14 to 56 (i.e., lower class < 20.0; lower middle class = 20.0 - 39.9; middle class > 40.0). For those that reported total income (n = 70), average annual income was $31,280 and ranged from $674 to $160,000. See Ancillary Table 2 in appendix for demographic information.

Procedure

Participant recruitment. Adolescents were recruited from Children's Hospital of Michigan's Adolescent Medicine Clinic. Flyers introducing the research (see Appendix) were placed in the waiting area of the clinic as well as in the exam rooms. Additionally, research assistants approached adolescents and their primary caregiver, asked for the age of the adolescent, and if the adolescent was between the ages of 14 and 17, they were informed about the study and provided screeners while waiting for their appointment in the Adolescent Medicine Clinic. Research assistants did their best to fit their schedules around times in which they knew 14-17 year old patients were scheduled to come into the clinic for an appointment, as the medical appointments schedule was made available to research assistants days in advance. If the schedule appeared full, attempts were made to have more than one research assistant available to so that multiple participants could begin the study at the same time.

Approximately 174 of the 14-17 year old adolescents filled out the screener (see Appendix) when approached. Research assistants reported that most adolescents agreed to fill out the screener; however, the exact number of refusals was not recorded. Of those 174, 76% were interested and eligible (n = 103 females, 30 males), 11% were interested but ineligible (n = 13 females, 6 males), 11% were not interested but were eligible (n = 9 females, 10 males), and 2% were not interested or eligible (n = 2 females, 1 male). Adolescents were deemed ineligible for the study if they did not report being concerned

about any of the following: I feel like I need to lose weight, I'm too fat, I need to eat better, I'm not satisfied with my body, I'm not being active enough, or I don't exercise frequently. They only needed to endorse one or more of those concerns in order to be eligible; therefore, eligibility criteria were not stringent. Adolescents who were interested and initially eligible were screened for psychotic symptoms. If they acknowledged psychotic symptoms (i.e., hear voices or see things that others cannot see or hear, causes them distress, and/or if they have ever been hospitalized for hearing voices or seeing things), they were excluded from the study, and their doctor was informed about the symptoms to ensure safety. Two adolescents were excluded due to psychotic symptoms. Additionally, one participant, who was initially eligible from the initial screening criteria, was deemed ineligible because she lived in a residential facility with no formal guardian. There were 33 adolescents who were interested and eligible but did not participate. Reasons for not participating included lack of time, guardian unable to participate, guardian not interested in allowing adolescent to participate, or they set up an appointment for a later date and did not follow through. Recruitment ended when 100 youth had completed the initial assessment for the study.

Eligible adolescents and their parent or guardian were invited to participate in the study and informed consent procedures were utilized, including use of a child assent form and parent consent form. Each adolescent and guardian completed several questionnaires including measures assessing adolescent dietary and physical activity patterns, the parent-adolescent relationship, basic demographic information, and other factors such as motivation and self-efficacy. Adolescents were able to participate in the study even if their parent did not wish to fill out the caregiver questionnaires.

Random assignment. Adolescents were randomly assigned to a) the full

intervention called Motivating Adolescents To Chat for Health (MATCH) or b) the goal-only group without the more extensive intervention. The randomization scheme was generated using the website Randomization.com (www.randomization.com). The scheme was created at the onset of the study. MATCH participants engaged in an autonomy supportive discussion involving plans for improving health behaviors. Adolescents assigned to the goal-only condition completed the same baseline and 1-month follow-up questionnaires as the MATCH condition and worked with a health coach for a couple minutes to determine their health goal. Both the MATCH group and goal-only group were compensated with a $10 gift card for participating in the baseline visit. At follow-up, approximately 1 month after the intervention, participants were mailed a packet of questionnaires, to complete with a return envelope, so that they could mail the measures back with no cost to them. Once the measures were received, they were sent a gift card worth $10.

Control condition. All adolescents engaged in a goal discussion with a health coach which lasted about 2 to 3 minutes, and those in the intervention group continued the intervention after the goal-setting portion. At the beginning of the goal discussion, adolescents were asked to think about what was currently their most important problem to work on related to diet or physical activity. They then rated how much they thought it was a problem for them, ranging from 1 (not a problem) to 10 (big problem). Then they were encouraged to write a goal based on the most important problem that they identified. Adolescents had a range of responses including some of the following: eat healthier, increase fruits and vegetables, decrease junk food, eat breakfast regularly, decrease portion size, increase physical activity, and decrease sedentary activities. Using a readiness ruler (scale 0-10, with 10 the highest), they were asked to indicate (by circling

the number) how important it was for them to change the behavior and reach the goal that they identified, how motivated they were to change, and how confident they were that they could reach the goal they identified. At that point, the goal-only group was finished with their portion.

Intervention group. Those in the MATCH condition continued the intervention by discussing reasons for wanting to make changes. They then answered a couple more questions with a 0 to 10 scale: How sure are you that you will make this change and reach the goal that you identified? How much do you think you will benefit from making this change and reaching the goal that you identified? Facilitators used probes related to the initial readiness questions about importance and motivation to change as well as the later questions about how sure they felt and benefits for changing. If the client answered "five," for example, the counselor would probe first with "Why did you choose 5 instead of a lower number, like a three or a four?" followed by "What would it take to get you to a six or a seven?" These probes elicit positive change talk, discussion of benefits, and ideas for potential solutions from the client. Participants were asked about past attempts to change the behavior (i.e., "Have you tried to change this behavior in the past?" "How were you successful?" "What got in the way or didn't go as planned?"). The teens were asked to recall a situation when they decided to do the healthy behavior in the past (eat healthy, exercise) rather than engage in the unhealthy behavior. They were also encouraged to imagine how they would feel if they engaged in the unhealthy behavior that they identified as problematic and then were encouraged to imagine how they would feel by choosing to engage in the healthy behavior instead. Further questions were used to elicit change talk and exploration of ambivalence if appropriate (see Script in Appendix). The full intervention lasted approximately 15 to 20 minutes.

With the help of the facilitator, the adolescent came up with a behavior plan for the chosen health goals (i.e., What steps can you take to make these changes? Who can help you make these changes? How can they help you? How will you know that your plan is working?). They also discussed potential barriers to success (i.e., What could get in the way of making these health behavior changes? What will you do if the plan isn't working). If the adolescent had difficulty answering any of the questions, the health coaches asked the adolescent if he or she would like suggestions about making realistic goals or trouble-shooting. If permission was granted, suggestions were given.

Health coaches working with the adolescents established a nonconfrontational and supportive setting with empathy and encouragement where teens could feel comfortable expressing both the positive and negative aspects of their current behavior (Ingersoll, Wagner, & Gharib, 2002; Miller & Rollnick, 2002; Rollnick, Miller & Butler, 2008). Adolescents were given control and freedom to choose health areas that they wished to improve in relation to diet or physical activity. Also, in order to build self-efficacy and feelings of competence, prior successful efforts to change behavior, whether specifically regarding the health topic or not, were highlighted, and past unsuccessful attempts were reframed as practice rather than failure (Resinicow, Davis, & Rollnick, 2006).

After completing the intervention, adolescents filled out a post-intervention questionnaire where they used another 0 to 10 rating scale to re-rate importance of change, motivation, confidence, and behavioral intentions. Using the 0 (not valuable, not at all) to 10 (very valuable, a lot) scale, they also rated how valuable the session was (M = 8.94, SD = 1.87) and how much they felt that the health coach understood or supported them (M = 9.20, SD = 1.52).

Health coaches and intervention fidelity. Facilitators were 3 trained bachelor's-

level research assistants and one trained master's-level principal investigator who each received supervision by a licensed clinical psychologist as needed. The intervention was manualized and consensus meetings occurred approximately twice a month during the recruitment period. All but 1 of the interventions were audio-recorded (one intervention was not recorded due to research assistant error) and all recorded interventions were rated for fidelity. Health coaches were assigned a selection of interventions to rate for fidelity and they were intentionally not assigned to rate interventions that they had facilitated themselves. As part of the training, two interventions were rated for fidelity together as a group, but inter-rater fidelity was not assessed. Fidelity to treatment was measured by ratings of facilitator behavior (e.g., following semi-structured interview) and adherence to selected principles of MI (see Appendix).

The first set of fidelity ratings measured adherence to a specific set of questions and probes in the intervention. Participants rated their level of motivation, confidence, certainty, and perceived benefits, and facilitators were instructed to follow-up with probes (e.g., Why did you indicate X rather than something lower like X?). Facilitators successfully probed across the different questions, and there were a total of only 8 instances across the four questions when probes were not properly used (once for motivation, five times for certainty, and three times for perceived benefits). All facilitators effectively reflected back reasons that the participant indicated they wanted to change. All facilitators asked the participants to think about and talk about past attempts to change the behavior. On all occasions except for one intervention, the facilitator asked the participant how they would feel if they engaged in the unhealthy or healthy behavior.

The next set of ratings measured global levels of empathy, affirmations, open-ended questions, nondirective approach, and facilitator frustration which were scored on

a 3-point likert scale (0 = low empathy, mostly close-ended questions, mostly directive, low frustration, 2 = high empathy, mostly open-ended, mostly nondirective, high frustration). Affirmations were rated on a 4-point likert scale from 0 (no affirmations or non-genuine affirmations) to 3 (two or more simple affirming statements OR one or more complex affirming statements that explain reasons why facilitator is applauding participants' efforts by highlighting specific *strengths*, *efforts, or supporting self-efficacy)*. Results demonstrated that 98% of interventions were rated as highly empathic (i.e., high warmth and care, active and reflective listening, show understanding, connect with participant) and 2% were moderately empathic. For level of open-ended questions, 87% had mostly open-ended questions and 13% had about half close-ended and half open-ended questions. Regarding the facilitator's level of guidance, 82% were mostly nondirective (i.e., emphasize participant's choice and personal control, show support and collaboration, ask permission before giving advice) and 18% had a combination of directive and nondirective guiding styles. Ninety-eight percent of facilitators showed only patience and acceptance rather than frustration, and 2 % of facilitators showed mostly patience with one to two instances of annoyance or frustration. For affirmations, 83% of interventions were rated as having high genuine affirmations, 15% had moderate levels of affirmations, and 2% had simplistic affirmations (e.g., "great job").

Materials

Demographic information. Basic demographic information was obtained from youth to establish their gender, age, ethnicity, and grade level. Adolescents also answered questions about the approximate frequency in which they had family meals (How many meals each week does your family eat together?) and amount of screen time (How many hours per day do you spend in front of the TV, videogames, or computer screen?). The

average amount of family meals per week was 3.79 (SD = 2.99, range 0 to 12) and average screen time was 4.30 hours per day (SD = 2.79, range 0 to 12). Their caregivers were also asked to answer questions about marital status, who was living in the family household, their education, employment status, occupational responsibilities, and family income. See Ancillary Table 2 for demographic information.

Current health behaviors. The Weight Management Questionnaire was used to assess fruit and vegetable intake (Intermountain Healthcare, 2007). Using a 5-point scale, adolescents rated their intake from 0 (never) to 4 (more than daily) for fruits (i.e., How often do you eat: Whole fresh fruit such as apples, oranges, bananas, peaches, berries, etc.) and for vegetables (i.e., How often do you eat: Dark green vegetables such as broccoli, spinach, kale, dark green lettuce; Orange vegetables such as squash, carrots, sweet potatoes; Starchy vegetables such as potatoes, peas, and corn; Other vegetables such as beets, green beans, cauliflower, cabbage, tomatoes). An average score was calculated for vegetables since there were several items assessing vegetable intake. Next, an average score was also calculated for overall fruit and vegetable intake by combining the fruit score with the average vegetable score. Reliability was adequate (alpha = .75) for the current study. In the total sample, the baseline average fruit and vegetable intake was 1.69 (SD = .67), which suggests that on average adolescents in the study were eating fruits and vegetables less than a few times a week. See Ancillary Table 3 for information (e.g., n's, means, standard deviations, ranges) about measures in the study.

Physical activity. Physical activity frequency was calculated using the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985), a brief 3-item query of usual leisure-time exercise habits. Weekly frequencies of strenuous, moderate, and light

activities are multiplied by nine, five, and three, respectively. Total weekly physical activity is calculated by summing the products of the separate components, as shown in the following formula: Weekly physical activity score = (9 x Strenuous) + (5 x Moderate) + (3 x Light). In the total sample, the baseline average physical activity score was 48.23 (SD = 29.62). More specifically, on average per week at baseline, adolescents engaged in strenuous activity 2.84 times (SD = 2.18), moderate activity 3.02 times (SD = 2.37), and mild activity 2.54 times (SD = 2.42).

Autonomous motivation. The Treatment Self-Regulation Questionnaire (TSRQ; Ryan & Connell, 1989) assesses the degree to which a person's motivation for a particular behavior or set of behaviors is relatively autonomous or self-determined. Fifteen items were included for each health behavior (i.e., The reason I would eat a healthy diet…would exercise regularly). There are three subscales: the autonomous regulatory style (e.g., "The reason I would eat a healthy diet is because I personally believe it is the best thing for my health); the controlled regulatory style (e.g., "Because others would be upset with me if I did not"); and amotivation, which refers to being unmotivated ("I don't really know why"). The autonomous motivation style, which is the variable of interest that we are analyzing in the current study, represents the most self-determined form of motivation and has consistently been associated with maintained behavior change and positive health-care outcomes. Participants responded to each item on a 7-point scale ranging from 1 (not at all true) to 7 (very true). The TSRQ has been widely used in the study of behavior change in health care settings. The TSRQ shows acceptable validity and reliability (Levesque, Williams, Elliot, Pickering, Bodenhamer, & Finley, 2007). The reliability for autonomous motivation in the current study was good

(alpha = .89). The average autonomous motivation for diet was 5.60 (SD = 1.32) and for physical activity was 5.88 (SD = 1.18).

Competence. The Perceived Competence Scale (PCS) concerns feelings about behaving in healthy ways (e.g., Williams, McGregor, Zeldman, Freedman, Elder, Deci, 2005). This is a short 4-item questionnaire that assesses the degree to which participants feel confident about being able to make (or maintain) a change toward a healthy behavior. The PCS has been adapted for many health behaviors and includes being able to maintain a healthy diet (e.g., I feel confident in my ability to maintain a healthy diet) and exercising regularly (e.g., I am able to exercise regularly over the long term). The PCS has shown good reliability and validity (Williams, Freedman, & Deci, 1998; Williams, Grow, et al., 1996). The reliability for perceived competence for maintaining a healthy diet in the current study was strong (alpha = .93), and the mean was 5.09 (SD = 1.56). Similarly, the reliability for perceived competence for physical activity in the current study was strong (alpha = .95), and the mean was 5.42 (SD = 1.47).

Self-efficacy. In order to assess perceived self-efficacy, teens completed measures assessing self-efficacy for a healthy diet and physical activity which were completed before the intervention and at 1-month follow-up. For nutrition, adolescents completed the Nutrition Self-Efficacy Scale and for physical activity, they completed the Exercise Self-Efficacy scale which has demonstrated adequate reliability and validity (Schwarzer & Renner, 2000). Both scales are composed of five items. In order to maintain uniformity across the self-efficacy measures, they were scored on a 10-point Likert scale ranging from 1 (definitely not/strongly disagree/not at all confident) to 10 (exactly true/strongly agree/totally confident). The reliability for healthy diet self-efficacy in the current study

was strong (alpha = .91), and the mean was 7.13 (SD = 2.04). Similarly, the reliability for physical activity self-efficacy in the current study was strong (alpha = .91), and the mean was 6.32 (SD = 2.35).

Autonomy support. The Perceptions of Parents Scale assesses adolescents' perceptions of the degree to which their parents are autonomy supportive versus controlling in their approach to parenting. The Perceptions of Parents Scale concerns the degree to which parents provide what self-determination theory considers an optimal parenting context with autonomy support, involvement, and warmth (Grolnick, Deci, & Ryan, 1997). For the purposes of the study, only the autonomy support subscale was utilized which includes 9 items scored on a 7-point Likert-type scale. Sample items include, "My mother, whenever possible, allows me to choose what to do," and "My mother listens to my opinion or perspective when I've got a problem." The college-student version is intended for use with participants who are late adolescents or older and was used in the study. The questionnaire was designed as part of a doctoral dissertation (Robbins, 1994) which provided evidence of reliability and validity. A longitudinal study further demonstrated the good reliability and validity for the scale (Niemiec, Ryan, & Deci, 2009). The reliability for autonomy support in the current study was adequate (alpha = .80). The average score was 4.91 (SD = 1.12).

Problem Recognition, Importance, and Motivation. As part of the goals-only section of the intervention which all participants completed, participants answered questions about problem recognition, importance of change, and motivation for change. Prior to answering the questions on a scale from 0 to 10, they identified a problem area by responding to the question "What do you think is currently the most important

problem for you to work on?" Next, they answered the following questions: "On a scale from 0 to 10, with 10 being the highest (0 – not a problem, 5 – moderate problem, 10- big problem), how much do you think this is a *problem* for you?, how *important* is it to you change (insert target behavior)?, and how *motivated* are you to change the behavior and reach the goal that you identified? The questions have been adapted from previous interventions using motivational interviewing techniques and autonomy supportive strategies (Ingersoll, Wagner, & Gharib, 2002; Rollnick, Miller & Butler, 2008). The average rating for problem recognition was 6.49 (SD = 1.82), the mean for importance was 8.57 (SD = 1.64), and the mean for motivation was 8.45 (SD = 1.72).

Behavior Intentions. The behavior intentions scale was measured on a 0-10 Likert-type scale (1 = definitely not, 10 = definitely yes). For the question "Do you plan to eat healthy in the next 6 months by eating more fruits and vegetables, eating a healthy breakfast, and minimizing junk food?" the average rating was 7.82 (SD = 1.89). For the question "Do you plan to be more physically active in the next 6 months by exercising more?" the average rating was 8.20 (SD = 1.94).

Parent-Adolescent Relationship. Armsden & Greenberg (1987) developed the Inventory of Parent and Peer Attachment which measures parent-adolescent relationship quality and has been widely used and psychometrically researched (Ridenour, Greenberg, & Cook, 2006). Three broad dimensions were assessed: degree of mutual trust (e.g., My mother trusts my judgment, My mother accepts me as I am, 10 items), quality of communication (e.g., I like to get my mother's point of view on things I'm concerned about, I tell my mother about my problems and troubles, 9 items), and extent of anger and alienation (e.g., I feel it's no use letting my feelings show around my mother, I get upset

a lot more than my mother knows about, 6 items). The instrument uses a five point Likert scale response format. For the purposes of the study, 25 items were used for the adolescent to assess the relationship with his or her primary caregiver. The IPPA is scored by reverse-scoring the negatively worded items and then summing the response values in each section. All three dimensions are also totaled to create a total relationship quality score. The IPPA has been shown to have good reliability and validity (Armsden & Greenberg, 1987) and has also been used with many adolescent samples (Paterson, Feld, & Pryor, 1994) including urban African American, Mexican American, and European American adolescents (Arbona & Power, 2003). The reliability for trust (M = 43.00, SD = 7.54), communication (M = 34.96, SD = 7.65), and alienation (M = 23.37, SD = 5.48) were good in the current study (alpha = 0.88, 0.85, and 0.79, respectively). The total relationship score (M = 102.04, SD = 17.96) had excellent reliability (alpha = .93).

CHAPTER 3

ANALYSIS

Preliminary Analyses

Descriptive analyses were run on each variable to locate missing data, determine the means, standard deviations, and ranges of each variable as well as examine the variables for skewness and kurtosis. Next, analyses were conducted to determine if any outliers were present in the dataset. Additionally, analyses were conducted to determine if gender, age, race, BMI, socio-economic status, or parental marital status should be controlled for in subsequent analyses regarding the outcome variables.

Analyses were conducted to determine if the goal-only and intervention groups were significantly different on any of the variables at baseline. Analyses were also conducted to determine if those who participated in the follow-up were significantly different than those who did not complete the follow-up measures. Additionally, correlations were conducted to explore the bivariate relations among the study variables.

Hypothesis 1. To determine whether the intervention affected diet and physical activity, analyses were conducted to compare the intervention and goal-only groups for each participant at the one-month follow-up. Specifically, separate analyses of variance, controlling for baseline scores and age, were conducted to determine if the intervention group reported significantly greater improvement in diet and physical activity than the goal-only group at the one-month follow-up. Assumptions underlying ANOVA were met, and the assumption for homogeneity of intercorrelations was also met. Partial eta squared, which is the proportion of the variability due to a particular variable, was calculated to determine effect sizes. According to Becker (2000), .01 is considered to be a

small effect size, .06 is a moderate effect size, and .14 and higher is a strong effect. These values are equivalent to the Cohen's d values for small, medium, and large effect sizes.

Given the repeated measures design, paired samples t-tests were also conducted to determine if there were significant changes in the primary outcome variables from baseline to follow-up. Paired samples t-tests were conducted among total participants as well as separated by the individual conditions in order to explore differences between those in the full intervention group and in the goal-only group. These analyses were conducted in addition to the analyses of variance to examine within group differences from baseline to the one-month follow-up, even if the full intervention and goal-only groups were not significantly different. Effect sizes were calculated (i.e., Cohen's *d*; Cohen, 1988) for the paired samples t-tests using the means, standards deviations, and correlation between the two means, in order to correct for dependence among means (Morris & DeShon, 2002). Cohen (1992) suggests that effect sizes of .20 are small, .50 are medium, and .80 are large.

Hypothesis 2. This hypothesis indicates that adolescents who report greater autonomous motivation, perceived competence, self-efficacy, and parental autonomy support will report more improvement on health behaviors at follow-up. Linear regressions were used to examine these relations. These multiple regressions were completed twice, once with reported diet (fruit and vegetable intake at follow-up) as the dependent variable, and once with reported physical activity at follow-up as the dependent variable, taking baseline behaviors into account for both outcome variables. This hypothesis would be supported by significant positive relationships between the indicated variables (competence, self-efficacy, autonomous motivation, and autonomy support) and the dependent variables of diet and physical activity at follow-up.

Hypothesis 3. It was hypothesized that greater perceived problem recognition, importance of change, behavioral intentions, and motivation for change would be related to improvement in diet and physical activity. Multiple linear regressions were used to examine these relationships.

Hypothesis 4. Autonomy support, self-efficacy, and competence were predicted to strengthen the association between autonomous motivation and behavior change. This hypothesis states that autonomy support, self-efficacy, and competence will have a moderating influence on the relations between autonomous motivation and behavior change. In order to test these possible moderating relationships for both diet and physical activity outcomes, six hierarchical regressions were conducted, two for each moderator (one for diet, one for physical activity). The first step of the equation included autonomous motivation and the potential moderating variable (e.g., autonomy support), which tested the main effect between autonomous motivation and behavior change. The two-way interaction between autonomous motivation and the moderating variable was then tested in the second step of the equation. For interactions that were significant, post-hoc probing was conducted as per Holmbeck (2002) and the moderator was dichotomized (1 SD above the mean compared to 1 SD below the mean). Graphs were produced that showed separate regression lines for both levels of the moderator. This allowed for a visual comparison of the differences in the regression lines and thus an examination of the effect of the moderator. The hypothesis would be supported if the relation between autonomous motivation and behavior change were strengthened by autonomy support, self-efficacy, and competence.

Exploratory analyses. To test for other possible moderating effects, hierarchical regressions were conducted with self-efficacy, competence, autonomous motivation,

parental autonomy support, recognition of change, importance of change, and motivation for change. Moreover, age, gender, BMI, amount of screen time, and frequency of family meals were examined as potential moderators. Significant interactions were graphed. Additionally, linear regressions were used to examine the relation between parental relationship quality and health behaviors at follow-up.

RESULTS

Data screening procedures were conducted at the outset of the analysis to ensure normality, homoscedasticity, and linearity of the variables. Several univariate outliers were identified (i.e., 1 outlier for vegetable intake, and 1 for behavioral intentions for diet). The outliers were replaced with the largest or smallest value in the dataset for the particular variable. Data screening revealed skewed variables, but because results were similar for analyses with and without transformed variables, the original data was used for ease of interpretation. Specifically, autonomous motivation for diet and behavioral expectations for exercise were negatively skewed. Importance and motivation were also negatively skewed, and weight was positively skewed. Missing data analysis revealed that one participant did not complete the entire packet, so only the data they completed (i.e., demographic information, behavioral intentions, and dietary habits) were used in analyses. Two participants did not complete the Godin exercise measure, so they were not included for analyses that incorporated that measure. For follow-up measures, of those who returned packets, one participant did not complete the autonomous motivation measure for physical activity, and another participant did not complete the self-efficacy measure for both diet and physical activity, so their data were not used for analyses with those measures.

To check the success of the randomization procedure, t-tests were used to compare the two condition groups in terms of baseline characteristics including demographic variables and independent and dependent variables. For the most part, the two groups were not significantly different from each other. However, the goals-only condition was significantly older than the full intervention condition, $t(98) = 3.04$, $p <$

.01, (15.7 years, SD = 1.13 vs. 15.1 years, SD = .98), so age was controlled for in analyses examining differences between the two conditions. The baseline motivation for change rating trended toward significance, $t(93) = 1.96$, $p = .053$, such that the goal-only condition showed slightly more motivation (M = 8.80 on 10 point scale, SD = 1.52) than the intervention condition (M = 8.12, SD = 1.84).

Demographic variables were examined as potential covariates. T-tests were used to examine the relations between gender, race, and parental marital status to the dependent variables of self-reported heath behavior, while socio-economic status, BMI, and age were examined using a correlation. Results demonstrated [$t = -2.3(97)$, $p < .05$] that females ate significantly more fresh fruit at baseline (M = 2.0 out of 4, SD = .84) when compared to males (M = 1.6, SD = .77) but when fruits and vegetables were combined as one outcome variable, there were no differences in gender; therefore, gender was not controlled for in the following analyses. Although the Hollingshead SES variable was not significantly related to the outcome variables, income was significantly related to average vegetable intake ($r = .50$, $p < .001$) and the Godin physical activity measure ($r = .24$, $p < .05$). However, because only about 2/3 of participants reported income (n = 70), income was not controlled for in the following analyses in order to maintain sample size.

At one-month follow-up, 53% of participants returned follow-up (T2) measures. Those who were in the intervention condition (n = 31) were more likely to return the follow-up measures than those in the goal-only condition χ^2 (1, $n = 22$) = 4.06, $p < .05$. Since forty-seven adolescents did not complete the one-month follow-up, independent samples t-tests were conducted to determine if the participants who did not complete the follow-up were significantly different on any of the variables at baseline than those who did complete the follow-up. While there were generally not any significant differences at

baseline between these groups, there were two significant differences. Of those that *did* complete the follow-up, the participants had higher autonomous motivation for diet at baseline (M = 5.87, SD = 1.10) than the participants who did not complete the follow-up (M = 5.29, SD = 1.48), $t(97) = 2.24$, $p < .05$. Similarly, participants who completed the follow-up had higher self-efficacy for diet (M = 7.60, SD = 1.68) than those who did not complete the follow-up (M = 6.58, SD = 2.29), $t(97) = 2.56$, $p < .05$.

Correlations among study variables at baseline for the full sample were conducted (see Anxillary Tables 2 and 3) and demonstrated that fruit and vegetable intake was positively related to physical activity (r = .30, p < .05). There were trends toward significance for the positive relationship between fruit and vegetable intake and autonomous motivation for diet (r = .18, p < .10), perceived competence for diet (r = .18, p < .10), and behavioral intentions for diet (r = .17, p < .10), and a trend toward a negative relationship with problem recognition (r = -.17, p < .10). Autonomous motivation for diet and physical activity, perceived competence for diet and physical activity, self-efficacy for diet and physical activity, parental autonomy support, behavioral intentions for diet and physical activity, importance for change, and motivation for change were all positively significantly related to one another except that autonomy support was not significantly related to behavioral intentions for physical activity. Problem recognition was only related to BMI (r = .35, p < .01) and importance for change (r = .29, p < .01).

Hypothesis 1. A mixed between-within subjects analysis of variance was conducted to assess the impact of the two different conditions (full intervention and goals only) on participants' reports of fruit and vegetable intake, across two time periods (pre-intervention, one month follow-up). There was no significant interaction between

condition and time, Wilks Lambda = 1.00, F (2,52) = .19, p = .66, partial eta squared = .004. Time trended toward significance, Wilks Lambda = .95, F (2, 52) = 2.88, p = .09, partial eta squared = .054, with both groups showing an increase in fruit and vegetable intake (see Figure 1). The interaction between time and age trended toward significance, Wilks Lambda = .94, F (2, 52) = 3.40, p = .07, partial eta squared = .064. The main effect comparing the two types of interventions was not significant, F (1, 53) = .24, p = .63 partial eta squared = .005, suggesting no differences in the two conditions.

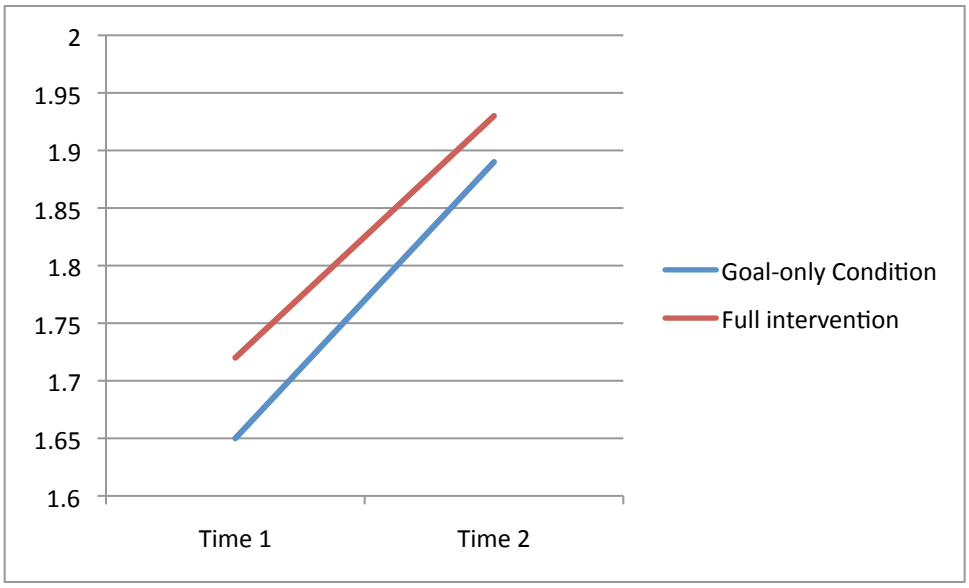


Figure 1. *Fruit and Vegetable Intake at Follow-up across Conditions*

A mixed between-within subjects analysis of variance was conducted to assess the impact of the two different conditions (full intervention and goals only) on participants' reports of physical activity, across two time periods (pre-intervention, one month follow-up). There was no significant interaction between condition and time, Wilks Lambda = .99, F (2, 49) = .58, p = .45, partial eta squared = .012. Time significantly affected outcomes, Wilks Lambda = .90, F (2, 49) = 4.99, p = .03, partial eta squared = .096, with both groups showing an increase in physical activity (see Figure 2) at time 2. The interaction between time and age also was significant, Wilks Lambda = .92, F (2, 49) =

4.11, p = .05, partial eta squared = .08. The main effect comparing the two types of intervention was not significant, F (1, 50) = .19, p = .66, partial eta squared = .004, suggesting no difference in the two conditions.

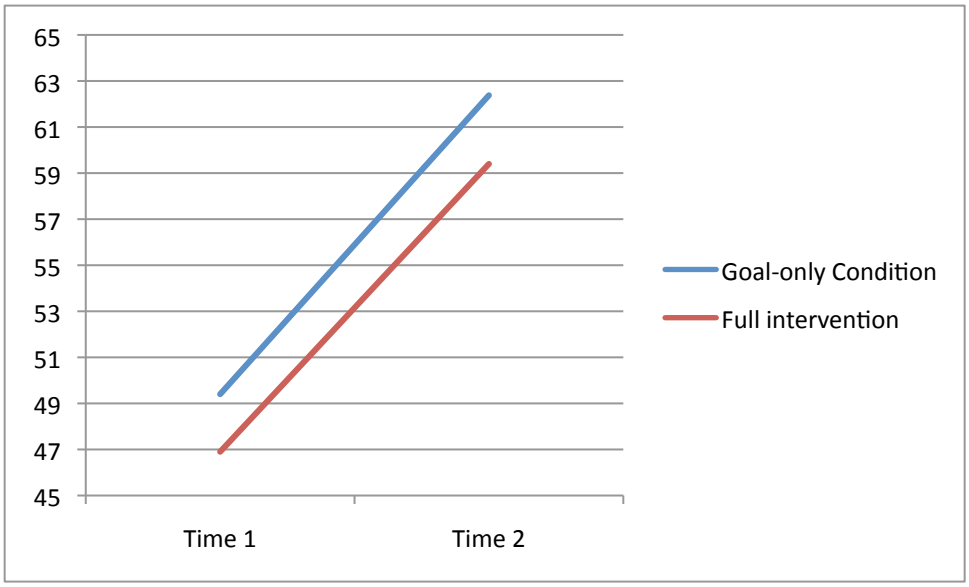


Figure 2. *Physical Activity at Follow-up across Conditions*

Among total participants who engaged in follow-up procedures, paired samples t-tests were conducted to see if there were significant differences over time among the outcome variables (See Table 1). From baseline to follow-up, there were significant increases in fruit and vegetable intake, t(53) = -2.16, p < .05, physical activity, *t*(53)= -3.11, *p* < .01, autonomous motivation for diet, *t*(53)= -2.75, *p* < .01, perceived competence for diet, *t*(53)= -2.14, *p* < .05, self-efficacy for diet, *t*(53)= -3.48, *p* < .01, and behavioral intentions for diet, *t*(53)= -2.65, *p* < .05.

Table 1.

Paired Samples T-Test for Full Follow-up Sample

Variable	Baseline Mean (SD)	Follow-up Mean (SD)	T	Effect size (Cohen's d)
Fruits & Veggies	1.69 (.64)	1.91 (.72)	-2.16*	.30
Physical Activity (PA)	47.90 (30.38)	61.14 (31.23)	-3.11**	.44
Autonomous Motivation—Diet	5.87 (1.10)	6.34 (1.02)	-2.75**	.37
Autonomous Motivation—PA	6.05 (1.04)	6.29 (.98)	-1.83^{+}	.25
Perceived Competence—Diet	5.33 (1.53)	5.70 (1.34)	-2.14*	.30
Perceived Competence—PA	5.50 (1.54)	5.83 (1.50)	-1.87^{+}	.25
Efficacy—Diet	7.63 (1.68)	8.29 (1.62)	-3.48**	.48
Efficacy—PA	6.74 (2.25)	6.70 (2.58)	.10	.02
Behavioral Intentions—Diet	8.02 (1.84)	8.72 (1.60)	-2.65*	.37
Behavioral Intentions—PA	8.26 (1.95)	8.60 (1.81)	-1.21	.17
Goal Motivation	8.22 (1.87)	8.65 (1.54)	-1.63	.24

Note: N = 53. PA = physical activity. $^{+}p < .10$, $*p < 05$, $**p < .01$.

In the goals only condition, paired samples t-tests were conducted to see if there were significant differences over time among the outcome variables (See Table 2). From baseline to follow-up, physical activity significantly increased, $t(22)= -2.27$, $p < .05$, autonomous motivation for physical activity significantly increased, $t(22)= -2.45$, $p < .05$, perceived competence for physical activity significantly increased $t(23)= -2.20$, $p < .05$, and perceived competence for diet trended toward a significant increase, $t(22)= -1.94$, $p < .10$.

Table 2.

Paired Samples T-Tests for Goal-Only Condition

Variable	Baseline Mean (SD)	Follow-up Mean (SD)	T	Effect size (Cohen's d)
Fruits & Veggies	1.65 (.79)	1.89 (.70)	-1.65	.36
Physical Activity (PA)	49.40 (31.34)	62.38 (34.00)	-2.27*	.46
Autonomous Motivation—Diet	5.97 (1.13)	6.17 (1.30)	-.62	.14
Autonomous Motivation—PA	5.91 (1.16)	6.33 (.89)	-2.45*	.56
Perceived Competence—Diet	5.46 (1.62)	6.00 (1.26)	-1.94^{+}	.42
Perceived Competence—PA	5.53 (1.64)	6.17 (1.24)	-2.20*	.49
Efficacy—Diet	7.86 (1.77)	8.32 (1.61)	-1.32	.28
Efficacy—PA	6.73 (2.19)	6.86 (2.48)	-.29	.06
Behavioral Intentions—Diet	8.46 (1.82)	8.91 (1.57)	-.94	.20
Behavioral Intentions—PA	8.73 (1.72)	8.77 (1.41)	-.12	.02
Goal Motivation	8.67 (1.61)	8.83 (1.35)	-.41	.07

Note: N = 22. PA = Physical Activity. $^{+}p < .10$, $*p < 05$, $**p < .01$.

In the full intervention condition, paired samples t-tests were conducted to see if there were significant differences over time among the outcome variables (See Table 3). From baseline to follow-up, physical activity significantly increased, $t(22)= -2.17$, $p < .05$, autonomous motivation for diet significantly increased, $t(22)= -3.59$, $p < .001$, self-efficacy for diet significantly increased $t(22)= -3.91$, $p < .001$, behavioral intentions for diet significantly increased, $t(22)= -2.94$, $p < .01$, and goal motivation trended toward a significant increase, $t(22)= -1.72$, $p < .10$.

Table 3.

Paired Samples T-Tests for Full Intervention Group

Variable	Baseline Mean (SD)	Follow-up Mean (SD)	T	Effect Size (Cohen's d)
Fruits & Veggies	1.72 (.52)	1.93 (.76)	-1.45	.271
Physical Activity	46.90 (30.23)	59.40 (29.49)	-2.17*	.395
Autonomous Motivation—Diet	5.79 (1.08)	6.46 (.77)	-3.59***	.665
Autonomous Motivation—PA	6.15 (.96)	6.27 (1.04)	-.65	.11
Perceived Competence—Diet	5.24 (1.48)	5.49 (1.38)	-1.13	.21
Perceived Competence—PA	5.47 (1.49)	5.59 (1.64)	-.54	.10
Efficacy—Diet	7.47 (1.82)	8.27 (1.66)	-3.91***	.67
Efficacy—PA	6.75 (2.33)	6.59 (2.69)	.30	.06
Behavioral Intentions—Diet	7.71 (1.83)	8.58 (1.63)	-2.94**	.53
Behavioral Intentions—PA	7.94 (2.07)	8.49 (2.06)	-1.37	.25
Goal Motivation	7.93 (2.00)	8.54 (1.64)	-1.72^{+}	.25

Note: N = 31. PA = Physical Activity. $^{+}p < .10$, $*p < 05$, $**p < .01$.

Hypothesis 2. Hierarchical linear regressions were conducted to examine the hypothesis that adolescents who report greater autonomous motivation, perceived competence, self-efficacy, and autonomy support will report more improvement on health behaviors at follow-up. First, a multiple linear regression was conducted for diet. This regression showed that the main effects of competence, self-efficacy, autonomous motivation, or autonomy support were not significant (see Table 4). Together, these variables accounted for 9.9% of the variance in changes in diet which was not significant.

Table 4.

Autonomous motivation, perceived competence, self-efficacy, and parental autonomy support predicting changes in diet intake for fruits and vegetables

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						10.53**	.17	
	Diet	.47	.14	.41	3.25**			
Step 2						3.48**	.27	.10
	Diet	.50	.15	.44	3.46***			
	Autonomous Motivation	.01	.10	.01	.09			
	Competence	.05	.09	.10	.56			
	Self- Efficacy	.10	.07	.23	1.42			
	Autonomy Support	.02	.10	.03	.17			

Note: N = 53. All measures are specific to diet except autonomy support. *p < .05, **p < .01, ***p < .001

Next, a multiple linear regression was conducted for physical activity. This regression showed that the main effects of competence, self-efficacy, and autonomous motivation were not significant, but autonomy support trended toward significance (β = -8.05, SE = 4.15, t (49) = -1.94, p = .06; see Table 5). Together, these variables accounted for only 6% of the variance in changes in physical activity which was not significant.

Table 5.

Autonomous motivation, perceived competence, self-efficacy, and parental autonomy support predicting changes in physical activity

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						18.16***	.27	
	Physical Activity T1	.54	.13	.52	4.26***			
Step 2						4.48**	.34	.06

	Physical Activity T1	.53	.13	.51	3.93***
	Autonomous Motivation	2.91	4.61	.10	.63
	Competence	3.63	3.92	.18	.93
	Self-Efficacy	-1.18	2.30	-.09	-.52
	Autonomy Support	-8.05	4.15	-.27	-1.94^{+}

Note: N = 50. All measures are specific to physical activity except autonomy support. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

Hypothesis 3. Multiple linear regressions were used to examine the relations between perceived problem recognition, importance of change, behavioral intentions, and motivation for change and improvement in diet and physical activity. For diet change, the following multiple linear regression was conducted. In step 1, baseline diet was entered. In the second step, the problem recognition, importance of change, motivation for change, and diet change intentions were added (see Table 6). The main effect for baseline diet was significant ($\beta = .44$, SE = .15, $t(49) = 2.93$, $p < .01$) and accounted for 15.2% of the variance in changes in diet. In the next step, the problem recognition, importance of change, motivation for change, and physical activity change intentions were added (see Table 6). The main effect for baseline diet was significant ($\beta = .41$, SE = .15, $t(49) = 2.70$, $p = .01$). Together, the four variables did not contribute significant variance over and above the main effects ($\Delta R^2 = .11$). The full model, with the inclusion of the four variables, remained significant ($R^2 = 26$, $F(5, 44) = 3.07$, $p < .05$).

Table 6.

Problem Recognition, Importance of Change, Motivation for Change, and Diet Change Intentions in Predicting Changes in Diet

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						8.58**	.15	
	Diet Time 1	.44	.15	.39	2.93**			
Step 2						3.07*	.26	.11
	Diet Time 1	.41	.15	.37	2.70**			
	Problem Recognition	.06	.06	.16	1.12			
	Importance of Change	-.01	.07	-.02	-.12			
	Motivation for Change	.03	.07	.08	.44			
	Diet Change Intentions	.10	.08	.24	1.29			

Note: N = 50. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

For physical activity change, the following multiple linear regression was conducted. In step 1, baseline physical activity was entered. In the second step, the problem recognition, importance of change, motivation for change, and physical activity change intentions were added (see Table 7). The main effect for baseline physical activity was significant (β = .54, SE = .13, t (46) = 16.46, p = .00). Baseline physical activity accounted for 26.8% of the variance in changes in physical activity. Although the four variables added in the next step were not significant predictors, and did not contribute significant variance over and above the main effects (ΔR^2 = .02), the full model, with the inclusion of the four variables, remained significant (R^2 = .29, F (5, 41) = 3.28, p = .014).

Table 7.

Problem Recognition, Importance of Change, Motivation for Change, and Physical Activity Change Intentions in Predicting Changes in Physical Activity

	Variable	B	SE B	ß	t	F	R^2	ΔR^2
Step 1						16.46***	.27	
	Physical Activity T1	.54	.13	.52	4.06***			
Step 2						3.28*	.29	.02
	Physical Activity T1	.55	.14	.53	3.97***			
	Problem Recognition	-1.57	2.74	-.09	-.57			
	Importance of Change	-.43	2.74	-.03	-.16			
	Motivation for Change	1.26	2.56	.08	.49			
	PA Change Intentions	1.20	2.21	.08	.54			

Note: N = 47. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

Hypothesis 4. Autonomy support, self-efficacy, and competence were predicted to strengthen the association between autonomous motivation and behavior change. The first potential interaction that was tested was the interaction between parental autonomy support and autonomous motivation for a healthy diet in predicting changes in diet. In step 1, the following variables were entered: baseline diet, autonomous motivation for diet, and autonomy support. In the second step, the interaction term was added (motivation x support; see Table 8). The main effect for baseline diet was significant (β = .46, SE = .15, t (52) = 3.14, p < .01); however, the other main effects were not significant. Together, these variables accounted for 20.3% of the variance in changes in diet. The interaction term between autonomous motivation and autonomy support trended toward significance (β = -.14, SE = .08, t (52) = -1.75 p = .09), and trended toward contributing significant variance over and above the main effects (ΔR^2 = .05, p = .09). The full model,

with the inclusion of the interaction term, remained significant (R^2 = .25, F (4,48) = 4.01, p < .01).

Post-hoc testing revealed that the relationship between autonomous motivation and diet at follow-up trended toward significance at low levels of parental support but was not significant at high levels of support. When adolescents report low parental autonomy support, there was a positive relationship between autonomous motivation and diet at follow-up (B = .23, SE = .13, p = .08). For adolescents who reported high parental autonomy support, there was an inverse non-significant relationship between self-efficacy and diet (B = -.09, SE = .13, p = .49). This interaction can be seen in Figure 3.

Table 8.

Autonomy Support X Autonomous Motivation in Predicting Changes in Diet

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						4.16*	.20	
	Diet Time 1	.46	.15	.40	3.14**			
	Autonomous Motivation Diet	.08	.09	.12	.83			
	Autonomy Support	.06	.10	.10	.68			
Step 2						4.01**	.25	.05$^+$
	Diet Time 1	.48	.14	.40	3.13**			
	Autonomous Motivation Diet	.07	.09	.10	.75			
	Autonomy Support	.02	.10	.03	.18			
	MotivationXSupport	-.14	.08	-.23	-1.75$^+$			

Note: N = 53. MotivationXSupport = interaction term for autonomous motivation and autonomy support.
*p < .05, **p < .01, ***p < .001, $^+$ p < .10.

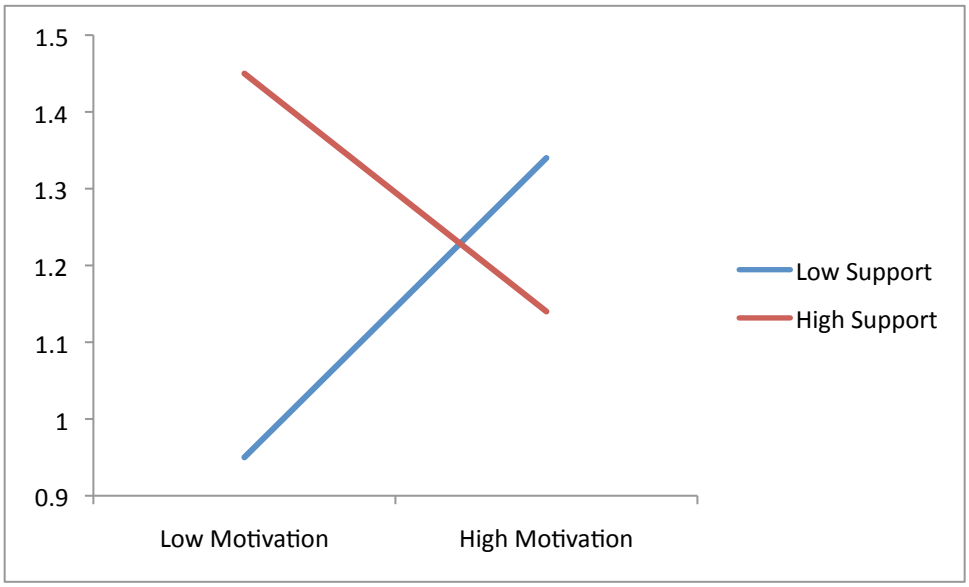


Figure 3. The interaction between autonomy support and autonomous motivation in predicting diet at time 2. The relationship between autonomous motivation and diet at follow-up trended toward significance at low levels of parental support but was not significant at high levels of support.

The next interaction that was tested was the interaction between parental autonomy support and autonomous motivation for physical activity in predicting changes in physical activity. In step 1, the following variables were entered: baseline physical activity, autonomous motivation for diet, and autonomy support. In the second step, the interaction term was added (motivation x support; see Table 9). The main effect for baseline physical activity was significant ($\beta = .57$, SE = .13, $t(49) = 4.53$, $p < .001$) and autonomy support trended toward significance ($\beta = -6.78$, SE = 3.84, $t(49) = -1.77$, $p = .08$); however, the other main effect of autonomous motivation was not significant. Together, these variables accounted for 32.4% of the variance in changes in physical activity. The interaction term between autonomous motivation and parental autonomy support was not significant ($\beta = -.30$, SE = 3.16, $t(52) = -.10$ $p > .10$), and did not contribute significant variance over and above the main effects ($\Delta R^2 = .00$). The full model, with the inclusion of the interaction term, remained significant ($R^2 = .32$, $F(5,44) = 5.40$, $p < .001$).

Table 9.

Autonomy Support X Autonomous Motivation in Predicting Changes in Physical Activity

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						7.36***	.32	
	Physical Activity T1	.57	.13	.55	4.53***			
	Autonomous Motivation PA	4.25	3.92	.14	1.09			
	Autonomy Support	-6.78	3.84	-.23	-1.77^{+}			
Step 2						5.40***	.32	.00
	Physical Activity T1	.57	.13	.55	4.45***			
	Autonomous Motivation PA	4.21	3.99	.14	1.05			
	Autonomous Support	-6.87	4.00	-.23	-1.72^{+}			
	MotivationXSupport	-.30	3.16	-.01	-.10			

Note: N = 50. MotivationXSupport = interaction term for autonomous motivation and autonomy support.
*p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

Next, the interaction between perceived competence for a healthy diet and autonomous motivation for a healthy diet in predicting changes in diet was tested. In step 1, the following variables were entered: baseline diet, autonomous motivation for diet, and perceived competence for diet. In the second step, the interaction term was added (motivation x competence; see Table 10). The main effect for baseline diet was significant (β = .46, SE = .14, t (52) = 3.26, p < .01); however, the other main effects were not significant. Together, these variables accounted for 23.9% of the variance in changes in diet. The interaction term between autonomous motivation and competence was not significant (β = -.03, SE = .07, t (52) = -.39 p > .05), and did not contribute significant variance over and above the main effects (ΔR^2 = .00, p > .05). The full model,

with the inclusion of the interaction term, remained significant (R^2 = .49, F (4,48) = 3.82, p < .01).

Table 10.

Perceived Competence X Autonomous Motivation in Predicting Changes in Diet

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						5.13**	.24	
	Diet Time 1	.46	.14	.41	3.26**			
	Autonomous Motivation	.03	.10	.04	.29			
	Competence	.11	.07	.24	1.67			
Step 2						3.82**	.24	.00
	Diet Time 1	.45	.15	.40	3.12**			
	Autonomous Motivation Diet	.02	.10	.04	.25			
	Competence	.11	.07	.24	1.66			
	MotivationXCompetence	-.03	.07	-.05	-.39			

Note: N = 50. MotivationXCompetence = interaction term for autonomous motivation and competence. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

The next interaction that was tested was the interaction between perceived competence for physical activity and autonomous motivation for physical activity in predicting physical activity at follow-up. In step 1, the following variables were entered: baseline physical activity, autonomous motivation for physical activity, and perceived competence. In the second step, the interaction term was added (motivation x competence; see Table 11). The main effect for baseline physical activity was significant (β = .55, SE = .14, t (49) = 4.03, p < .001); however, the other main effects were not significant. Together, these variables accounted for 27.8% of the variance in changes in physical activity. The interaction term between autonomous motivation and perceived

competence was not significant (β = 1.96, SE = 2.80, t (52) = .70 p > .10), and did not contribute significant variance over and above the main effects (ΔR^2 = .01). The full model, with the inclusion of the interaction term, remained significant (R^2 = .29, F (5,44) = 4.51, p < .01).

Table 11.

Perceived Competence X Autonomous Motivation in Predicting Changes in Physical Activity

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						5.92**	.53	
	Physical Activity T1	.54	.13	.52	3.99***			
	Autonomous Motivation PA	1.53	4.61	.05	.33			
	Competence	.38	3.13	.02	.12			
Step 2						4.51**	.54	.01
	Physical Activity T1	.55	.14	.53	4.03***			
	Autonomous Motivation PA	1.64	4.64	.05	.35			
	Competence	.81	3.21	.04	.25			
	MotivationXCompetence	1.95	2.80	.09	.70			

Note: N = 53. MotivationXCompetence = interaction term for autonomous motivation and competence. PA = physical activity. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

The interaction between self-efficacy for a healthy diet and autonomous motivation for a healthy diet in predicting diet at follow-up was next tested. In step 1, the following variables were entered: baseline diet, autonomous motivation for diet, and self-efficacy for diet. In the second step, the interaction term was added (motivation x self-efficacy; see Table 12). The main effect for baseline diet was significant (β = .50, SE = .14, t (52) = 3.53, p < .001) and the main effect for self-efficacy was also significant (β =

.12, SE = .06, t (52) = 2.12, p < .05); but the other main effect was not significant. Together, these variables accounted for 26.3% of the variance in changes in diet. The interaction term between autonomous motivation and efficacy was not significant (β = .01, SE = .06, t (52) = -.19 p > .10), and did not contribute significant variance over and above the main effects (ΔR^2 = .00). The full model, with the inclusion of the interaction term, remained significant (R^2 = .26, F (4,48) = 4.30, p < .01).

Table 12.

Self-Efficacy X Autonomous Motivation in Predicting Changes in Diet

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						5.84**	.26	
	Diet Time 1	.50	.14	.44	3.53***			
	Autonomous Motivation	.04	.09	.05	.39			
	Self-Efficacy Diet	.12	.06	.28	2.12*			
Step 2						4.30**	.26	.00
	Diet Time 1	.51	.15	.45	3.35**			
	Autonomous Motivation Diet	.03	.09	.05	.36			
	Self-Efficacy Diet	.12	.06	.28	2.11			
	MotivationXEfficacy	.01	.06	.03	.19			

Note: N = 53. MotivationXEfficacy = interaction term for autonomous motivation and self-efficacy. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

The interaction between self-efficacy for physical activity and autonomous motivation for physical activity in predicting physical activity at follow-up was also tested. In step 1, the following variables were entered: baseline physical activity, autonomous motivation for diet, and self-efficacy. In the second step, the interaction term

was added (motivation x self-efficacy; see Table 13). The main effect for baseline physical activity was significant (β = .54, SE = .13, t (49) = 4.20, p < .001); however, the other main effects were not significant. Together, these variables accounted for 27.9% of the variance in changes in physical activity. The interaction term between autonomous motivation and self-efficacy trended toward significance (β = 4.33, SE = 2.41, t (49) = 1.80 p = .08), and trended toward contributing significant variance over and above the main effects (ΔR^2 = .05). The full model, with the inclusion of the interaction term, remained significant (R^2 = .33, F (4,45) = 5.48, p < .001).

Post-hoc testing revealed that the relationship between autonomous motivation and physical activity at follow-up trended toward significance at high levels of self-efficacy but was not significant at low levels of self-efficacy. When adolescents report high levels of self-efficacy, there was a positive relationship between autonomous motivation and physical activity at follow-up (B = 16.69, SE = .13, p = .07). For adolescents who reported low levels of self-efficacy, there was no relationship between motivation and physical activity at follow-up (B = -3.44, SE = 5.29, p = .25). This interaction can be seen in Figure 4.

Table 13.

Self-Efficacy X Autonomous Motivation in Predicting Changes in Physical Activity

	Variable	B	SE B	ß	t	F	R^2	ΔR^2
Step 1						5.93**	.28	
	Physical Activity T1	.54	.13	.53	4.20***			
	Autonomous Motivation PA	2.32	4.32	.08	.54			
	Self-Efficacy PA	-.43	1.94	-.03	0.22			
Step 2						5.48***	.33	.05$^+$

	Physical Activity T1	.61	.13	.59	4.64***
	Autonomous Motivation PA	6.63	4.85	.22	1.37
	Self-Efficacy PA	-2.62	2.25	-.19	-1.17
	MotivationXEfficacy	4.33	2.41	.28	1.80^{+}

Note: N = 50. MotivationXEfficacy = interaction term for autonomous motivation and self-efficacy. PA = physical activity. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

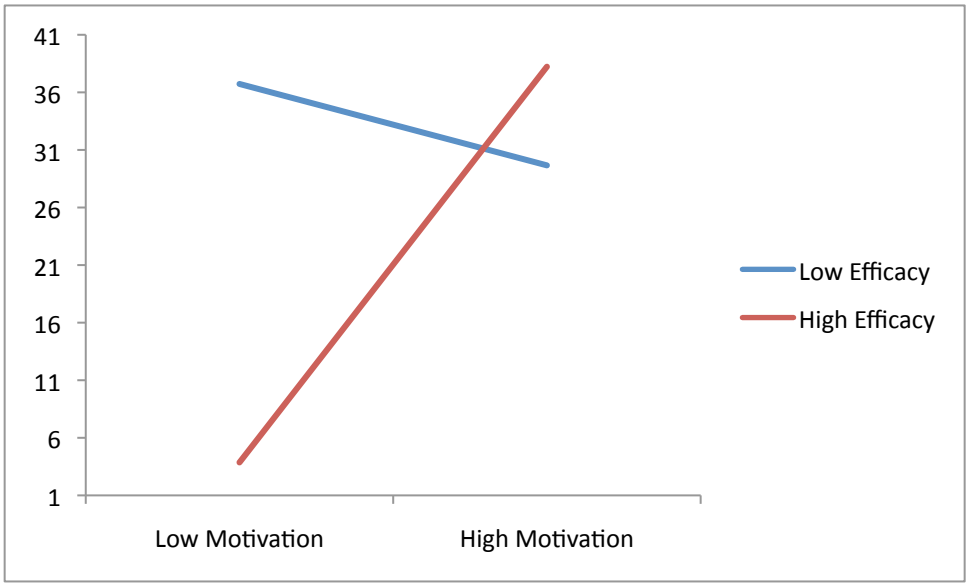


Figure 4. The interaction between autonomous motivation and self-efficacy for physical activity in predicting physical activity at time 2. The relationship between autonomous motivation and physical activity at follow-up trended toward significance at high levels of self-efficacy but was not significant at low levels of self-efficacy.

Exploratory analyses

To test for other possible moderating effects, hierarchical regressions were conducted with self-efficacy, competence, autonomous motivation, parental autonomy support, recognition of change, importance of change, and motivation for change. Moreover, age, gender, BMI, amount of screen time, and frequency of family meals were examined as potential moderators but no significant results were found other than those described and graphed below. Additionally, linear regressions were used to examine the

relation between parental relationship quality, baseline health behaviors, and health behaviors at follow-up.

The exploratory interaction between self-efficacy for a healthy diet and parental autonomy support in predicting diet at time 2 was tested. In step 1, the following variables were entered: baseline diet, parental autonomy support, and self-efficacy for diet. In the second step, the interaction term was added (support x self-efficacy; see Table 14). The main effect for baseline diet was significant ($\beta = .51$, SE = .14, $t(52) = 3.65$, $p < .001$) and the main effect for self-efficacy was also significant ($\beta = .12$, SE = .06, $t(52) = 2.20$, $p < .05$); and the other main effect was not significant. Together, these variables accounted for 26.5% of the variance in changes in diet. The interaction term between parental autonomy support and efficacy trended toward significance ($\beta = -.10$, SE = .05, $t(52) = -1.92$ $p = .06$), and trended toward contributing significant variance over and above the main effects ($\Delta R^2 = .05$, $p = .06$). The full model, with the inclusion of the interaction term, remained significant ($R^2 = .32$, $F(4,48) = 5.56$, $p < .001$).

Post-hoc testing revealed that the relationship between self-efficacy and diet at follow-up was significant at low levels of parental autonomy support but not at high levels of autonomy support. When adolescents report low parental autonomy support, there was a positive relationship between self-efficacy and diet at follow-up (B = .24, SE = .08, $p < .01$). For adolescents who reported high parental autonomy support, there was no relation between self-efficacy and diet (B = .01, SE = .05, $p = .91$). This interaction can be seen in Figure 5.

Table 14.

Self-Efficacy X Parental Autonomy Support in Predicting Changes in Diet

Variable	B	SE B	ß	T	F	R^2	ΔR^2

Step 1					5.87**	.27	
	Diet Time 1	.51	.14	.45	3.65***		
	Autonomy Support	.04	.09	.06	.48		
	Self-Efficacy Diet	.12	.06	.28	2.20*		
Step 2					5.56***	.32	.05^{+}
	Diet T1	.48	.14	.42	3.49***		
	Autonomy Support	.01	.09	.01	.10		
	Self-Efficacy Diet	.12	.06	.29	2.27*		
	SupportXEfficacy	-.10	.05	-.24	-1.92^{+}		

Note: N = 53. SupportXEfficacy = interaction term for autonomy support and self-efficacy. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

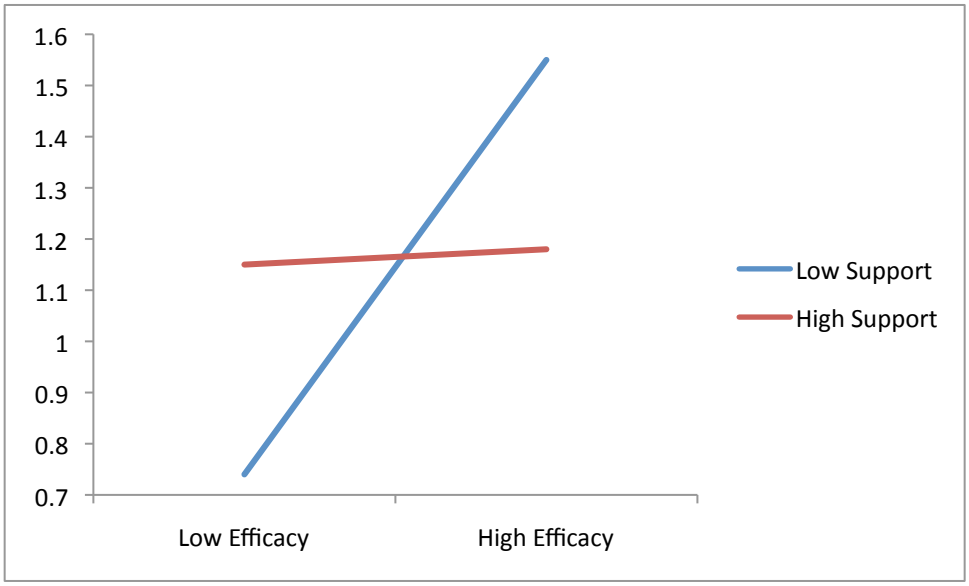


Figure 5. The interaction between autonomy support and self-efficacy in predicting diet at time 2. There was a significant relationship between self-efficacy and diet at low levels of autonomy support but not at high levels of autonomy support. When support was low, self-efficacy had a much stronger affect on diet changes than when support was high.

Next, the exploratory interaction between autonomy support and behavioral intentions for diet in predicting changes in diet was tested. In step 1, the following variables were entered: baseline diet, behavioral intentions for diet, and parental autonomy support. In the second step, the interaction term was added (autonomy support

x behavioral intentions; see Table 15). The main effect for baseline physical activity was significant (β = .42, SE = .14, t (52) = 2.89, p < .01) and behavioral intentions trended toward significance (β = .10, SE = .05, t (52) = 1.87, p = .067). Together, these variables accounted for 24.6% of the variance in changes in diet. In the next step, the interaction term between parental autonomy support and behavioral intentions was significant (β = -.08, SE = .04, t (52) = -2.07 p < .05), and contributed significant variance over and above the main effects (ΔR^2 = .06, p < .05). The full model, with the inclusion of the interaction term, also remained significant (R^2 = .31, F (3, 52) = 5.32, p < .001).

Post-hoc testing revealed that the relationship between behavioral intentions and diet was significant at low levels of parent autonomy support and was not significant at high levels of autonomy support. When adolescents report low levels of autonomy support, there was a positive relationship between behavioral intentions and diet at follow-up (B = .18, SE = .06, p < .01). For adolescents who reported high levels of autonomy support, the negative relationship between behavioral intentions and diet was not significant (B = -.02 SE = .08, p > .05). This interaction can be seen in Figure 6.

Table 15.

Autonomy Support X Behavioral Intentions for Diet in Predicting Changes in Diet

Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1					5.32**	.25	
Diet Time 1	.42	.14	.37	2.89**			
Behavioral Intentions	.10	.05	.26	1.87^{+}			
Autonomy Support	.03	.09	.04	.31			
Step 2					5.32***	.31	.06*
Diet Time 1	.41	.14	.36	2.92**			

Behavioral Intentions	.08	.05	.20	1.47
Autonomy Support	-.03	.09	-.04	-.28
SupportxIntentions	-.08	.04	-.27	-2.07*

Note: N = 53. SupportXIntentions = interaction term for autonomy support and behavioral intentions. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10

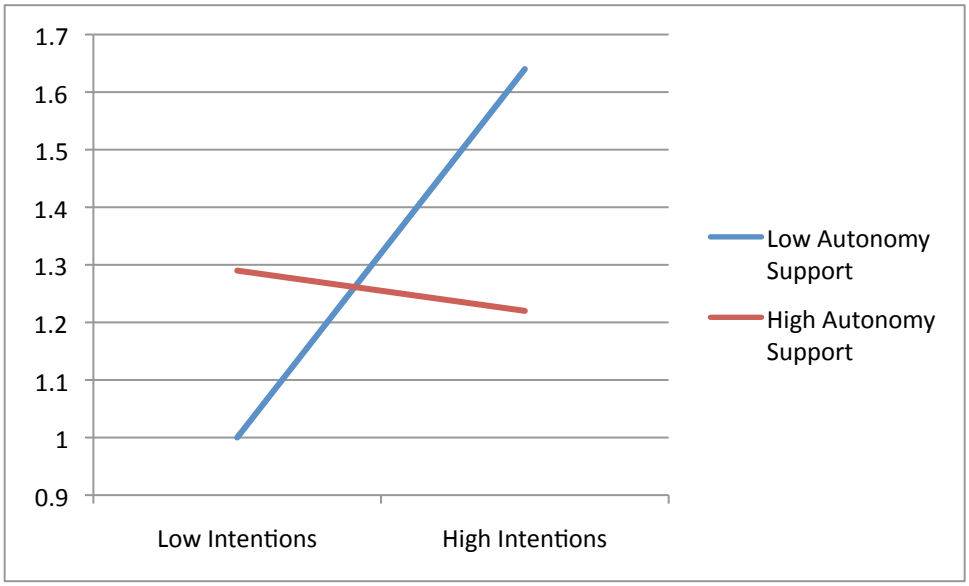


Figure 6. The interaction between autonomy support and behavioral intentions for diet in predicting changes in diet. For participants reporting low autonomy support, there was a significant relationship between behavioral intentions and diet. For participants reporting high levels of autonomy support, there was no relationship between behavioral intentions and diet.

The exploratory interaction between autonomy support and screen time in predicting changes in physical activity was tested. In step 1, the following variables were entered: baseline physical activity, screen time, and parental autonomy support. In the second step, the interaction term was added (autonomy support x screen time; see Table 16). The main effect for baseline physical activity was significant (β = .54, SE = .13, t (45) = 4.13, p < .001) and the other main effects were not significant. Together, these variables accounted for 31.5% of the variance in changes in physical activity. In the next step, the main effect for parental autonomy support was significant (β = -12.27, SE = 4.57, t (45) = -2.69 p < .01). Also, the interaction term between parental autonomy

support and screen time was significant (β = -2.66, SE = 1.24, t (45) = -2.15 p < .05), and contributed significant variance over and above the main effects (ΔR^2 = .07, p < .05). The full model, with the inclusion of the interaction term, also remained significant (R^2 = .38, F (3, 45) = 6.39, p < .001).

Post-hoc testing revealed that the relationship between parental autonomy support and physical activity was significant at high levels of screen time but was not significant at low levels of screen time. When adolescents report low levels of autonomy support, there was no relationship between screen time and physical activity at follow-up (B = 2.18, SE = 2.21, p > .05). For adolescents who high levels of autonomy support, there was a negative relation between screen time and physical activity (B = -4.67 SE = 2.30, p < .05). This interaction can be seen in Figure 7.

Table 16.

Parental Autonomy Support X Screen Time in Predicting Changes in Physical Activity

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						6.43***	.32	
	PA Time 1	.54	.13	.53	4.13***			
	Screen Time	-.94	1.66	-.07	-.57			
	Autonomy Support	-6.40	3.82	-.22	-1.68			
Step 2						6.39***	.38	.07*
	PA Time 1	.62	.13	.61	4.74***			
	Screen Time	-.64	1.60	-.05	-.40			
	Autonomy Support	-12.27	4.57	-.42	-2.69**			
	SupportXScreen	-2.66	1.24	-.33	-2.15*			

Note: N = 50. SupportXScreen = interaction term for autonomy support and screen time. PA = physical activity. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

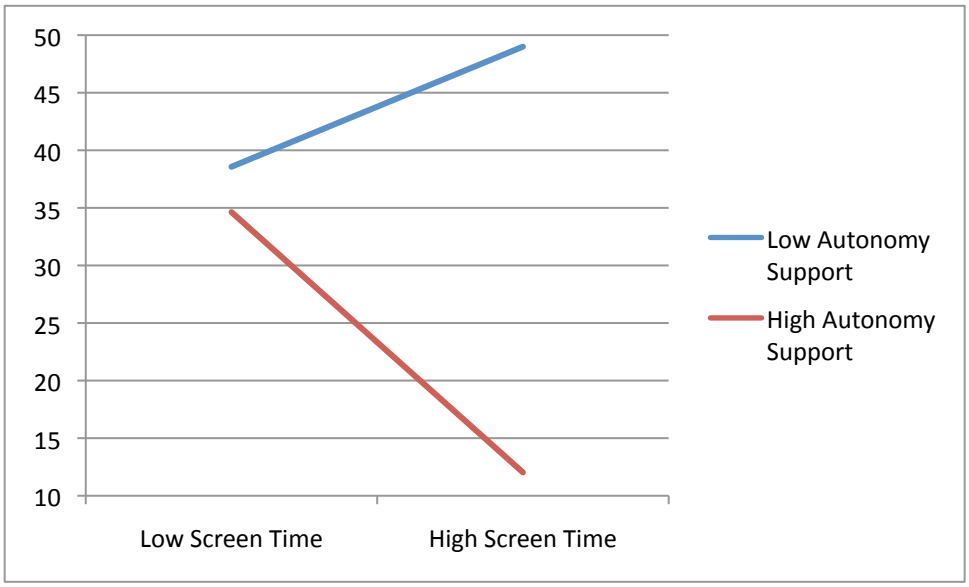


Figure 7. The interaction between autonomy support and screen time in predicting changes in physical activity. For participants reporting high autonomy support, there was a significant negative relationship between screen time and physical activity. At low levels of autonomy support, there was no relation between screen time and physical activity.

Next, the exploratory linear regression for parent relationship quality in predicting changes in diet was tested. In step 1, baseline diet was entered. In the second step, the main effect of parent relationship quality was added (see Table 17). The main effect for baseline diet was significant ($\beta = .46$, $SE = .15$, $t\ (48) = 3.06$, $p = .004$). Baseline diet accounted for 16.6% of the variance in changes in diet. The main effect of parent relationship was significant ($\beta = .01$, $SE = .01$, $t\ (48) = 2.35$ $p < .05$), and contributed significant variance over and above baseline diet ($\Delta R^2 = .09$, $p < .05$). The full model, with the inclusion of the main effect of parent relationship quality, also remained significant ($R^2 = .26$, $F\ (3, 45) = 7.90$, $p < .001$).

Table 17.

Parent Attachment Predicting Changes in Diet

Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1					9.38**	.17	
Diet Time 1	.46	.15	.41	3.06**			
Step 2					7.90***	.26	.09*
Diet Time 1	.48	.14	.43	3.37**			
Parent Relationship	.01	.01	.30	2.35*			

Note: N = 49. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

The exploratory linear regression for parent attachment in predicting changes in physical activity was tested. In step 1, baseline physical activity entered. In the second step, the main effect of parent relationship quality was added. The main effect for baseline physical activity was significant (β = .50, SE = .13, t (45) = 3.82, p < .001). Baseline physical activity accounted for 24.9% of the variance in changes in physical activity. The main effect of parent relationship quality was not significant (β = -.33, SE = .23, t (45) = -1.45 p > .05), and did not contribute significant variance over and above baseline physical activity (ΔR^2 = .04). The full model, with the inclusion of parent relationship quality, remained significant (R^2 = .28, F (2, 43) = 58.53, p < .001).

The exploratory interaction between parent relationship quality and gender in predicting changes in physical activity was tested. In step 1, the following variables were entered: baseline physical activity, gender, and parent-child relationship quality. In the second step, the interaction term was added (relationship x gender; see Table 18). The main effect for baseline physical activity was significant (β = .52, SE = .14, t (45) = 3.77, p < .001) and the other main effects were not significant. Together, these variables accounted for 28.4% of the variance in changes in physical activity. In the next step, the

main effect for parent relationship quality was significant (β = -2.27, SE = .95, t (45) = -2.39 p < .05). Also, the interaction term between parent relationship and gender was significant (β = 1.11, SE = .53, t (45) = 2.10 p < .05), and contributed significant variance over and above the main effects (ΔR^2 = .07, p < .05). The full model, with the inclusion of the interaction term, also remained significant (R^2 = .35, F (4, 45) = 5.60, p < .001).

Post-hoc testing revealed that the relationship between parent-child relationship quality and physical activity was significant for boy but was not significant for girls. For boys, there was a negative relationship between relationship quality and physical activity at follow-up (B = -1.16, SE = .46, p = .015). For girls, there was no relation between relationship quality and physical activity (B = -.05, SE = .26, p = .84). This interaction can be seen in Figure 8.

Table 18.

Parent Relationship X Gender Predicting Changes in Physical Activity

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						5.56**	.28	
	PA Time 1	.52	.14	.51	3.77***			
	Gender	.65	9.95	.01	.07			
	Parent Relationship	-.33	.23	-.19	-1.40			
Step 2						5.61***	.35	.07*
	PA Time 1	.56	.13	.57	4.21***			
	Gender	3.29	9.65	.05	.34			
	Parent Relationship	-2.27	.95	-1.28	-2.39*			
	RelationshipXGender	1.11	.53	1.13	2.10*			

Note: N = 46. RelationshipXGender = interaction term for parent relationship and gender. PA = physical activity. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

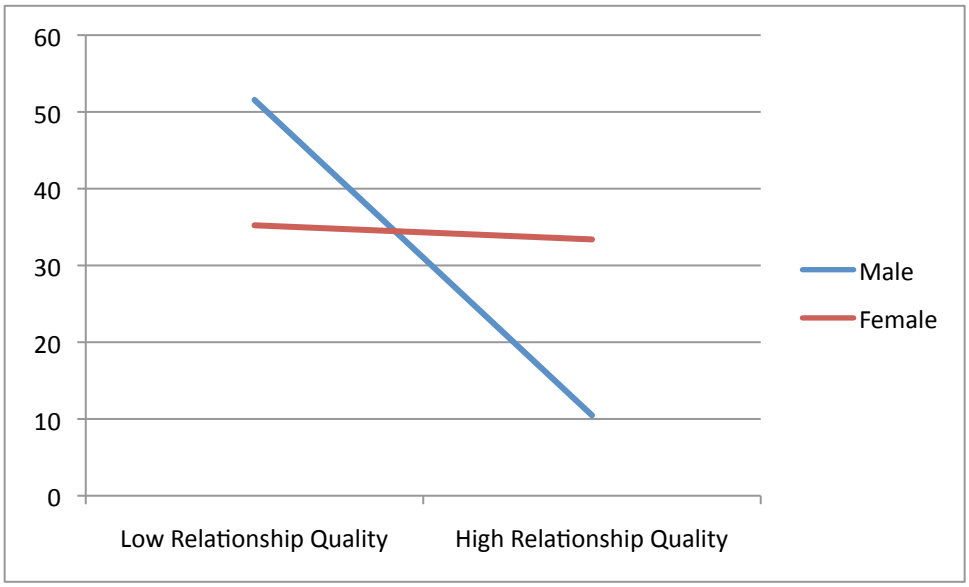


Figure 8. The interaction between relationship quality and gender in predicting changes in physical activity. For boys, there was a significant negative relationship between relationship quality and physical activity, but there was no relation between relationship and physical activity for girls.

The exploratory interaction between self-efficacy for physical activity and perceived competence in physical activity in predicting changes in physical activity was tested. In step 1, the following variables were entered: baseline physical activity, perceived competence, and self-efficacy for physical activity. In the second step, the interaction term was added (competence x self-efficacy; see Table 19). The main effect for baseline physical activity was significant ($\beta = .52$, SE = .14, $t(49) = 3.83$, $p < .001$) and the other main effects were not significant. These variables accounted for 27.8% of the variance in changes in diet. The interaction term between competence and efficacy was significant ($\beta = 3.16$, SE = 1.48, $t(49) = 2.14$ $p < .05$), and contributed significant variance over and above the main effects ($\Delta R^2 = .07$, $p < .05$). The full model, with the interaction term, remained significant ($R^2 = .35$, $F(4, 45) = 5.93$, $p < .001$).

Post-hoc testing revealed that the relationship between self-efficacy and physical activity trended toward significance at low levels of competence but was not significant at high levels of competence. When adolescents report low levels of competence, there

was a negative relationship between self-efficacy and diet at follow-up (B = -8.88, SE = 4.68, p = .07). For adolescents who reported high levels of competence, there was no relation between self-efficacy and physical activity (B = -.16, SE = 2.84, p = .96). This interaction can be seen in Figure 9.

Table 19.

Self-Efficacy X Perceived Competence in Predicting Changes in Physical Activity

	Variable	B	SE B	ß	t	F	R^2	ΔR^2
Step 1						5.91**	.28	
	Physical Activity T1	.52	.14	.50	3.83***			
	Competence	1.67	3.49	.08	.48			
	Self-Efficacy PA	-.68	2.31	-.05	-.29			
Step 2						5.93***	.35	.07*
	Physical Activity T1	.51	.13	.50	3.90***			
	Competence	7.91	4.45	.39	1.78^{+}			
	Self-Efficacy Diet	-4.03	2.72	-.30	-1.48			
	CompetenceXEfficacy	3.16	1.48	.35	2.14*			

Note: N = 50. CompetenceXEfficacy = interaction term for competence and self-efficacy. PA = physical activity. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

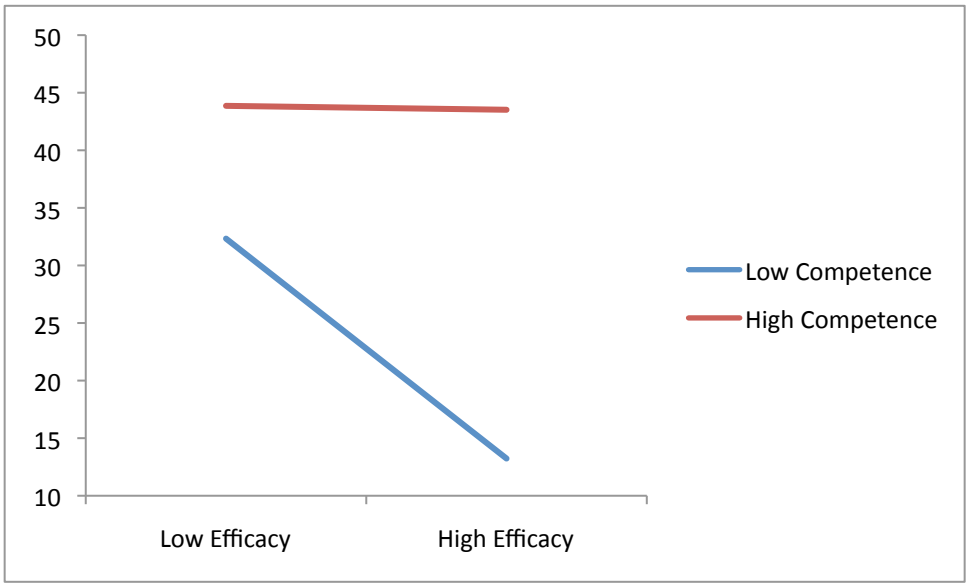


Figure 9. The interaction between competence and self-efficacy in predicting changes in physical activity. The relationship between self-efficacy and physical activity trended toward significance at low levels of competence but was not significant at high levels of competence. When competence is low, self-efficacy appears to have more of a negative affect on physical activity than when competence is high.

Next, the exploratory interaction between problem recognition and physical activity intentions in predicting changes in physical activity was tested. In step 1, the following variables were entered: baseline physical activity, problem recognition, and physical activity intentions. In the second step, the interaction term was added (Problem x Intentions; see Table 20). The main effect for baseline physical activity was significant ($\beta = .55$, $SE = .14$, $t\ (47) = 4.05$, $p < .001$) and the other main effects were not significant. Together, these variables accounted for 27.8% of the variance in changes in physical activity. In the next step, the interaction term between problem recognition and physical activity intentions was significant ($\beta = 2.71$, $SE = 1.07$, $t\ (47) = 2.53$ $p < .05$), and contributed significant variance over and above the main effects ($\Delta R^2 = .09$, $p < .05$). The full model, with the inclusion of the interaction term, also remained significant ($R^2 = .37$, $F\ (3, 47) = 6.35$, $p < .001$).

Post-hoc testing revealed that the relationship between behavioral intentions and physical activity was significant for teens with high problem recognition but was not significant for teens with low problem recognition. For high problem recognition, there was a positive relationship between intentions and physical activity at follow-up (B = 7.10, SE =2.91, $p < .05$). For low problem recognition, there was no relation between intentions and physical activity (B = -1.85, SE = 2.38, $p > .05$). This interaction can be seen in Figure 10.

Table 20.

PA Intentions x Problem Recognition in Predicting Changes in Physical Activity

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						5.64**	.28	
	Physical Activity T1	.55	.14	.53	4.05***			
	Problem Recognition	-2.05	2.47	-.11	-.83			
	PA Intentions	1.63	2.06	.11	.79			
Step 2						6.35***	.37	.09*
	Physical Activity T1	.57	.13	.55	4.47***			
	Problem Recognition	-2.61	2.34	-.14	-1.11			
	PA Intentions	2.63	1.98	.17	1.33			
	ProblemXIntentions	2.71	1.07	.31	2.53*			

Note: N = 50. ProblemXIntentions = interaction term for problem recognition and physical activity intentions. PA = physical activity. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

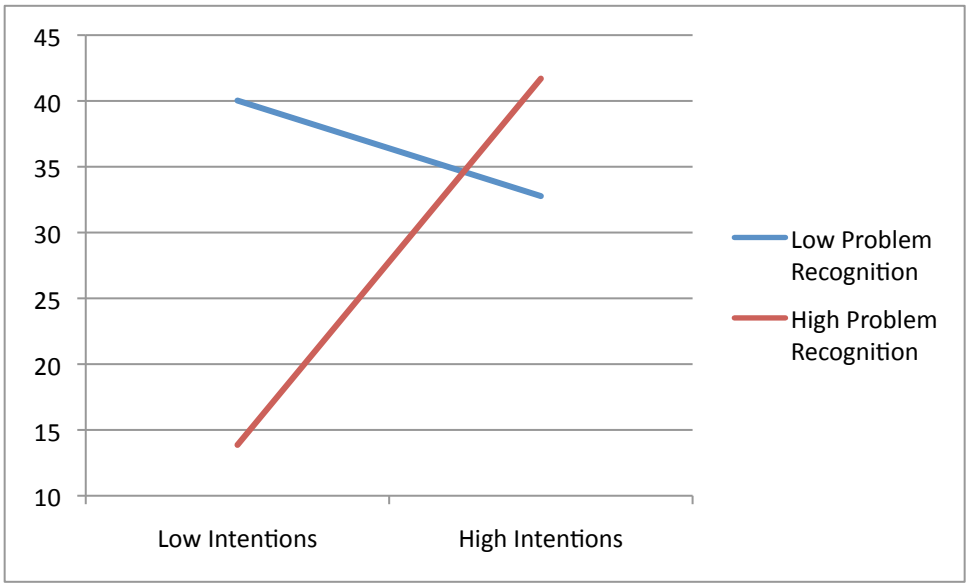


Figure 10. The interaction between problem recognition and behavioral intentions for physical activity in predicting changes in physical activity. At high levels of problem recognition, the relationship between intentions and physical activity was significant, but it was not significant at low levels of problem recognition.

The exploratory interaction between BMI and physical activity intentions in predicting changes in physical activity was tested. In step 1, the following variables were entered: baseline physical activity, BMI, and physical activity intentions. In the second step, the interaction term was added (BMI x Intentions; see Table 21). The main effect for baseline physical activity trended toward significance ($\beta = .36$, SE = .19, $t(35) = 1.95$, $p = .06$) and the other main effects were not significant. Together, these variables accounted for 13.9% of the variance in changes in physical activity. In the next step, the interaction term between BMI and physical activity intentions trended toward significance ($\beta = 1.11$, SE = .53, $t(35) = 2.10$ $p < .05$), and trended toward contributing significant variance over and above the main effects ($\Delta R^2 = .10$, $p = .06$). The full model, with the inclusion of the interaction term, also trended toward significance ($R^2 = .24$, $F(3, 35) = 2.31$, $p = .08$).

Post-hoc testing revealed that the relationship between BMI and physical activity intentions trended toward significance for teens with higher BMI but was not significant for teens with lower BMI. For higher BMI, there was a positive relationship between intentions and physical activity at follow-up (B = 7.33, SE =3.70, p = .057). For higher BMI, there was no relation between intentions and physical activity (B = -2.14, SE = 2.23, p = .51). This interaction can be seen in Figure 11.

Table 21.

PA Intentions x BMI in Predicting Changes in Physical Activity

	Variable	B	SE B	ß	T	F	R^2	ΔR^2
Step 1						1.67	.14	
	Physical Activity T1	.36	.19	.33	1.95^{+}			
	BMI	-.59	.59	-.17	-1.00			
	PA Intentions	1.94	2.56	.13	.76			
Step 2						2.31^{+}	.24	$.10^{+}$
	Physical Activity T1	.27	.18	.25	1.49			
	BMI	-.26	.59	-.08	-.45			
	PA Intentions	-13.57	8.33	-.89	-1.63			
	BMIxIntentions	.56	.29	1.06	1.95^{+}			

Note: N = 35. BMI = Body mass index. PA = physical activity. BMIxIntentions = interaction term for BMI and physical activity intentions. *p < .05, **p < .01, ***p < .001, $^{+}$ p < .10.

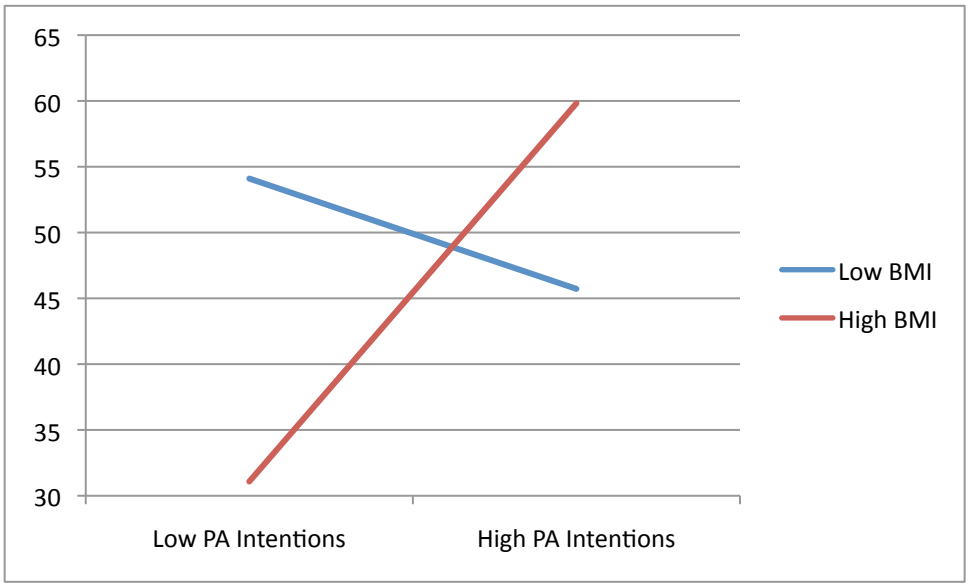


Figure 11. The interaction between BMI and behavioral intentions for physical activity in predicting changes in physical activity. The positive relationship between intentions and physical activity trended toward significance for teens with higher BMI but was not significant for teens with lower BMI.

DISCUSSION

Adolescence represents a unique period of development and self-discovery during which youth explore and begin establishing their personal identities, values, and autonomy (Rice & Dolgin, 2008). Choices and health patterns, such as sedentary activity or poor dietary intake, which are established during adolescence, can set the stage for adult health. Obesity in youth has emerged as a major health problem in the United States and across the globe and research shows that children who are obese have an 80% chance of becoming obese as an adult (American Academy of Child and Adolescent Psychiatry, 2012). During the past 25 years, prevalence of adolescents who are obese or overweight has increased considerably (NHANES, 2002). Obesity has been linked to significant health problems such as heart disease, stroke, diabetes, osteoarthritis, depression, breathing problems, and sleeping difficulties (American Academy of Child and Adolescent Psychiatry, 2012; Ozer et al., 2003). Unfortunately, physical activity, on average, appears to decline substantially during adolescence (Goran, Reynolds, & Lindquist, 1999), especially in minority groups (Gordon-Larsen, Adair, & Popkin, 2002; Spruijt-Metz, Nguyen-Michel, Goran, Chou, & Huang 2008). Hence, intervening early and encouraging the development of positive health behaviors is especially necessary in order to help guide adolescents toward creating healthier futures.

Research is mixed regarding the effectiveness of improving health behaviors with brief (e.g., Kelleher et al., 1999; Patrick et al., 2001; Prochaska & Sallis 2004; Walker et al., 2002; Werch et al., 2005) and extended (e.g., Ortega-Sanchez et al., 2004; Robbins et al., 2006, Wilson, Evans, Williams, Mixon, Sirard, & Pate, 2005; Wilson et al., 2002) interventions for adolescents. The literature on the effects of goal setting for dietary or

physical activity behavior amongst children and adolescents is limited (Shilts, Horowitz, & Townsend, 2004). Moreover, pediatric health care practitioners report low confidence in their ability to counsel overweight children or adolescents, and they question the efficacy of behavioral counseling (Kolagotla & Adams, 2004; Perrin, Flower, Garrett, & Ammerman, 2005; Story, et al., 2002). However, a brief intervention can readily be incorporated into usual care, so youth can more easily access prevention and intervention services. To date, few brief motivational interventions for improving nutrition and physical activity have been evaluated in urban adolescents (Berg-Smith, et al., 1999; Werch, et al., 2003). The current study, therefore, evaluated the effects of a brief intervention delivered in a primary care setting in an attempt to motivate adolescents and promote healthy changes in diet and physical activity.

The Youth at Baseline

The patterns of behaviors reported by youth at baseline assessment of the current sample are similar to reports in the literature (American Academy of Child and Adolescent Psychiatry, 2012; CDC, 2009). The current sample was composed of urban teens with 1/3 who were considered obese, and almost 2/3 of the sample were considered overweight or obese. At baseline, the adolescents in the study were eating fruits and vegetables on average less than a few times a week and were engaging in physical activity 2-3 times for each level of activity (strenuous, moderate activity, mild) for 15 minutes or more. A healthy diet was associated with a more active lifestyle. Those who ate more fruits and vegetables also tended to have more autonomous motivation to eat healthy and tended to have greater intentions to eat healthy in the future. Autonomous motivation for eating has been cross-sectionally associated with healthier eating patterns (Pelletier et al. 2004; Pelletier & Dion 2007) and research shows that motivation quality

plays a role in the capacity to adopt and, more importantly, to sustain healthful diets (Teixeira, Patrick, & Mata, 2011).

Intervention Outcomes

Results showed that those in the full intervention group did not show improvements above and beyond those in the goal-only condition, although, both groups did show health behavior improvements over time. Adolescents in the study who were older (i.e., 16 to 17) were more likely to make changes in both diet and physical activity than did 14 to 15 year olds, perhaps due in part to increased behavioral autonomy which is their ability to develop independence in decision-making without depending on others, such as parents or peers, for consultation or advice (Holmbeck et al., 2006; Rice & Dolgin, 2008).

Unfortunately, there was 47% attrition in the study, which not only limited the power needed to detect effects, but also was not random. Those in the full intervention group were significantly more likely to return the follow-up measures than those in the goal-only condition. Participants in the intervention group reported finding the intervention very valuable and they felt very supported and understood by the health coach, so they may have felt more invested in the study and compelled to follow through with the study. Also, taken as a whole, participants who completed the follow-up measures had higher baseline autonomous motivation for diet and higher self-efficacy for diet than those who did not complete the follow-up, so the characteristics of the participants and changes seen in the follow-up sample may not be representative of the larger sample. Additionally, research shows that autonomous motivation can predict regular attendance to a weight loss program (Williams, Grow, Freedman, Ryan, & Deci,

1996), showing that participants who are more engaged and self-motivated in a program are more successful.

On the other hand, the fact that intervention group and prior motivation and self-efficacy scores predicted completing the study provides some indirect support for the constructs of interest. It is possible that the intervention elicited a stronger commitment to behavior change as reflected by remaining engaged in the study. Similarly, those who remained in the study had higher motivation and self-efficacy than those who dropped out, so although motivation and efficacy did not directly predict behavior change in the follow-up sample, it is likely that if the full sample were included in the follow-up, motivation and self-efficacy, among other variables of interest, would predict behavior change.

Adolescents in both conditions, who completed the follow-up assessment, showed improvements based on self-report. Apparently, participants benefited from their involvement in the study regardless of the assigned group. The act of filling out questionnaires and creating a goal may have primed adolescents to think about health behaviors and lifestyle changes, and the longer chat with the health coach appears to not have been necessary for adolescents to take initial steps toward health changes. Also, in line with the self-perception theory (Bem, 1972) and cognitive dissonance theory (Aronson, Fried, & Stone, 1991; Brehm, 1962), the act of presenting themselves and their goals in a positive manner to the health coach may have induced shifts in their self concept which influenced behavior or at least reported behavior (Rhodewalt, 1998). Also, it is important to note that the use of more detailed nutrition and physical activity measures, such as a 24-hour recall approach or use of a daily food and exercise diary, may have been a more accurate way to measure behavior.

Since both groups engaged in goal-setting, it is possible that goal-setting was an important mechanism in change. A review of the literature showed limited research on the effectiveness of goal-setting for dietary or physical activity behavior amongst children and adolescents (Shilts, Horowitz, & Townsend, 2004). One study showed that guided goal setting among urban adolescents can affect behavior change such as dietary gains and improved physical activity (Shilts, Horowitz, & Townsend, 2009). Goal setting has been shown to lead to improvements in nutrient intake among children and adolescents (Weber Cullen, 2011; White & Skinner, 1988) and college students (Schnoll, & Zimmerman, 2001). A review of interventions for healthy eating and physical activity demonstrated that some of the key mechanisms for change include prompting intentions to change and specific goal setting (Michie, Whittington, Abraham, McAteer, & Gupta, 2009).

In the current study, there were no data on gains beyond one month, so it is unclear if adolescents maintained changes or if certain groups were more able to maintain gains. It may be challenging to overcome barriers that are ubiquitous in urban settings such as limited access to low cost nutritious foods and recreational facilities (Babey, et al., 2008; Encyclopedia of Public Health, 2002), so it may be difficult to maintain gains over time. Perhaps chatting with the health coach in the intervention condition about potential barriers helped adolescents overcome long-term barriers. It is likely that an increased focus on barriers and support systems would be important in order to affect large-scale and more permanent changes in lifestyle and weight management, and future research is needed in order to examine these hypotheses. Future research might benefit from including family members or friends in the intervention, as research has shown that targeting multiple systems and addressing barriers at the individual, family, and extra-

familial level (e.g., peers, school, community) contributes to significant improvements in weight loss (Naar-King, Ellis, et al., 2009).

Independent Variables

Based on self-determination theory, which proposes that the psychological needs of autonomy, competence, and relatedness (Deci & Ryan, 2000; Ryan, 1995) can support motivation to change behaviors, it was expected that adolescents who reported greater autonomous motivation, perceived competence, self-efficacy, and autonomy support would report more improvement on health behaviors at follow-up. Contrary to expectations, these variables were not related to behavior change. However, there were more complex associations (discussed below) with behavior change. Since the majority of adolescents in the study reported high autonomous motivation and competence, results may have been influenced by limited variance and a ceiling affect. Moreover, those with low autonomous motivation were less likely to complete the follow-up assessment, making it impossible to examine the relations between this variable and change.

It was also expected that adolescents who reported greater problem recognition, importance of change, motivation for change, and behavioral intentions to change would report more improvement; however, results did not demonstrate this finding. Most adolescents reported high ratings of importance of change, motivation for change, and behavioral intentions to change, so again, the results may have been influenced by limited variance and a ceiling effect. Social desirability factors may have played a role in the adolescents' ratings, as they may have wanted to show the health coach that they were motivated and it was important for them to change. Alternatively, they may have been earnest when making their ratings, but some may have not fully considered the commitment it would take to make major lifestyle changes. With further exploration,

more complex relations (discussed below) were found that contributed to behavior change.

It may be that for urban adolescents, motivation to change and belief in ability to change are not powerful enough factors in and of themselves to bring about change. Minority youth are more likely to be exposed to environments that promote obesity in individuals or populations due to particular surroundings, opportunities, and conditions (Moreno et al., 2004) that offer less opportunities and resources for physical activity and healthy foods (Kipke et al., 2007; Lewis et al., 2005). Therefore, contextual and support factors may be as important or even more influential or necessary than motivation or competence during adolescence when teens are still dependent on parents for providing dietary needs and promoting physical activity (Lioret et al., 2007; Rice & Dolgin, 2008). Factors such as subjective norms and attitudes within cultures or peer groups also may influence behavior change (Ajzen & Madden, 1986). Moreover, there are influences within neighborhoods (e.g., peer influences, role models, monitoring, and resources) that affect child development and opportunities for change (Brooks-Gunn, Duncan, Klebanov, & Seal, 2006; Dearing, Simpkins, Bouffard, & Caronongan, 2009), so future research would do well to examine neighborhood and social influences on behavioral change.

Moderators

It was next predicted that autonomy support, self-efficacy, and competence would strengthen the association between autonomous motivation and behavior change, but overall, the predictions were not supported. There were, however, two interactions that tended toward significance. When participants reported low parental autonomy support, greater autonomous motivation related to greater behavior change. Whereas at high levels of support, greater autonomous motivation was related to less behavior change, but the

latter relation was not significant. Parental autonomy support and behavior change will be discussed more thoroughly below. The other relation that tended toward significance was the interaction between autonomous motivation and self-efficacy in predicting physical activity. At high levels of self-efficacy, there was a strong relation between motivation and behavior change. This trend can be understood, in part, with the theory of planned behavior (Ajzen & Madden, 1986), which highlights the importance of motivation combined with perceived behavioral control (Bandura, 1977), a form of self-efficacy. Thus, motivated adolescents are more likely to make changes in their behavior if they believe that they can. Research has demonstrated the importance of self-efficacy in making changes in physical activity amongst both adolescents and adults (Cusatis & Shannon, 1996; Pearson, Ball, & Crawford, 2012; Shilts, Horowitz, & Townsend, 2009; Teixeira et al., 2006).

Parental Autonomy Support

Parental autonomy support appeared to influence behavior change in unexpected ways. In the current study, contrary to expectations, parental autonomy support appeared to have either no affect or a *negative* affect on behavior change. When parental autonomy support was *low*, motivation (as stated above), self-efficacy, and behavioral intentions each appeared to relate more strongly to behavior change than when support was high. Perhaps when parents provide more control, rules, and directives with less volition, adolescents who are motivated or confident in their ability to change are even more determined to do so. Also, presumably they are in a more structured context that helps them to become better prepared to realistically carry out their goals. If the adolescent is not motivated or confident in their ability to change, however, they may become immobilized. Parental control and food-related rules have been shown to positively affect

behavior change. For example, Pearson, Ball, and Crawford (2011) showed that parental control regarding food was significantly associated with adolescent fruit consumption and adolescent dietary self-efficacy. Unfortunately, the parental autonomy support measure in the current study was not specific to diet or physical activity, but future research could examine the particular types of support for specific health behaviors.

There was another surprising finding related to autonomy support. Results showed that there was a significant negative relation between screen time and physical activity for adolescents who reported high parental autonomy support, but not for teens reporting low autonomy support. This suggests that when parents provide personal choice and understanding to teens who engage in more sedentary activities (e.g., television, computer), they may be contributing to their child's maintenance of low physical activity or other poor habits. Often, teens develop patterns that were modeled by their parents, so these teens may be likely to have parents who engage in sedentary activity, too. Moreover, active parents tend to be more supportive of their children's physical activity than non-active parents (Gustafson & Rhodes, 2006), so it possible that these teens are spending leisure time being inactive with their parents. Screen time has been associated with poor relationships with parents and peers (Richards et al., 2010), so decreasing screen time would be important not only for physical health, but also for improving the quality of relationships with close others.

Given the unexpected findings, it may be important to consider the possibility that some participants may have interpreted the items in the parental autonomy support measure in a way that did not accurately measure the construct. The measure, based on self-determination theory, aimed to assess the extent to which parents are empathic to their children's perspective, provide choices to their children whenever it is possible,

minimize the use of control and power assertion, and help their offspring to explore and act upon their true personal values and interests (Grolnick, 2003; Ryan et al., 1995). However, it may have inadvertently tapped into other qualities, too, such as permissiveness or tolerance of behavior, or another form of autonomy support that promotes adolescents' independent expression, thinking, and decision-making (Gray & Steinberg, 1999), regardless of a child's best interest. These two forms of autonomy support are related but distinct constructs and research suggests the self-determination form of autonomy support is uniquely important for adolescents' well-being, because it encourages them to become more fully aware of and act upon their interests and personal values (Soenens et al., 2007; Soenens, & Beyers, 2012). Future studies may want to include a measure of parental involvement with the measure of parental autonomy support to assist in the discrimination between parents who support autonomy and parents who are just uninvolved.

Parent-Child Relationship

In the current study parent-child relationship quality predicted changes in diet. When adolescents feel close to their parents and feel able to communicate about their goals, they may be more able to utilize parental resources (Ryan & Lynch, 1989). Research suggests that when parents provide companionship at mealtime, establish a positive atmosphere, and model appropriate food-related behaviors, their children tend to have improved dietary quality (Stanek, Abbott, & Cramer, 1990). However, when parents have poor habits themselves, the close relationships that parents and adolescents form may actually strengthen the family culture of sedentary activity and unhealthy eating, which undermines the adolescents' health goals. For example, the results from the current study demonstrated that for boys, but not for girls, stronger parent-child relationships

were related to lower physical activity at follow-up. It may be that time at home engaging in sedentary activities with their primary caregiver (e.g., watching TV) promotes more closeness than when boys are being active outside of the house. Perhaps boys who have poor relationships with their primary caregiver utilize physical activity (e.g., sports teams) as a means of connecting with adult role models (coaches) or peers.

Behavioral Intentions

Behavioral intentions appear to play an important role in predicting changes in physical activity, especially in the context of adolescents who recognize problems in health behaviors and in adolescents who are overweight or obese. Consistent with this hypothesis, adolescents in the current study who reported high problem recognition were more likely to increase in physical activity at follow-up. Hence, adolescents are more likely to change when they both recognize there is a problem with their current behaviors and have intentions to make behavioral improvements. This is consistent with Miller and Rollnick (2002) who posit that recognizing that there is a problem that needs changing and having a desire to change are important factors for change. Those with higher BMI's were more likely to recognize a problem with their current behaviors. Moreover, for adolescents with higher BMI's, greater behavioral intentions tended to relate to greater changes in physical activity. This demonstrates the importance of helping teens who are overweight begin forming goals for their future (Michie et al., 2009), because if they make intentions to change, they are more likely to improve activity levels.

Limitations and Future Directions

This study had several strengths, including the randomization to the intervention versus the goal-only conditions, and looking at mostly African American adolescents living in an environment with high risk for obesity. However, there were also many

limitations that are important to note. It may be that there were no significant group differences at the one-month follow-up due to the brevity of the full intervention. In order to help adolescent obtain greater gains in health improvement, it is recommended that future research help the adolescent create a specific plan for monitoring their behavior, provide booster sessions or phone calls after the initial intervention, and include parents, other family members, or peers in the intervention. Family level interventions are beneficial because of the many potential avenues for parental and sibling influence (e.g., modeling, social support, and transportation; Sallis, 1998). Family interventions may be particularly useful for younger adolescents who have less behavioral autonomy.

Given that the goal-only group participated in a short goal-setting chat, there was not a true control group. Therefore, it is not possible to determine if changes seen in the adolescents from baseline to follow-up were due to the act of goal-setting, to engaging briefly with a caring health coach, or other unmeasured variables.

It is important to note, too, that changes in behaviors seen in the study may be due to natural changes such as increasing activity and health foods during summer months. The study took place between April and September, a time period when fruits and vegetables are more available and it is easier to exercise outside. If the study occurred in the winter months, there may have been less health-related changes due to restricted environments and limited produce. It would be helpful in future research to pay attention to the timing of the intervention in regard to the calendar and examine for any potential seasonal influences.

Another limitation of this study is the large number of analyses that was conducted. Therefore, Type 1 error issues are a consideration. The correlations and interactions may have been capitalizing on chance and therefore, there may be significant

findings that are false positives. It is important to replicate this study to ensure these findings reflect reality and that they did not occur due to chance alone.

An important limitation is the attrition at the one-month follow-up. Only 53% of participants completed the follow-up questionnaires. Because of the limited sample size at follow-up, it may be necessary to take into account Type II error such that there was not enough power to detect an effect. Moreover, while there were few differences between adolescents that completed and did not complete the one-month follow-up, it is possible that these adolescents were different in other respects than those that completed the follow-up. Since there was only one phone call reminder made to participants about returning follow-up packets, it may be that the more conscientious adolescents or ones who made more improvements took the effort to mail in their packets. Future research needs to include more efforts and resources to collect follow-up information, such as utilizing home-based follow-up strategies, in order to ensure that findings from the follow-up sample are generalizable to the larger population.

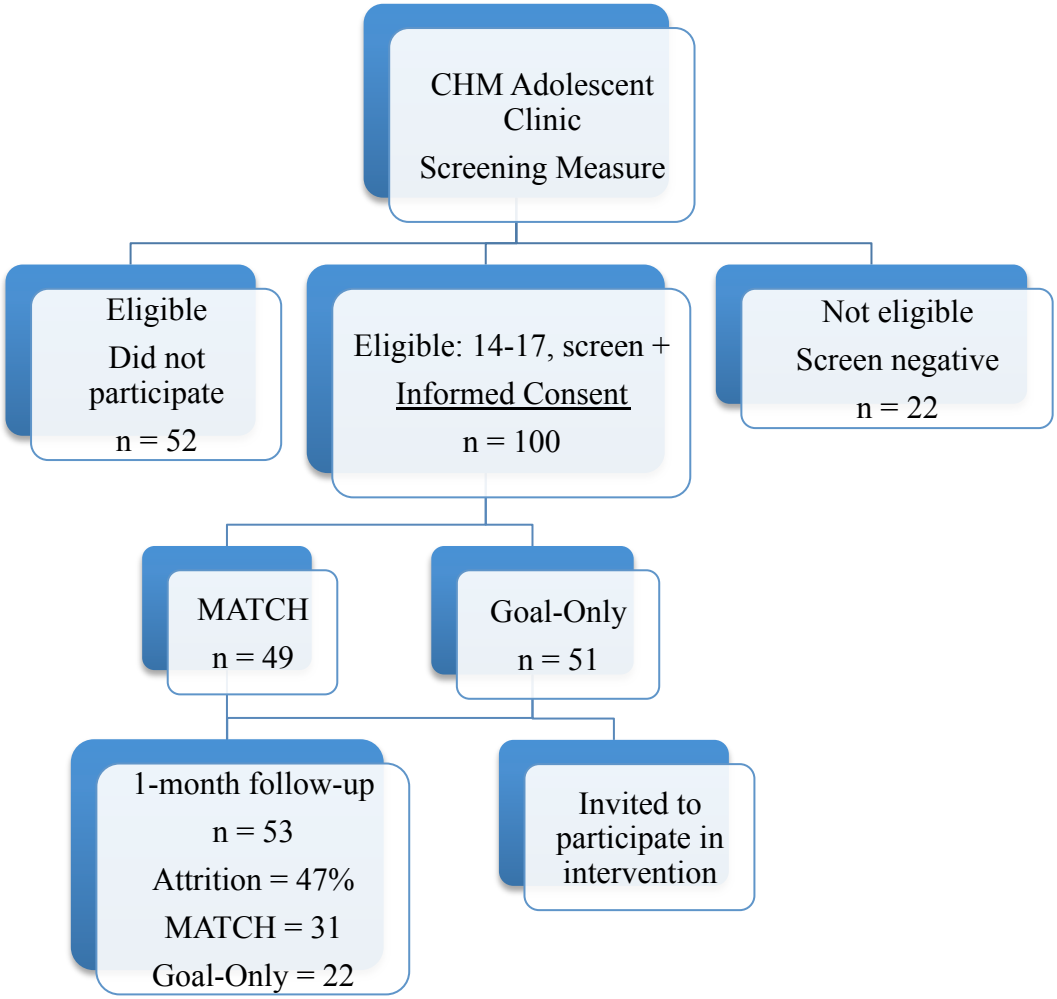
Although the intervention did not show behavior changes above and beyond the goal-only group, it was an important first step in integrating preventive care strategies into the primary care setting by focusing on the individual's values, goals, and intrinsic motivations. It is hopeful that such a brief chat with a caring adult has the potential to bring about significant improvements. Interventions such as MATCH may be useful as a preparatory intervention that inspires the adolescent to make changes and instill hope and optimism, and the next step may be working closely with a pediatrician or other health professional to carry out long-term goals. Since many pediatricians doubt their efficacy for obesity counseling or do not feel that counseling is effective (Kolagotla & Adams, 2004), a potential next important step would be improving the confidence of physicians

in delivering brief goal-oriented interventions. Neumark-Sztainer (2009) describes research-based recommendations for health care providers in order to help prevent obesity among adolescents. Recommendations include focusing on sustained behavioral change by encouraging and supporting eating and physical activity behaviors that can be maintained on an ongoing basis, promoting a positive body image, encouraging more frequent and enjoyable family meals, and encouraging families to do more at home to facilitate healthy eating and physical activity.

At this time, continued research needs to be conducted to evaluate whether adjustments in the intervention, such as including parental involvement, would work with adolescents across settings. By including aspects of this intervention in future primary care visits, it is possible that "treatment as usual" in medical facilities can become more effective and increase preventative efforts.

FIGURES

Ancillary Figure 1: Intervention Flow Chart



TABLES

Ancillary Table 1.

Selected 2009 Youth Risk Behavior Survey Results

	Average in US % (confidence interval)	Average African Americans in US % (confidence interval)	Average in Detroit % (confidence interval)
Nutrition			
Did not eat at least 5 servings of fruits and vegetables (past 7 days)	77.7 (76.3-78.9)	73.4 (70.9-75.7)	76.6 (71.9-80.8)
Obese (BMI is 95th percentile or greater)	12 (10.9-13.1)	15.1 (13.4-17)	20.8 (17.6-24.5)
Overweight (BMI is 85th percentile or greater)	15.8 (14.7-17)	21 (18.6-23.6)	19.6 (16.7-22.9)
Described themselves as slightly or very overweight	27.7 (26.7-28.6)	22.9 (21.1-24.9)	28.9 (25.9-32.1)
Physical Activity			
Did not attend physical education classes in an average week	43.6 (36.3-51.1)	45.6 (39.5-51.8)	55.4 (50.1-60.5)
Watched 3 or more hours of television each day	32.8 (30.4-35.3)	55.5 (53.3-57.7)	48 (44.5-51.5)
Did not engage in 60 minutes of physical activity (past 7 days)	23.1 (21.5-24.8)	32.1 (29.7-34.5)	26.6 (23.4-30)

Ancillary Table 2.

Integration of Theory and Intervention

Theory	Application to Intervention
Self-determination theory	Elicit autonomous motivation: Which health behavior are you worried is most likely to be a problem in reaching your goals? How motivated are you to change the behavior and reach the goal that you identified?
Motivational interviewing	Readiness to change, resolving ambivalence: On a scale from 1 to 10, with 10 being the highest, how important is it to you change? What are reasons for wanting to change your current behaviors?
Theory of planned behavior	Behavior intention: How sure are you that you will make this change and reach the goal that you identified?
Social cognitive theory	Self-efficacy: What could get in the way of making these health behavior changes? Who can help you make these changes?

Ancillary Table 3.

Demographic Variables

Demographic Variable	Mean (SD)	Range	N
Age	15.41 (1.10)	14-17	100
Weight (lbs)	170.04 (56.61)	94-375	82
BMI	28.93 (8.57)	18-50.	71
SES Hollingshead Rating	31.84 (11.77)	14-56	55
Income	$31,280 ($27,882)	$674-$160,000	70
Daily Screen Time (hours)	4.30 (2.79)	0-12	90
Weekly Family Meals	3.79 (2.99)	0-12	92

Gender	N (total = 100)
Females	75
Males	25
Ethnicity	
African American	89
Caucasian	2
Hispanic/Latino	2
Other	7

Ancillary Table 4.

Information about Measures

Measures	Mean (SD)	Possible Range	Obtained Range	N
Fruit and Vegetable Intake	1.69 (SD = .67)	0-4	0-3.50	100
Physical Activity (PA)	48.23 (29.62)	0-126	0-119	98
Autonomous Motivation Diet	5.60 (1.32)	0-7	2-7	99
Autonomous Motivation PA	5.88 (SD = 1.18)	0-7	2.50-7	99
Perceived Competence Diet	5.09 (1.56)	0-7	1.50-7	99
Perceived Competence PA	5.42 (1.47)	0-7	1.75-7	99
Self-Efficacy Diet	7.13 (SD = 2.04)	0-10	1.60-10	99
Self-Efficacy PA	6.32 (SD = 2.35)	0-10	0.60-10	99
Parental Autonomy Support	4.91 (1.12)	0-7	1.67-7	99
Problem Recognition	6.49 (SD = 1.82)	0-10	2-10	96
Importance of Change	8.57 (SD = 1.64)	0-10	3-10	95
Motivation for Change	8.45 (SD = 1.72)	0-10	3-10	95
Behavioral Intentions Diet	7.82 (1.89)	0-10	3-10	100
Behavioral Intentions PA	8.20 (1.94)	0-10	3-10	100
Parent Relationship Quality	102.04 (17.96)	25-125	49-125	87

Ancillary Table 5.

Correlations Amongst Study Variables #1

	BMI	Fruit & Veg	PA	Auto Motive Diet	Auto Motive PA	PCS Diet	PCS PA	Efficacy Diet	Efficacy PA	Parent Auto Support
BMI	--									
Fruits & Veggies	.12	--								
PA	-.04	.30*	--							
Auto Motive Diet	.01	.18^{+}	-.07	--						
Auto Motive PA	.12	.15	-.02	.74***	--					
PCS Diet	-.11	.18^{+}	.19	.61***	.60***	--				
PCS PA	-.16	.08	.19	.55***	.66***	.70***	--			
Efficacy Diet	.21^{+}	.05	.09	.50***	.66***	.68***	.55***	--		
Efficacy PA	-.01	-.02	.11	.47***	.56***	.56***	.65***	.77***	--	
Parent Auto Support	-.19	.01	.13	.32**	.25*	.47***	.34***	.34***	.33***	--

Note: Correlations among study variables (N = 99). BMI = Body Mass Index (N = 71), PA = Physical Activity, Auto Motive Diet = TSRQ Autonomous Motivation for Diet, Auto Motive PA = TSRQ Autonomous Motivation for Physical Activity, PCS Diet = Perceived Competence for Diet, PCS PA = Perceived Competence for Physical Activity, Efficacy PA = Efficacy for Physical Activity, Parent Auto Support = Parental Autonomy Support. *p < .05, **p < .01, ***p<. 001, $^{+}$p < .10

Ancillary Table 6.

Correlations Amongst Study Variables #2

	BMI	Fruit & Veg	PA	Problem Recognition	Importance of Change	Motivation for Change	Diet Intentions	PA Intentions
BMI	--							
Fruit & Veggies	.12	--						
Physical Activity	-.04	.30*	--					
Problem Recognition	.35**	-.17^{+}	-.03	--				
Importance of Change	.10	.11	.01	.29**	--			
Motivation for Change	-.03	.12	.09	.01	.50***	--		
Diet Intention	.27*	.17^{+}	.14	.09	.47***	.47***	--	
PA Intention	.20	.07	.15	.18	.17^{+}	.22*	.44***	--

Note: Correlations among study variables (N = 99). BMI = Body Mass Index (N = 71), PA = Physical Activity, *p < .05, **p < .01, ***p<. 001, $^{+}$p < .10

APPENDIX A: SCREENER & FLYER

Are you concerned about any of the following?

□ I feel like I need to lose weight

□ I'm too fat

□ I need to eat better

□ I'm not satisfied with my body

□ I'm not being active enough

□ I don't exercise frequently

If your answer to one or more of these is yes, you are likely eligible to participate in our exciting research study!

□ I'm interested in hearing more about the study

□ I'm not interested

Circle one: I'm a boy / girl

I am _____ years old

Have you heard about our exciting research at the Adolescent Medicine Clinic?

Do you want to live a healthier lifestyle?

We hope to better understand motivation to improve

nutrition and physical activity.

Would you like to receive gift certificates ($) for your time?

Are you between the ages of 14 and 17?

The study takes about 2 ½ hours total over a 1-month period of time.

Participation is completely voluntary.

Be sure to ask the clinic staff about our study!

If you have questions about the study, you can contact the study coordinator, Jackie Issner, at 313-577-8369 or StudyMATCH@Gmail.com

APPENDIX B: MEASURES

Adolescent Demographic Questions
Circle only one answer.

1.) Do you identify as…
1. *African American*
2. *Caucasian*
3. *Hispanic/Latino*
4. *Asian*
5. *Native American*
6. *Mixed*
7. *Other* (list) _____

2.) Are you…
1. *Male*
2. *Female*

3.) How old are you?
1. *14 years old*
2. *15 years old*
3. *16 years old*
4. *17 years or older*

4.) What grade are you in?
1. *7th grade*
2. *8th grade*
3. *9th grade*
4. *10th grade*
5. *11th grade*
6. *12th grade*
7. *Not in school*
8. *Graduated High School*

Caregiver Demographic Questions
1. Who lives in your household? _____

2. What is the highest level of education you (and your child's other parent) have completed? _____

3. What is your own yearly income? _____

4. What is your total household income, including all earners in your household_____

5. What is your current marital status? _____

6. What is your occupation? _____

7. Describe your responsibilities at work. _____

Weight Management Questionnaire:

How often do you eat:

Whole fresh fruit such as apples, oranges, bananas, peaches, berries, etc.	**Never**	**A few times a MONTH**	**A few times a WEEK**	**DAILY**	**MORE than DAILY**
Canned or frozen fruits	**0**	**1**	**2**	**3**	**4**
Dark green vegetables such as broccoli, spinach, kale, dark green lettuce	**0**	**1**	**2**	**3**	**4**
Orange vegetables such as squash, carrots, sweet potatoes	**0**	**1**	**2**	**3**	**4**
Starchy vegetables such as potatoes, peas, corn	**0**	**1**	**2**	**3**	**4**
Other vegetables such as beets, green beans, cauliflower, cabbage, tomatoes	**0**	**1**	**2**	**3**	**4**

Godin Leisure-Time Exercise Questionnaire

1. During a typical **7-Day period** (a week) **during the past month** (*the time since you began the study*), how many times on the average did you do the following kinds of exercise for **more than 15 minutes** during your free time (write on each line the appropriate number).

a) STRENUOUS EXERCISE
(HEART BEATS RAPIDLY)
(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

Times Per Week _____

b) MODERATE EXERCISE
(NOT EXHAUSTING)
(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

Times Per Week _____

c) MILD EXERCISE
(MINIMAL EFFORT)
(e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)
Times Per Week _____

Treatment Self-Regulation Questionnaire (TSRQ)

(Concerning Motivation for Healthy Behaving)

TSRQ (Diet)

The following question relates to the reasons why you would either start eating a healthier diet or continue to do so. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you. All 15 responses are to the same question which asks, "The reason I would eat a healthy diet is…"

Please indicate the extent to which each reason is true for you, using the following 7-point scale:

The reason I would *eat a healthy diet* is:

The reason I would *eat a healthy diet* is:	**1 Not at all true**	**2**	**3**	**4 Some-what true**	**5**	**6**	**7 Very true**
1. Because I feel that I want to take responsibility for my own health.	1	2	3	4	5	6	7
2. Because I would feel guilty or ashamed of myself if I did not eat a healthy diet.	1	2	3	4	5	6	7
3. Because I personally believe it is the best thing for my health.	1	2	3	4	5	6	7
4. Because others would be upset with me if I used substances.	1	2	3	4	5	6	7
5. I really don't think about it.	1	2	3	4	5	6	7
6. Because I have carefully thought about it and believe it is very important for many aspects of my life.	1	2	3	4	5	6	7
7. Because I would feel bad about myself if I did not eat a healthy diet.	1	2	3	4	5	6	7

8. Because it is an important choice I really want to make.	1	2	3	4	5	6	7
9. Because I feel pressure from others to eat a healthy diet.	1	2	3	4	5	6	7
10. Because it is easier to do what I am told than think about it.	1	2	3	4	5	6	7
11. Because it is consistent with my life goals.	1	2	3	4	5	6	7
12. Because I want others to approve of me.	1	2	3	4	5	6	7
13. Because it is very important for being as healthy as possible.	1	2	3	4	5	6	7
14. Because I want others to see I can do it.	1	2	3	4	5	6	7
15. I don't really know why	1	2	3	4	5	6	7

TSRQ (exercise)

The following question relates to the reasons why you would either start to exercise regularly or continue to do so. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you. All 15 responses are to the one question which asks, "The reason I would exercise regularly is…"

Please indicate the extent to which each reason is true for you, using the following 7-point scale:

The reason I would *exercise regularly* is:	**1 Not at all true**	**2**	**3**	**4 Some-what true**	**5**	**6**	**7 Very true**
1. Because I feel that I want to take responsibility for my own health.	1	2	3	4	5	6	7
2. Because I would feel guilty or ashamed of myself if I did not exercise regularly.	1	2	3	4	5	6	7
3. Because I personally believe it is the best thing for my health.	1	2	3	4	5	6	7
4. Because others would be upset with me if I did not exercise regularly.	1	2	3	4	5	6	7
5. I really don't think about it.	1	2	3	4	5	6	7
6. Because I have carefully thought about it and believe it is very important for many aspects of my life.	1	2	3	4	5	6	7
7. Because I would feel bad about myself if I did not exercise regularly.	1	2	3	4	5	6	7
8. Because it is an important choice I really want to make.	1	2	3	4	5	6	7
9. Because I feel pressure from others to exercise							

regularly.	1	2	3	4	5	6	7
10. Because it is easier to do what I am told than think about it.	1	2	3	4	5	6	7
11. Because it is consistent with my life goals.	1	2	3	4	5	6	7
12. Because I want others to approve of me.	1	2	3	4	5	6	7
13. Because it is very important for being as healthy as possible.	1	2	3	4	5	6	7
14. Because I want others to see I can do it.	1	2	3	4	5	6	7
15. I don't really know why	1	2	3	4	5	6	7

Perceived Competence Scales (PCS)

Perceived Competence (Maintaining a Healthy Diet)

Please indicate the extent to which each statement is true for you, assuming that you were intending either to permanently improve your diet now or to maintain a healthy diet.

Use the following scale:	**1 Not at all true**	**2**	**3**	**4 Some-what true**	**5**	**6**	**7 Very true**
1. I feel confident in my ability to maintain a healthy diet.	1	2	3	4	5	6	7
2. I now feel capable of maintaining a healthy diet.	1	2	3	4	5	6	7
3. I am able to maintain a healthy diet permanently.	1	2	3	4	5	6	7
4. I am able to meet the challenge of maintaining a healthy diet.	1	2	3	4	5	6	7

Perceived Competence (Exercising Regularly)

Please indicate the extent to which each statement is true for you, assuming that you were intending either to begin now a permanent regimen of exercising regularly or to permanently maintain your regular exercise regimen.

Use the following scale:	**1 Not at all true**	**2**	**3**	**4 Some-what true**	**5**	**6**	**7 Very true**
1. I feel confident in my ability to exercise regularly.	1	2	3	4	5	6	7
2. I now feel capable of exercising regularly.	1	2	3	4	5	6	7
3. I am able to exercise							

regularly over the long term.	1	2	3	4	5	6	7
4. I am able to meet the challenge of exercising regularly.	1	2	3	4	5	6	7

Exercise Questions

Please indicate the extent to which each statement is true for you by using the following scale:

0 1 2 3 4 5 6 7 8 9 10
Definitely not/ Strongly Disagree — Somewhat Disagree — Neutral — Somewhat Agree — Exactly True/ Strongly Agree

How certain are you that you could overcome the following barriers?

I can manage to carry out my exercise intentions,…

1.)…even when I have worries and problems.
0 1 2 3 4 5 6 7 8 9 10
Definitely not/ Strongly Disagree — Somewhat Disagree — Neutral — Somewhat Agree — Exactly True/ Strongly Agree

2.) …even when I feel depressed.
0 1 2 3 4 5 6 7 8 9 10
Definitely not/ Strongly Disagree — Somewhat Disagree — Neutral — Somewhat Agree — Exactly True/ Strongly Agree

3.)…even when I feel tense.
0 1 2 3 4 5 6 7 8 9 10
Definitely not/ Strongly Disagree — Somewhat Disagree — Neutral — Somewhat Agree — Exactly True/ Strongly Agree

4.)…even when I am tired.
0 1 2 3 4 5 6 7 8 9 10
Definitely not/ Strongly Disagree — Somewhat Disagree — Neutral — Somewhat Agree — Exactly True/ Strongly Agree

5.)…even when I am busy.
0 1 2 3 4 5 6 7 8 9 10
Definitely not/ Strongly Disagree — Somewhat Disagree — Neutral — Somewhat Agree — Exactly True/ Strongly Agree

Nutrition Questions

Please indicate the extent to which each statement is true for you by using the following scale:

0	1	2	3	4	5	6	7	8	9	10
Definitely not/ Strongly Disagree		Somewhat Disagree			Neutral		Somewhat Agree			Exactly True/ Strongly Agree

How certain are you that you could overcome the following barriers?
I can manage to stick to healthy foods, …

1.)…even if I need a long time to develop the necessary routines.

0	1	2	3	4	5	6	7	8	9	10
Definitely not/ Strongly Disagree		Somewhat Disagree			Neutral		Somewhat Agree			Exactly True/ Strongly Agree

2.)…even if I have to try several times until it works.

0	1	2	3	4	5	6	7	8	9	10
Definitely not/ Strongly Disagree		Somewhat Disagree			Neutral		Somewhat Agree			Exactly True/ Strongly Agree

3.)…even if I have to rethink my entire way of nutrition.

0	1	2	3	4	5	6	7	8	9	10
Definitely not/ Strongly Disagree		Somewhat Disagree			Neutral		Somewhat Agree			Exactly True/ Strongly Agree

4.)…even if I do not receive a great deal of support from others.

0	1	2	3	4	5	6	7	8	9	10
Definitely not/ Strongly Disagree		Somewhat Disagree			Neutral		Somewhat Agree			Exactly True/ Strongly Agree

5.)…even if I have to make a detailed plan.

0	1	2	3	4	5	6	7	8	9	10
Definitely not/ Strongly Disagree		Somewhat Disagree			Neutral		Somewhat Agree			Exactly True/ Strongly Agree

Perception of Parents Scale (POPS)

Please answer the following questions about your mother or guardian.

1.) My mother/guardian seems to know how I feel about things.

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

2.) My mother/guardian tries to tell me how to run my life.

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

3.) My mother/guardian, whenever possible, allows me to choose what to do.

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

4.) My mother/guardian listens to my opinion or perspective when I've got a problem.

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

5.) My mother/guardian allows me to decide things for myself.

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

6.) My mother/guardian insists upon my doing things her way.

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

7.) My mother/guardian is usually willing to consider things from my point of view.

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

8.) My mother/guardian helps me to choose my own direction.

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

9.) My mother/guardian isn't very sensitive to many of my needs.

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

Inventory of Parent and Peer Attachment (IPPA), Adolescent Report

The following questions ask about your relationship with your mother or guardian. Use the following scale when answering the questions.

		Almost Never Or Never True	**Not Very Often True**	**Sometimes True**	**Often True**	**Almost Always or Always True**	
		1	**2**	**3**	**4**	**5**	
1.	My mother/guardian respects my feelings.	1	2	3	4	5	
2.	I feel my mother/guardian does a good job as my mother.	1	2	3	4	5	
3.	I wish I had a different mother/guardian.	1	2	3	4	5	
4.	My mother/guardian accepts me as I am.	1	2	3	4	5	
5.	I like to get my mother's/guardian's point of view on things I'm concerned about.	1	2	3	4	5	
6.	I feel it's no use letting my feelings show around my mother/guardian.	1	2	3	4	5	
7.	My mother/guardian can tell when I'm upset about something.	1	2	3	4	5	
8.	Talking over my problems with my mother/guardian makes me feel ashamed or foolish.	1	2	3	4	5	
9.	My mother/guardian expects too much from me.	1	2	3	4	5	
10.	I get upset easily around my mother/guardian.	1	2	3	4	5	
11.	I get upset a lot more than my mother/guardian knows about.	1	2	3	4	5	
12.	When we discuss things, my mother/guardian cares about my point of view.	1	2	3	4	5	
13.	My mother/guardian trusts my judgment.	1	2	3	4	5	
14.	My mother/guardian has her own problems, so I don't bother her with mine.	1	2	3	4	5	
15.	My mother helps me understand myself better.	1	2	3	4	5	
16.	I tell my mother/guardian about my problems and troubles.	1	2	3	4	5	
17.	I feel angry with my mother/guardian.	1	2	3	4	5	
18.	I don't get much attention from my mother/guardian.	1	2	3	4	5	
19.	My mother/guardian helps me talk about my difficulties.	1	2	3	4	5	

20.	My mother/guardian understands me.	1	2	3	4	5
21.	When I am angry about something, my mother/guardian tries to be understanding.	1	2	3	4	5
22.	I trust my mother.	1	2	3	4	5
23.	My mother/guardian doesn't understand what I'm going through these days.	1	2	3	4	5
24.	I can count on my mother/guardian when I need to get something off my chest.	1	2	3	4	5
25.	If my mother/guardian knows something is bothering me, she asks me about it.	1	2	3	4	5

Contact Information

In 1 month, we will be sending you a packet of questionnaires to fill out and send back in the pre-stamped envelope. Once we receive the packet from you, we will send you a $10 gift card. Please provide the information listed below so that we can send you the appropriate materials.

Participant (teen) name:

Mailing Address:

Phone Number(s):

Email Address:

Phone number of friend or relative (in case we cannot reach you):

APPENDIX C: INTERVENTION SCRIPT CHECKLIST

Intervention Script Checklist

- Introduce that we are helping to improve current health behaviors and choices and how they will help now and in the future

- Fill out the complete Health Behavior Change Preliminary Worksheet

Control Stop. Match Continue.

- Ask/ Write : "What are some of your reasons for wanting to make these changes?"

- Probe about last 2 questions from Health Behavior Change Preliminary Worksheet (motivation, confidence)

- Ask/ Write answers to 2 questions on the scale from Intervention Worksheet (how sure, benefits). Probe about these 2 questions

- IF NOT YET DISCUSSED: "How will you benefit from making this change?"

- **Only if not wanting to change, ask :**
  - "What are some reasons for not wanting to change your current behaviors?"
  - If you continued these behaviors for years, what negative consequences might you experience?

- **For everyone, ask :** "Have you tried to change this behavior in the past?" "How were you successful?" "What got in the way or didn't go as planned?"

- Recall a situation and think about how you felt and how you feel now about making a good decision. (if they never have, imagine one)

- Finish up remainder of questions on MATCH Intervention Worksheet

- Imagine how you'd feel if you engaged in the unhealthy behavior and reflect on this. Now imagine the healthy behavior.

- **ASK**: Are you interested in resources?

- Applaud their efforts and hand out the After Intervention Worksheet

- Throughout Intervention, remember to use:
  - Reflections
  - Affirmations/Praise
  - Open-Ended Questions
  - Summarizing

APPENDIX D: GOAL WORKSHEET

Health Behavior Change Preliminary Worksheet

What do you think is currently the most important problem for you to work on?

_____

_____

On a scale from 0 to 10, with 10 being the highest, how much do you think this is a problem for you? (0 – not a problem, 5 – moderate problem, 10- big problem)

0 1 2 3 4 5 6 7 8 9 10
Not a problem moderate problem big problem

Please write your goal based on the most important problem that you identified:

_____

_____

_____

On a scale from 0 to 10, with 10 being the highest, how important is it to you to change the behavior and reach the goal that you identified above?

0 1 2 3 4 5 6 7 8 9 10
Not important moderately important very important

On a scale from 0 to 10, with 10 being the highest, how motivated are you to change the behavior and reach the goal that you identified above?

0 1 2 3 4 5 6 7 8 9 10
Not motivated moderately motivated very motivated

On a scale from 0 to 10, with 10 being the highest, how confident are you that you can make this change and reach the goal that you identified above?

0 1 2 3 4 5 6 7 8 9 10
Not confident moderately confident very confident

APPENDIX E: INTERVENTION WORKSHEET

MATCH Health Behavior Change Worksheet

What are some of your reasons for wanting to make these changes?

_____

_____

_____

Using a scale from 0 to 10, with 10 being the highest, please answer the following questions:

How <u>sure</u> are you that you will make this change and reach the goal that you identified?

0 1 2 3 4 5 6 7 8 9 10
Not sure moderately sure very sure

How much do you think you will <u>benefit</u> from making this change and reaching the goal that you identified?

0 1 2 3 4 5 6 7 8 9 10
Not at all a moderate amount a very large amount

What are some steps you can take to make these changes?

_____

_____

_____

Who can help you make these changes? How can they help you?

_____

_____

How will you know that your plan is working?

_____

_____

What could get in the way of making these health behavior changes?

_____

_____

What will you do if the plan isn't working?

_____

POST-MATCH INTERVENTION

Please circle the appropriate number for each question.

On a scale from 0 to 10, with 10 being the highest, how important is it to you to change the behavior and reach the goal that you identified above?

0 1 2 3 4 5 6 7 8 9 10
Not important moderately important very important

On a scale from 0 to 10, with 10 being the highest, how motivated are you to change the behavior and reach the goal that you identified above?

0 1 2 3 4 5 6 7 8 9 10
Not motivated moderately motivated very motivated

On a scale from 0 to 10, with 10 being the highest, how <u>confident</u> are you that you could make this change and reach the goal that you identified?

0 1 2 3 4 5 6 7 8 9 10
Not confident moderately confident very confident

Do you plan to eat healthy in the next 6 months by eating more fruits and vegetables, eating a healthy breakfast, and minimizing junk food?

0 1 2 3 4 5 6 7 8 9 10
Definitely No Maybe Definitely Yes

Do you plan to be more physically active in the next 6 months by exercising more?

0 1 2 3 4 5 6 7 8 9 10
Definitely No Maybe Definitely Yes

How valuable was this session today?"

0 1 2 3 4 5 6 7 8 9 10
Not valuable Moderately valuable Very valuable

How much did you feel that your health coach understood and supported you?

0 1 2 3 4 5 6 7 8 9 10
Not at all Moderate amount A lot

What did you like about the intervention?

APPENDIX F: FIDELITY CHECKLIST

ID #:_____ Checked by:_____ Date checked: _____

Probes: Circle the appropriate number (see key below):

- 0 = absent
- 1 = partially present (general idea present, but asked incorrectly or incompletely: "why did you put x" or "why did you put 4" when they actually put a different number)
- 2 = present (asked question clearly)

Note: If participant scored 10, then indicate "N/A" for 2nd probe because you do not need to use the probe "What would move your score of X to something higher like X."

- Probed about *motivation* score
  - Why did you indicate X rather than something lower like X: 0 1 2
  - What would move your score of X to something higher like X: 0 1 2 N/A
- Probed about *confidence* score
  - Why did you indicate X rather than something lower like X: 0 1 2
  - What would move your score of X to something higher like X: 0 1 2 N/A
- Probed about *certainty* ("sure") score
  - Why did you indicate X rather than something lower like X: 0 1 2
  - What would move your score of X to something higher like X: 0 1 2 N/A
- Probed about *benefits* score
  - Why did you indicate X rather than something lower like X: 0 1 2
  - What would move your score of X to something higher like X: 0 1 2 N/A

Reflected participant's <u>reasons for wanting to make a change:</u>

0 1 2

Reflections absent Reflections present

- 0 = no reflection
- 1 = one *basic* reflection
  - *restatement of reason*, (They say, I want to be in shape" and you say, "you would like to be in better shape")
- 2 = one or more *complex* reflections OR reflect and then *elicit* more information through open-ended questions and *reflect* that additional information
  - Complex reflections: add *meaning* (e.g., you want to be in better shape so you'll have a healthier body/future") or reflect *feeling* (e.g., you want to be in shape so you'll feel more confident…you're concerned/worried about your health so you want to xxx)
  - Reflect, elicit, reflect: "you said xxx - why would you like to feel more in shape? (or what would be nice about feeling more in shape?)." And then reflect that reason, too.

<u>Asked about past attempts at changing behavior</u>: 0 1 2

- 0 = Did not ask about past attempts
- 1 = Only asked 1 question about past attempts (e.g., "Have you tried to change x in the past?"
- 2 = Asked 2 or more questions about past attempts (e.g., "How were you successful?" "What got in the way or didn't go as planned?" "How did it feel to make a good health decision?")
  - Has the participant ever tried to change the behavior in the past? Yes/no
  - If yes, describe past attempt: _____

_____

Did health coach ask how they'd *feel* if they engaged in the *unhealthy* behavior? Yes / No

- Examples: Picture yourself ignoring your goal and pigging out on junk food…How do you think you may feel? Picture yourself sitting on the couch and watching TV rather than working out like you planned. How might you feel about yourself?
- Indicate how teen responded (disappointed, bad, neutral): _____

Did health coach ask how they'd *feel* if they engaged in the *healthy* behavior? Yes / No

- Example: Imagine sticking to your plan and eating healthy foods…How would you feel?
- Indicate how teen responded (proud, good, neutral): _____

Affirmations:

0 1 2 3

No affirmations (or non-genuine) Genuine Affirmations

- 0 = no affirmations or very non-genuine affirmations
- 1 = Simple affirming words used (e.g., "great, good job") during intervention, but no affirming statements toward end of intervention
- 2 = one simple affirming statement (e.g., I am confident you can reach your goal)
- 3 = *two* or more simple affirming statements OR *one* or more **complex** affirming statements that explain **reasons** why you're applauding their efforts by highlighting specific *strengths*, *efforts, or supporting self-efficacy* (e.g., "I'm really impressed with how well you've *thought through your* goal and the challenges you may encounter"…"Wow, you really seem *motivated* and *prepared* to meet your goal - I'm sure you'll be able to do it!")
  - Did the health coach sound **insincere** during intervention? Yes / No

Directive vs. Guiding/nondirective:

0 1 2

Mostly Directive Mostly Guiding/Nondirective

- 0 = Mostly directive, giving advice without permission, convincing/persuading, confronting, engaging in problem-solving before participant has a chance to come up with their own goal
- 1 = Mixture of directive and non-directive approaches
- 2 = Mostly nondirective/guiding: Emphasize participant's choice and personal control, show support and collaboration, ask permission before giving advice

Open-ended vs. Close-ended Questions:

0 1 2

Mostly Close-ended Mostly Open-ended

- 0 = Mostly close-ended questions (?'s that elicit single-word or yes/no responses)
- 1 = About half close-ended and half open-ended questions
- 2 = Mostly open-ended questions

Overall Empathy Rating:

0 1 2

Low Empathy High Empathy

- 0 = Low warmth, lack of understanding/acceptance of participant. Little interest in participant's perspective. Asks questions for the purpose of completing the worksheet rather than genuine interest and care for participant.
- 1 = Moderate warmth and care is conveyed to participant. Shows interest in understanding the participant and their unique perspective, but little effort to gain a deeper understanding or to connect with the participant on a deeper level.
- 2 = High warmth and care is conveyed. Active, reflective listening is demonstrated; the health coach conveys their understanding to the participant. Connects with the participant.

Frustration Rating:

0 1 2

Low Frustration High Frustration

- 0 = Health coach shows only patience and acceptance
- 1 = Health coach shows mostly patience, but one to two instances of annoyance or frustration.
- 2 = Health coach shows three or more instances of annoyance, frustration, or impatience.

APPENDIX G: FOLLOW-UP LETTER TO PARTICIPANTS

Hi _____,

It was a pleasure working with you to develop goals for your future. Your participation has been very helpful to the study, so we thank you very much for taking the time to participate.

Please fill out the enclosed packet. When filling out the questionnaires, please answer the questions by thinking only about your behaviors during the <u>past month</u> -- <u>the time since you began the study.</u> Once we receive your completed packet, we will send you another $10 gift card.

If you are interested in taking a few minutes to talk with a health coach about your health goals, you can set up an appointment or ask for more information by calling Jackie Issner at 313-577-8369 or by emailing Jackie at StudyMatch@gmail.com.

Remember, you can always talk to your doctor about your health goals as well, and your doctor can answer any questions you may have about your nutrition or physical activity.

Thank you again for your commitment to our research project in the Adolescent Medicine Clinic at Children's Hospital of Michigan. Your contribution to the study has been greatly appreciated!

Best Wishes,

Jackie Issner, M.A.
Principal Investigator

APPENDIX H: HIC APPROVAL AND AMENDMENT

WAYNE STATE UNIVERSITY

HUMAN INVESTIGATION COMMITTEE
87 East Canfield, Second Floor
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
http://hic.wayne.edu

FILE

Full AAHRPP Accreditation

NOTICE OF FULL BOARD APPROVAL

To: Jaclyn Issner
Psychology
5057 Woodward

From: Dr. Scott Millis or designee S. Millis, PhD
Chairperson, Behavioral Institutional Review Board (B3)

Date: March 31, 2011

RE: HIC #: 012011B3F
Protocol Title: Motivating Adolescent to Chat for Health (MATCH): Promoting Healthy Changes in Youth
Sponsor: ° Psychology
Protocol #: 1101009246

Expiration Date: February 16, 2012

Risk Level / Category: 45 CFR 46.404 - Research not involving greater than minimal risk

The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Full Board Review* by the Wayne State University Institutional Review Board (B3) for the period of 03/31/2011 through 02/16/2012. This approval does not replace any departmental or other approvals that may be required.

- Protocol Summary Form revised and received 3-31-11.
- Receipt of a research protocol
- Script for Parents
- Script for Adolescents
- Parental Permission/Research Informed Consent and HIPAA Authorization, revised 3-10-11.
- Behavioral Documentation of Adolescent Assent Form, revised 3-10-11.
- HIPAA Summary Form
- Minimal risk research - 45 CFR 46.404

° Federal regulations require that all research be reviewed at least annually. You *may* receive a *"Continuation Renewal Reminder"* approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval ***before*** the expiration date. Data collected during a period of lapsed approval is unapproved research and can never be reported or published as research data.

° All changes or amendments to the above-referenced protocol require review and approval by the HIC **BEFORE** implementation.

° Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the HIC Policy (http://www.hic.wayne.edu/hicpol.html).

NOTE:

1. Upon notification of an impending regulatory site visit, hold notification, and/or external audit the HIC office must be contacted immediately.
2. Forms should be downloaded from the HIC website at **each** use.

WAYNE STATE UNIVERSITY

HUMAN INVESTIGATION COMMITTEE
87 East Canfield, Second Floor
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
http://hic.wayne.edu

FILE

Full AAHRPP Accreditation

NOTICE OF EXPEDITED AMENDMENT APPROVAL

To: Jaclyn Issner
Psychology
5057 Woodward

From: Dr. Scott Millis
Chairperson, Behavioral Institutional Review Board (B3)

S. Millis, PhD

Date: April 14, 2011

RE: HIC #: 012011B3F
Protocol Title: Motivating Adolescent to Chat for Health (MATCH): Promoting Healthy Changes in Youth
Funding Source: Unit: Psychology
Protocol #: 1101009246

Expiration Date: February 16, 2012

Risk Level / Category: 45 CFR 46.404 - Research not involving greater than minimal risk

The above-referenced protocol amendment, as itemized below, was reviewed by the Chairperson/designee of the Wayne State University Institutional Review Board (B3) and is APPROVED effective immediately.

- Protocol Revision - Data collection instrument(s):(1) addition of several one-month follow-up questions; (2) new screening measure, (3) reformatted behavioral expectations questions.
- Protocol Revision - Data collection methods: (1) addition of checklists to assist research assistants, (2) addition of a receipt to document family's receipt of a gift certificate, (3) The intervention group will answer the behavioral expectations questions again on post-intervention questionnaire.
- Receipt of a revised flyer (more aesthetically pleasing).
- Addition of a small poster with pictures of research staff.
- Brochure - now distributed to all participants after completing questionnaires regardless of their assigned group.

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ABSTRACT

MOTIVATING ADOLESCENTS TO CHAT FOR HEALTH (MATCH): IMPROVING NUTRITION AND EXERCISE IN URBAN YOUTH

by

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Adolescence represents a unique period of development that is filled with both opportunities and challenges. Choices and health patterns, such as sedentary activity or poor dietary intake, which are established during adolescence can set the stage for adulthood. Obesity in youth has emerged as a major health problem in the United States and across the globe (American Academy of Child and Adolescent Psychiatry, 2012). One way to help prevent obesity is by incorporating preventive intervention services into primary care health systems. The current study, therefore, evaluated the effects of a brief 1-session intervention delivered in a primary care setting in an attempt to promote healthy changes in diet and physical activity. The sample included 100 adolescents from the Children's Hospital of Michigan's Adolescent Medicine Clinic who were randomly assigned to one of two conditions: a) the full intervention called Motivating Adolescents To Chat for Health (MATCH) with a health coach, or b) goal-only session.

Health behaviors and individual characteristics (e.g., autonomous motivation, self-efficacy) were assessed at baseline and health behaviors were re-assessed at follow-up 1 month later. There was a 47% attrition rate. Those in the intervention group were more

likely to participate in the follow-up portion of the study. Similarly, those with higher baseline motivation and self-efficacy were more likely to continue in the study. Results showed that those in the full intervention group did not show improvements above and beyond those in the goal-only condition. However, both groups did show health behavior improvements over time and older adolescents showed more improvements. There were complex relationships that predicted behavior change. At high levels of self-efficacy, there was a strong relationship between motivation and behavior change. Parental autonomy support appeared to have either no affect or a negative affect on behavior change. When parental autonomy support was low, motivation, self-efficacy, and behavioral intentions each appeared to relate more strongly to behavior change than when support was high. Parent-child relationship quality predicted positive changes in diet; however, for boys, a stronger parent-child relationship was related to lower physical activity at follow-up. When adolescents reported high problem recognition, there was a positive relationship between behavioral intentions and physical activity at follow-up. For adolescents with higher BMI's, greater behavioral intentions were related to greater changes in physical activity. The study demonstrates an important first step in integrating preventive care strategies into the primary care setting by focusing on the individual's values, goals, and intrinsic motivations.

AUTOBIOGRAPHICAL STATEMENT

Jaclyn Heller Issner, M.A., TLLP, received a Bachelor of Science degree in 2002 from Northwestern University in Evanston, Illinois, where she majored in Human Development and Psychological Services. She is currently a doctoral candidate in the Clinical Psychology Doctoral Program at Wayne State University, specializing in Child Psychology. She is completing her clinical internship at the Institute for Human Adjustment at University of Michigan in Ann Arbor, Michigan. She will be beginning her postdoctoral fellowship at the Child/Adolescent Psychiatry Department affiliated with the University of Michigan Health System where she will be doing research and program development in the area of childhood bereavement and trauma. Her primary interests include pediatric psychology, family relationships, adolescent health behaviors, empathy, and chronic pain. She worked at Children's Hospital of Michigan for two years as a clinical practicum student in the adolescent medicine clinic, HIV clinic, and sickle cell clinic. Recognizing the contributions that family members (e.g., spouses, parents) have in the management of chronic illnesses or special needs, she has contributed largely to several publications and presentations that address these relationships and the effects of specific social responses.