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THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM: USING PROFESSIONAL ATHLETES AS ROLE MODELS TO PREVENT ADOLESCENT OBESITY

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THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM: USING PROFESSIONAL ATHLETES AS ROLE MODELS TO PREVENT ADOLESCENT OBESITY

by

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Dedication

I would like to dedicate this work to my family: to my grandparents for prioritizing and supporting my education; to my husband for his love and support throughout graduate school and my career; to my parents to whom I will never be able to thank enough for everything they have done for me; to my dad for always letting me know no one would ever love me like him and instilling a great confidence and work ethic in me; to my mother especially for inspiring me to take this career path and instilling a love of nutrition in me, for brainstorming and executing this program with me and supporting me through this entire research process; and to Riley, the love of my life, who moved to Austin with me and has been my constant companion and support system.

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THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM: USING PROFESSIONAL ATHLETES AS ROLE MODELS TO PREVENT ADOLESCENT OBESITY

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The objective of this study was to examine the effects of using professional athletes or registered dietitians (RD) as role models to modify diet/exercise behaviors and weight status in overweight/obese adolescents. The overall hypothesis of this study was that professional athletes could more effectively change diet/exercise behaviors in overweight/obese adolescents due to their representation of a physically active lifestyle, high adolescent identification, ability to popularize ideals, broadly distribute information and influence social norms.

The Houston Texans TwEAT Healthy program was a 12-week social media delivered program where adolescents received text messages (3x/wk) and video messages (2x/wk) from either a professional athlete (n=16) or registered dietitian (n=14). They were assessed for anthropometrics (height, weight, waist circumference), percent body fat, diet/exercise behaviors, weight status and psychological mediators of behavioral change pre- and post- intervention to determine changes. Adolescents, parents and athletes were interviewed post-intervention to examine feasibility/acceptability of the program.

Subjects (n=30) paired with a professional athlete were significantly more likely to report something positive about their mentor than those paired with an RD (80% vs. 7%, $p<0.001$). Participants paired with an athlete were significantly more likely to decrease consumption of sugar sweetened beverages (SSB) $t(27)=1.82$, $p=0.08$, but the registered dietitian group was significantly more likely to decrease BMI z-score $t(28)=-2.99$, $p=0.006$. Additionally, registered dietitians were more effective at increasing stages of change for physical activity than athletes $t(28) = 2.12$, $p < .05$. Both RD's and athletes were effective at significantly increasing motivation to be healthy, $t(13) =2.56$, $p < .05$; $t(15) = 2.03$, $p < .10$.

While professional athletes may improve acceptability of a social media delivered weight loss program, they do not appear to be more effective than RD's at influencing psychosocial mediators of behavioral change and weight status. Although both groups increased motivation to be healthy, only RD's were able to influence weight status. Behaviorally based interventions should include a longer intervention time frame and larger sample size to allow for more robust changes. Utilizing role models who may be perceived as experts in the field of healthy eating and weight loss appear to be more effective mentors than utilizing public figures that solely represent that lifestyle.

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Chapter 1: Introduction

The prevalence of overweight and obese children in the United States has reached epidemic proportions. Data from the National Health and Nutrition Examination Survey (NHANES) completed in 1999-2000 and 2009-2010 indicate an increase in adolescent (age 12-19) obesity from 14.8% to 18.4% (1). When broken down by gender, female adolescent obesity increased by 2.3%, but has begun to taper off while male adolescent obesity increased by 4.8% and continues to rise (1). More recent research (2011-2012) indicates a continued rise specifically in adolescent obesity with 20.5% of adolescents (age 12-19) being categorized as obese ($\geq 95^{th}$ BMI-for-age-percentile) and 34.5% categorized as overweight/obese ($\geq 85^{th}$ BMI-for-age percentile) (2,3).

Early onset obesity during adolescence is one of the strongest predictors of adult obesity and therefore is an ideal time to intervene to improve health behaviors (4). This is also a time of increased autonomy, making the presence of a healthy role model imperative (5). It is commonly accepted that adolescents emulate behaviors of role models, and although the impact of professional athletes as role models to increase physical activity has rarely been studied (6), 72% of children list a professional athlete as someone they admire most, only second to their parents (92%) (7). Although professional athletes are seen as role models and emulate healthy lifestyles, they are rarely used in theoretically based programs to influence healthy eating and exercise behaviors.

Overview of This Research

The theoretically based Houston Texans TwEAT Healthy Program (THP) was developed to utilize social media to connect professional athletes and overweight/obese

adolescents in order to promote healthy eating/exercise habits ultimately resulting in improved weight status. The overall hypothesis of this study was that professional athletes could more effectively change diet/exercise behaviors in overweight/obese adolescents as compared to RD's due to their representation of a physically active lifestyle, high adolescent identification, ability to popularize ideals, broadly distribute information and influence social norms.

In order to determine success of the program, the first specific aim assessed the feasibility and acceptability of the THP in adolescents, parents, and athletes. The goal was to provide a curriculum that was feasible for all parties involved in the program. The athletes needed to believe this program had the strength to be applicable across the league and that it was an initiative that could be carried out by any team for any length of time to be considered successful. The subjects and their parents needed to believe in the program and that it was of value to their health.

The second specific aim was to determine the ability of the THP to modify diet/exercise behaviors as well as body weight/fat status of adolescents enrolled. It was hypothesized that a role model who exhibits both a healthy diet and physically active lifestyle would be most effective at influencing others to do the same. A greater extent of this effect would be seen when the role model was a widely recognized public figure versus a traditional clinician (8). Since the general public views athletes as icons of healthy living, these role models may be more effective at promoting behavioral change.

The final aim was to examine the effect of different role models on psychosocial variables in an online obesity prevention program. A change in psychosocial variables is necessary but not sufficient to produce behavioral change (9-11). Therefore, to promote behavioral transformation, the influence of the THP on psychosocial constructs must be

explored. Using professional athletes to endorse and deliver nutrition and exercise messages may encourage adolescents to take the information provided as truth and may be motivated to learn more and make changes (12).

Chapter 2: Literature Review

Childhood obesity is associated with increased premature co-morbidities (13) that include advanced bone age, orthopedic complications (14,15), hyperlipidemia (14,16), glucose intolerance (17,18), Type 2 diabetes (19), hepatic steatosis (20,21), and metabolic syndrome (22). Metabolic syndrome, which increases the risk of diabetes, has been reported at increased rates in adolescents. Currently, 2.5 million adolescents (8.6% of the adolescent population) are afflicted by metabolic syndrome in the United States (US) (23). Overweight/obese children and adolescents also suffer from psychosocial problems such as negative self-image (24,25) and decreased quality of life (26,27). It is estimated that the overall cost of obesity in the US by 2030 is expected to reach $957 billion, which would account for 18% of total US health expenditures (28). These morbidities and related costs provide further evidence of the importance of interventions in young individuals to reduce the rates of childhood and adolescent obesity.

There are multiple factors that can lead to adolescent obesity as weight status can be affected by lifestyle, environmental, personal and genetic factors (29). However, in the simplest terms, overweight and obese status is a result of a consumption of excess calories versus that which is expended (30). There has been a trend termed "the nutrition transition" that has occurred over the past few decades where there has been an increase in consumption of calorically dense foods with little nutritional value, SSB and an overall decline in physical activity (31). Government agencies have set recommendations for diet and exercise behaviors in children and adolescents to combat the current obesity epidemic, however, they are largely unfollowed. Current studies have indicated that approximately half of the youth population consumes <1 serving of fruit per day and approximately one-third of them are consuming <1 serving of un-fried vegetables per day (32). In adolescents

specifically, <30% consume the recommended amounts of fruit and vegetables (33,34) and only 20.1% of teenagers are consuming ≥5 servings of fruits and vegetables per week (35). In combination with minimal consumption of fruits and vegetables, adolescents obtain a substantial proportion of calories (10-15% of total calories) from SSB which provide no nutritional value (36). The consumption of SSB have positive associations with unhealthy eating habits, a decrease in the amount of moderate to vigorous physical activity, participation in school physical education classes and organized sports (37).

In children younger than 18 years of age, <3% meet exercise recommendations for moderate to vigorous physical activity per day (33,34). A study conducted by Hoor et al., revealed that < 20% of adolescents currently meet the World Health Organization's (WHO) recommendation for a minimum of 60 minutes of moderate to vigorous physical activity per day (38). Screen time contributes significantly to a lack of physical activity with children spending an average of three hours on weekdays and four and a half hours on weekend days in front of a screen (39). Negative associations between adolescent healthy diet habits and small screen time have been established (40). These statistics indicate the need for a stronger push for educational and behavioral interventions in a young population to encourage them to meet daily recommendations. Despite the evidence indicating the alarming need to prevent obesity in early adolescence, the adolescent population receives minimal attention in terms of preventative services (41).

Traditional obesity interventions typically attempt preventive measures using a familial approach in early childhood. This approach has demonstrated limited success and non-sustainable weight loss (42). Early intervention is imperative with two specific time points being targeted: around age five to six (43-46) and during adolescence (44,46). Around age five to six, children experience a phenomenon called "adiposity rebound",

which is a point of minimum BMI before it begins to increase as the child approaches adulthood (43-45). Intervention approaches for this time period target family members since the child is most strongly influenced by family members –a trend that continues into adolescence (5). The child may not receive direct intervention and therefore changes made by family members may not be sustainable by the child as they transition into adulthood.

It has been previously assumed that early onset obesity (by age five) was a strong predictor of adult obesity. However, it appears that obesity in adolescence may be an even stronger predictor of adult obesity (4). A recent study suggests that screening for risk of adult obesity in younger children may exclude 50% of those who transition into an obese adult (47). Conversely, they found that >70% of children categorized as overweight at age five were not obese at the age of 18. These authors suggest that adolescent obesity (age 15) is also a much stronger predictor of adult obesity and other co-morbid conditions such as diabetes than childhood obese status (47). This study also suggested the most detrimental effects of obesity may be triggered during adolescence, which lead to a higher relative mortality risk than late onset obesity (48). Since adolescent/early adulthood obesity is such a strong predictor of adult obesity and mortality, (4) it is an ideal time point to intervene and attempt to improve health behaviors. This is a time of growth and weight gain, which is often maintained into adulthood (49-52). It is also a time of increased autonomy and changing environment with greater community access (53). Obesity interventions should be implemented immediately prior to mid-to-late adolescence to prevent the progression of overweight/obese status and co-morbid conditions, rather than early childhood or late adulthood.

FAMILY BASED OBESITY INTERVENTIONS

Much research has been conducted to determine the most effective method of preventing and treating adolescent obesity. However, most studies that do include longitudinal data report disappointing results (54,55). The most obvious means for preventing childhood obesity involves targeting family members, particularly parents, as they often are the ones making food decisions for their children. Literature on the involvement of parents in obesity prevention/treatment programs is equivocal at best (42,56,57). A review conducted by McLean et al., suggested that the use of mothers in adolescent obesity intervention actually hindered weight loss as compared to when mothers were not involved (42). However, they also noted some studies where the involvement of parents when children are younger and more dependent may have encouraged greater weight loss (42). The systematic review completed by Hingle et al., did not find enough evidence to claim whether targeting parents in order to promote weight loss in children was beneficial. However, they did suggest the more direct involvement the parents had in the intervention, the more positive results they found (57). Heinberg et al., found similar results in that children with higher parental involvement were more likely to lose weight than those that had lower parental involvement. Methodology and measurement of involvement is inconsistent in the literature and therefore making fair comparisons is difficult. It appears that targeting parents in a younger child age group and keeping parents directly involved may be an effective strategy, however, many of these studies did not provide long-term weight loss data so it is difficult to draw that conclusion (42, 57). Additionally, the isolated impact of parental involvement on obesity related outcomes is unknown because many studies use varying levels of parental components without assessing involvement or using a comparison group (58).

SCHOOL BASED INTERVENTIONS

Another popular avenue for the delivery of obesity interventions is through schools. The Institute of Medicine called for schools to provide an environment conducive to healthy eating and activity in its *Preventing Childhood Obesity: Health in the Balance* report (59). School based studies are popular due to the fact that adolescents spend the majority of their day within the school environment. This environment also provides an effective way to target a large population with one intervention. These interventions are very cost effective as many curriculums can be adapted to existing classroom education, and can be implemented by teachers already employed by the school, thus eliminating the need to hire additional staff. This can be particularly beneficial in low-income communities who are already at higher risk for overweight and obesity (60). These interventions typically aim to improve nutritional quality of foods served/consumed at meals or provided at snack stands/vending machines, increase physical activity and educate children and parents about healthy eating (46).

A review examining school based obesity intervention programs between 1999 and 2004 found they were effective at changing diet, exercise and sedentary behaviors, but found less consistent results in body mass index (BMI) or body fat status changes (60). Interestingly, these school based interventions appear more effective at changing behaviors and BMI/obesity in girls than in boys. Studies that examined both genders found more significant changes in BMI, as well as strength and endurance in girls (61-63). School based studies generally vary in length, from very short (four hour-long sessions) to up to an academic year, but success has not necessarily been correlated with length of the study (60). It is also important to consider that some of these studies

implemented some form of parental support or supplemental activities outside of school so it is difficult to elucidate the role of solely modifying a school environment to produce behavioral and weight status change. Additionally, many school based studies lack longitudinal data or consistent measures of BMI or adiposity so overall effectiveness of these programs on the reduction of overweight and obesity is difficult to determine.

Two of the most extensive school-based studies to date have also demonstrated mixed results. The Pathways study was conducted in third through fifth graders over the course of three years. While researchers demonstrated success in the program's ability to produce changes in health knowledge and attitudes as well as fat content of meals served in the cafeteria, they were unable to reduce percent body fat in the children enrolled in intervention schools. They also were unable to decrease calories consumed at cafeteria meals or any objective measurements of physical activity (64,65). The Child and Adolescent Trial for Cardiovascular Health (CATCH) study did not specifically aim to reduce obesity, but they did aim to change diet and exercise behaviors. Measurements of BMI were taken although they were not the primary outcome variable (66). This intervention was successful at reducing energy intake and increasing diet knowledge (67) and positive dietary and physical activity changes remained three years post intervention (68). However, this program did not produce significant changes in BMI immediately following completion or at the three-year follow-up (67).

PRIMARY CARE PROVIDER OBESITY INTERVENTIONS

Ideally, weight loss and weight loss strategies would be discussed with a primary care physician in an office setting. Many physicians educate regarding the basics of weight loss, however, may not possess the time, skills or tools to be able to tackle in-depth obesity

prevention/treatment strategies during office visits (69-71). There have been reports that even when patients receive counseling about weight, diet and exercise in a structured curriculum from a physician, a large percentage of patients report low quality of counseling (72). Few studies have identified structured obesity interventions implemented in a primary care setting and their success in decreasing BMI and waist circumference and improving readiness to change (73). In adolescents specifically, one study demonstrated the success of a structured behavioral weight control program initiated in primary care at changing BMI z-score and increasing behavioral skills over single session physician visits (74). This intervention was unable to change energy intake, percentage of calories from fat, physical activity or sedentary behavior. This program was initiated, but not completely delivered in a primary care setting with online, phone and mail support that extended outside the primary care setting (74). In the fight against adolescent obesity, primary care physicians may be best utilized to screen for the necessity of enrollment in a behavioral based program but may not be best equipped to deliver interventions or consultations alone.

COMMUNITY BASED AND LARGE SCALE OBESITY INTERVENTIONS

Community and large-scale interventions can be successful as they typically collaborate with schools, community establishments, and government agencies. One campaign, the VERB campaign, created by the Center for Disease Control and Prevention (CDC), was created to encourage children (age 9-13) to be physically active everyday using social marketing. The campaign used television commercials, magazine advertisements and school-directed educational materials to increase physical activity in the target market. This program was successful in increasing awareness and recognition of the campaign and producing increased physical activity levels in children aware of the campaign, which had

a lasting positive effect into adolescence (75). It has also been demonstrated that communities, even economically disadvantaged communities, were willing to utilize these programs (76), which could be beneficial in targeting a population with limited availability of resources. The largest limitation of a program this size is that the overall cost approached $339 million, which is unrealistic to sustain.

Large scale community interventions can be difficult as they are costly and may be less individualized because they attempt to reach a large audience. One way researchers have tried to make community interventions more engaging and personalized is by adding an electronic component to the intervention. The researchers of the Loozit trial attempted to use a successful community style 24-month intervention and add additional therapeutic contact in the form of telephone, short-message service (text messages) and/or email messages (77). The addition of electronic communication did not improve the results of the program. However, contact was only initiated once every two weeks and more constant contact may have produced additional benefits (77). Community and large scale interventions may be able to decrease cost and increase individualization by adding an electronic component, but may need to increase frequency of communication to see improved results.

ONLINE OBESITY INTERVENTIONS

The use of electronic mediums for obesity interventions has dramatically increased in the past few years. Social media, phone applications, online websites and social networking sites have all been targeted as approaches to prevent obesity. Traditional research has demonstrated that social networks and support are critical for preventative health behavior (78,79). Even just the perception of social support can enhance coping

skills and may lessen stress for those trying to lose weight (80). The rise of social media has allowed for a virtual expansion of social support.

Approximately 95% of adolescents (age 12-17) have Internet access and many of those are active on social media sites (81). The use of social media/social networking sites to implement interventions improves accessibility to intervention components, increases social support and provides increased privacy as compared to in-person interventions (82). Social media sites are important to the new trend of communication where virtual communities can be established, and serve as an intangible form of social support where users can exchange experiences (83,84). Additionally, social media allows the opportunity to utilize popular and familiar resources with no financial cost to research institutions and participants. It can deliver information to a diverse population because it is easily accessible, convenient, functions in real time and allows audiences to self-manage behavioral interventions (85). Additionally, these sites may decrease participant burden due to widespread availability and decreased travel to intervention sites, and subsequently increase compliance and adherence (86).

The use of Internet obesity programs has been shown to be effective at improving health behaviors as well as self-efficacy for weight loss in adolescents (87). Two high-quality independent Internet interventions conducted in adolescents showed a significant decrease in BMI z-score of 0.09kg/m^2 ($p<0.05$) at 16 weeks (88) and a significant reduction in BMI (mean=0.7kg/m^2, $p<0.01$) and BMI z-score (mean=0.18, $p<0.01$) at 16 weeks (89). These results mimic the findings in a Cochrane review of randomized controlled trials for the treatment of childhood obesity (90). Using an Internet based intervention, researchers were able to reach a large population in a working-class neighborhood to deliver nutrition related information regarding increasing fruit and vegetable consumption in adults (85).

An analysis of twelve studies conducted by Ashrafian et al., found that the use of social networking sites for interventions produced a significant reduction in BMI from baseline (mean=0.64%, $p<0.05$) (82). A cross-sectional study found Twitter™ to be an effective health information promotion tool (91), and a behavioral intervention demonstrated that interactive websites can be effectively used to promote weight loss (92). Internet based obesity prevention programs have demonstrated preliminary efficacy for successful weight loss (93). The use of mobile applications may also provide another effective avenue to increase accessibility of Internet based programs (94).

Studies utilizing mobile devices to implement interventions have been found to effectively change physical activity and diet behaviors (95). They have also achieved changes in outcomes such as weight loss, especially when added to traditional style interventions (96-98). The addition of mobile technology for the use of self-monitoring has resulted in greater adherence to and satisfaction with interventions and lower attrition rates as compared to traditional intervention delivery methods (96,99). In a three-month mobile weight loss intervention where participants received information via podcast, 58% of participants accessed podcasts with non-mobile devices. However, there was a slightly greater weight loss in those who accessed podcasts using a mobile device (86). Studies have found that initial adherence to Internet delivered programs is high and tapers off like more traditional studies but the use of personalized messages and feedback may decrease attrition rates of participation (100).

Many programs utilizing mobile health applications fail to utilize aspects of behavioral change to promote weight loss (101). Even though electronic interventions have demonstrated the successful ability to improve adiposity outcomes in children/adolescents, many are used as adjunct measures to an existing program in efforts to increase compliance

and decrease weight status (58). Therefore, there is a need to examine electronic obesity interventions in adolescents independently from other intervention components to assess the direct effect of this technology on weight outcomes (58). Also, few to no studies have examined the effect of the person delivering the messages and how that can affect efficacy in adolescents.

ROLE MODELING IN ADOLESCENCE

The transitory period of adolescence is a crucial time period where lifestyle choices and patterns of behavior are established and carried into adulthood (5) and the presence of a positive role model is imperative. A role model is an entity perceived as worthy of emulation or identification that can reflect self-esteem to young adolescents (9, 102). The presence of a role model can influence positive behaviors in adolescents but often the *type* of role model is the best predictor of behavioral outcomes. Young adults tend to identify with people who are racially and demographically similar to themselves. Family members are typically the largest influence in an adolescent's life followed by professional athletes and entertainers (8). Males tend to identify strongly with same-sex counterparts, while females are less inclined to identify a same-sex role model (8). Data regarding female role models is slightly more controversial; however, literature indicates that athletes consistently appear as role models in some facet to young females (8,103-105). Those who model themselves after someone they admire tend to engage in less risk taking behaviors (104,105). For young adults that report a family member or athlete as someone they admire, there is a strong correlation with positive behaviors, whereas those who identify with entertainers are more likely to engage in detrimental behaviors (8).

Several experiments exploring ethnically diverse and high-risk populations indicate the presence of positive role models increases resiliency in adolescence, leading to an increased ability to overcome adversity and challenges (106-108). Therefore, it is important to use and investigate the effect of different role models and their ability to influence diet and exercise behaviors. In one study, African American adolescents were paired with college-aged racially matched mentors and were delivered a health promotion/obesity intervention grounded in the Social Cognitive Theory. They were measured for anthropometrics, body composition and physical activity. Researchers found that 76% of the adolescents remained in the program for 24 months and overweight/obese status was reduced by 5% in adolescents enrolled in the program, compared to an 11% increase in the control group. The intervention group also reduced total body fat, increased fat free mass and displayed a significant decline in snack and dessert consumption at the 24 month follow up. Physical activity increased in intervention adolescents but was not retained at follow up (109) Despite these studies, there are few investigations exploring the influence of role modeling on weight loss, healthy eating and exercise habits (8). Professional athletes may be ideal role models because of high adolescent identification to them, their celebrity status, diverse backgrounds and representation of a healthful lifestyle.

THE USE OF PROFESSIONAL ATHLETES AS ROLE MODELS

It is commonly accepted that adolescents emulate behaviors of role models, and although the impact of professional athletes as role models to increase physical activity has rarely been studied (6), athletes are commonly listed as a role model to adolescents (7). A study conducted in 2000 by the Henry J Kaiser Family Foundation found that kids learn about physical activity and life behaviors from professional athletes (7). The effect of

professional athletes extends across age and gender as 73% of both sexes state Olympic athletes as role models and children spanning the age range of 10-17 are most likely to list a professional athlete as a role model over any other public figure. Female children (67%) list male athlete role models more frequently than female athlete role models (7). Professional athletes provide a unique opportunity to improve public physical activity and diet behaviors as they are fitness icons for both adults as well as children (6).

Athletes are considered some of the most influential people to the general public but are underutilized regarding the promotion of healthy lifestyle habits (12). The relationship between professional sports teams and their communities presents a unique opportunity to reach a large audience and improve public health outcomes. Sports teams can expose entire populations to healthy living interventions and promote positive behaviors on a large scale (12). Professional athletes represent economically diverse backgrounds, many different ethnicities and are considered prominent, inspirational figures to the communities that they serve (12).

Recently, the National Football League (NFL) has collaborated with the American Heart Association and the National Dairy Council to create the NFL Play 60/ Fuel Up to Play 60 program encouraging children to eat healthy and be active for 60 minutes each day. This program focuses on the development of a healthy school environment as a primary prevention strategy. As rewards, participating schools are awarded with appearances by athletes, field trips to official practice facilities, and even participation in the opening ceremonies of a home game (110). However, these interactions are sporadic and intermittent and do not provide individual contact with the athletes over time.

Several individual professional sports organizations have created initiatives using their celebrity influence to fight childhood obesity within their communities. The

effectiveness of these programs is unknown because they lack evaluation components, control groups and follow up data to provide documented results (111). These programs use the athletes for their image, but rarely provide constant athlete-participant interaction, which does not allow for the participants to develop a personal relationship with the athlete and form the social support necessary for sustainable changes in health related behaviors (9, 102, 112-114). Another important limitation to these programs is that they target very small communities and may not extrapolate to larger geographical areas (111). There is a need to investigate the success of programs that use professional athletes as role models as well as their mechanisms of success to determine whether to continue them, modify them, or redirect funds to more effective programs.

A study by Irwin et al., demonstrated positive results of a healthy living intervention implemented during physical education classes of fourth and fifth graders (n = 888) enrolled in Memphis area schools throughout the 2006-2007 school year (111). This program included nutrition and exercise education with support provided from the Memphis Grizzlies' players, mascots, coaches and dancers. Parents were also involved by exercising and eating together with their children at home although, their involvement and influence was not assessed. Students participating in this study showed significant improvement in 87.5% of the exercise and nutrition knowledge based questions and significant positive change for 70% of the questions exploring dietary behaviors. Even though the subjects significantly increased their moderate (odds ratio = 1.4; $p = .005$) to vigorous (odds ratio = 1.6, $p = .003$) physical activity time, there was a significant decrease (odds ratio = 0.8, $p = .042$) in the knowledge based questions regarding the length of time they should be active each day. Additionally, their soft drink consumption did not improve

(odds ratio = 0.8, p = .008) nor did the amount of screen time reported (odds ratio = 0.8, p = .058).

This program did not provide consistent interaction with Memphis players or personnel, and did not contain control groups or follow up data. The intervention in this study was minimal and contained a weak evaluation component. Despite its faults, this study provides preliminary evidence that the involvement of a professional sports team for a healthy living intervention can create positive results. It not only changed knowledge but also proceeded to change behaviors. Using social media to connect athletes with participants in obesity interventions would allow for increased contact and extended social support.

USING SOCIAL MEDIA TO CONNECT ATHLETES TO COMMUNITIES

One major limitation to using professional athletes as role models for healthy living interventions is their limited availability to the public. The advent of social media sites allowed for the ability to connect previously protected figures and the general public making them more widely accessible. Twitter™ is an ideal medium as it is a way to provide real time contact between athletes and the community. Short messages (<140 characters) can be sent, read and replied to in a real time conversation. This website and associated phone app can be accessed via computer, smart phone or other Internet enabled device. Both large and small audiences can be connected via this social media site. Twitter™ and similar websites have been utilized for obesity interventions because it circumvents traditional obesity intervention barriers such as time commitment, travel to and from intervention sites and limited contact with intervention staff. In the case of professional athletes, Twitter™ also overcomes the barrier of limited contact between athletes and the

public without placing a large burden on the athlete or the subjects enrolled. Since social media is popular with adolescents (81), it is also an ideal avenue for direct delivery of interventions to adolescents instead of through parents or guardians. This allows for an adolescent seeking autonomy to be in charge of their choices during interventions. Although social media has been used for obesity interventions (58, 82), there has yet to be interventions using social media to connect popular public figures to adolescents to deliver intervention components.

There is a growing need to explore success of programs that use professional athletes as role models as well as the mechanisms for which athletes influence adolescent health behaviors. The THP was developed to explore that relationship. This study evaluated the feasibility and acceptability of an intervention using professional athletes as role models. It contained an evaluation component exploring effects of this program on diet and exercise behavior, psychosocial variables and outcome variables as well as contained a control group, effectively filling in the gaps of previous studies.

This study determined the feasibility, acceptability and preliminary efficacy of a positive role modeling intervention – The THP- on weight status in obese adolescents using professional athletes as agents of change. The study also examined changes in psychosocial variables necessary for change, dietary and exercise behaviors, as well as total body weight/fat status.

DEVELOPMENT OF THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM

The THP consisted of positive role modeling via professional athletes based on theoretical constructs of the Social Cognitive Theory (9-11). This 12-week program was designed to modify personal, behavioral and environmental factors to create a healthier

lifestyle. The Social Cognitive Theory focuses on the reciprocal determinism of personal, environmental and behavioral factors and helped form the basis of the messages and activities of this program. The behavioral changes specifically addressed in this program included eating and exercise behaviors. Personal factors such as participant knowledge would increase due to the information provided in each message. Attitudes, beliefs, self-efficacy, motivation and readiness to change, which are other personal factors, would be influenced by environmental factors such as positive role modeling, support and encouraging messages sent by the players. The influence of those environmental factors would, in return, create a more positive, health promoting environment for the adolescent. These proposed changes in personal and environmental factors aimed to encourage behavioral modification. (**Figure 1**). The THP intervention consisted of the following four components to achieve the ultimate goal of behavioral modification: role modeling by the athletes, Twitter™ text and video messaging, a kick-off event, and rewards (**Figure 2**).

Role modeling was demonstrated through Twitter™ text and video messages. Twitter™ text messages were sent 3x/week and video messages were posted through Twitter™ 2x/week. The messages were prepared by registered dietitians and a Texans player delivered them in the intervention group. RD's delivered identical messages to the

Figure 1. Social Cognitive Theoretical map of The Houston Texans TwEAT Healthy Program

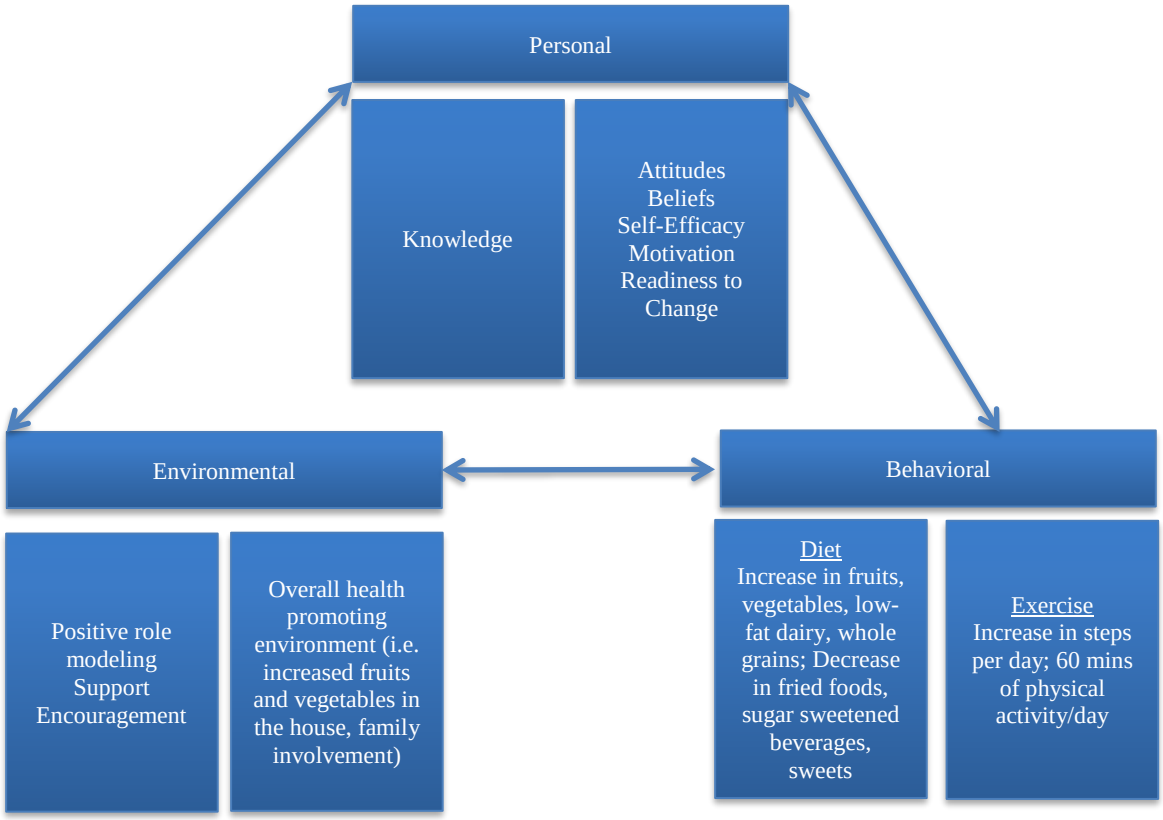
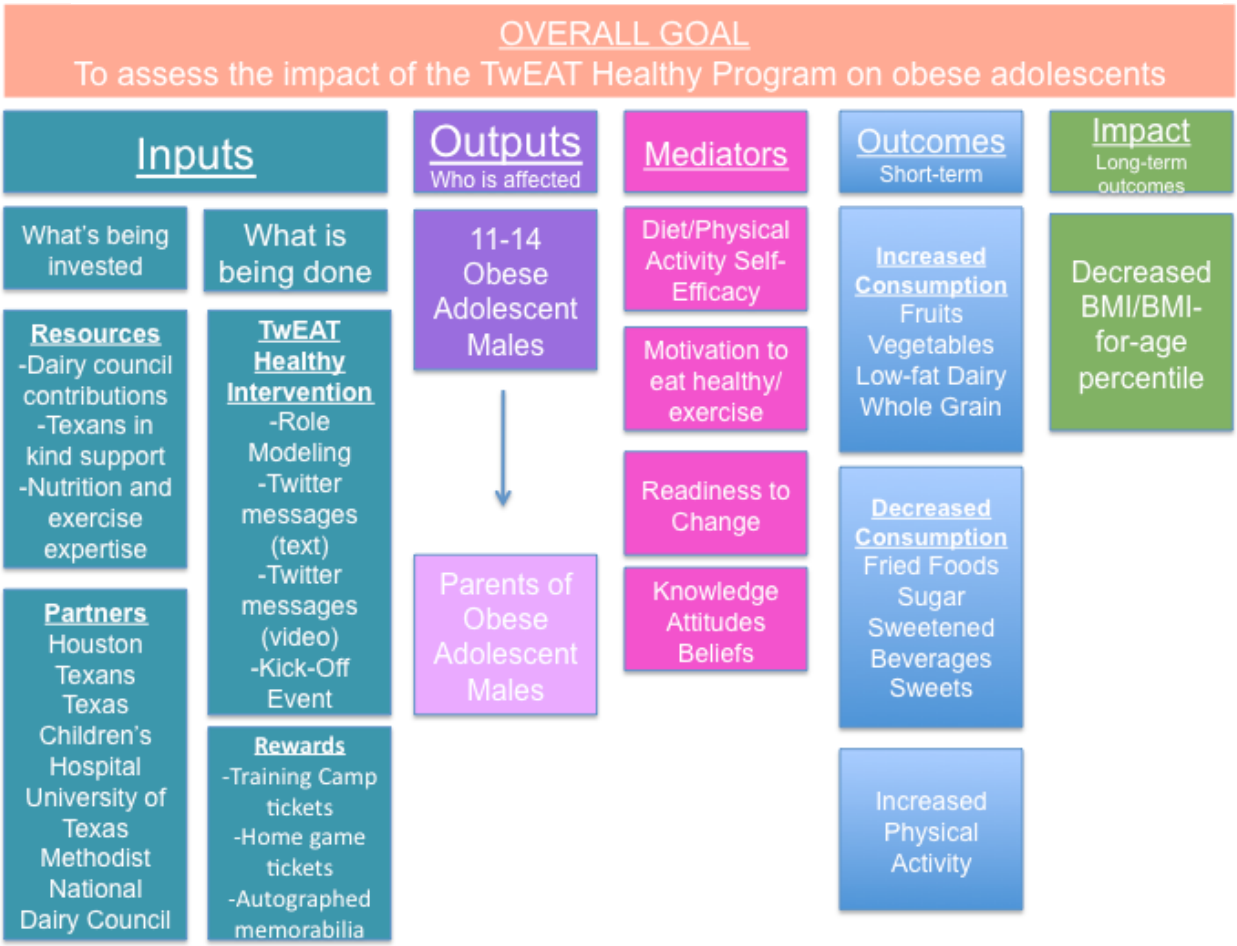


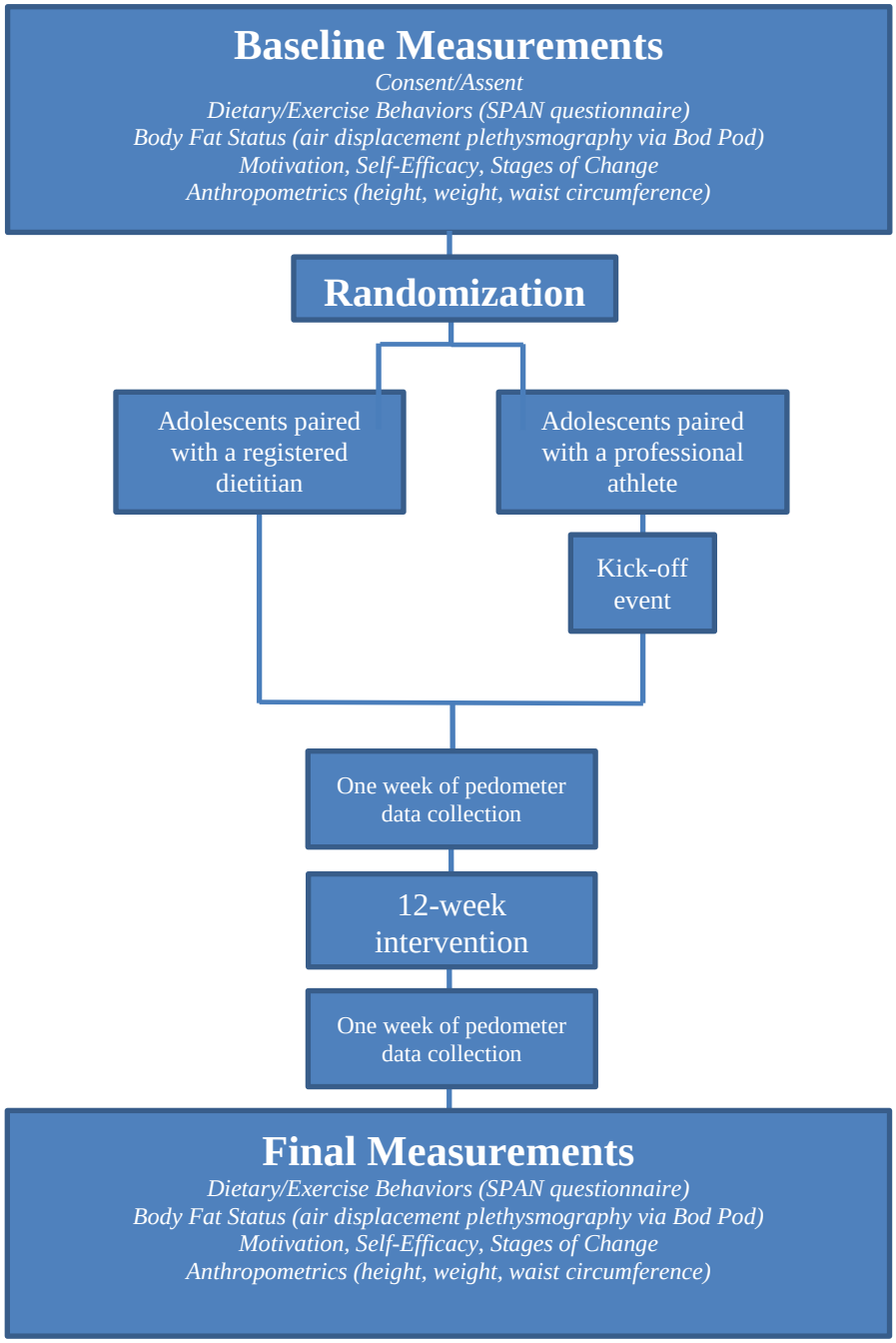
Figure 2. Concept model of the Houston Texans TwEAT Healthy Program



adolescents in the control group. Three categories of messages included: 1) questions (to encourage discussion and keep participants engaged with their mentor); 2) tips (to provide information and increase knowledge); and 3)challenges (to promote immediate activity). Providing information is essential to an intervention as acquisition of knowledge must precede behavioral change (9-11). Questions were posed to participants in order to keep them engaged in the program in an effort to decrease attrition rate. These questions were also a way to individualize the program since it encouraged discussion between the participant and their mentor. Internet based interventions in adults have demonstrated high attrition rates (115) but the ability to customize an online intervention may lead to increased participation which may result in greater weight loss and overall success (116). Concepts for the video messages mimicked and reiterated ideas presented in the Twitter™ messages that week. All topics followed MyPlate and American Academy of Pediatrics guidelines for dietary intake and exercise recommendations (117).

A kick-off event enabled adolescents to meet and interact with the professional football players who sent the Twitter™ messages and acted as mentors. Subjects were taught how to properly use their Twitter™ account on a computer and mobile phone, run practice drills with players and eat in the team cafeteria during that time. Rewards included tickets to a 2012-2013 Texans home game, VIP tickets to a training camp practice and autographed memorabilia that was provided for completing different stages of the program. All control subjects received the same program with the exception of the kick-off event and all messages were delivered by an RD, not an athlete. A complete description of intervention design can be found in **Figure 3**.

Figure 3. Intervention design of The Houston Texans TwEAT Healthy Program



Chapter 3: The feasibility and acceptability of a pilot weight loss intervention using professional athletes and registered dietitians as mentors

ABSTRACT:

Objectives: To determine the feasibility and acceptability of a social media-delivered pilot weight loss intervention in overweight/obese adolescents delivered by a professional athlete or healthcare professional.

Methods: Overweight/obese adolescents (age 11-14) (n=30) randomly assigned to one of two groups were sent Twitter™ text/video messages for 12-weeks by either a professional athlete (Group 1) or a registered dietitian (RD) (Group 2). Post-intervention interviews with adolescents, parents and athletes were used to assess feasibility and acceptability.

Results: Subjects in Group 1 were more likely than subjects in Group 2 to complete the program (79% versus 70%, respectively, $p = 0.29$), and to report accessing >75% of text and video messages (64% vs 46%, $p = 0.56$). Subjects in Group 1 were significantly more likely than those in Group 2 to report something positive about their role model (80% vs.7%, $p < 0.001$).

Conclusions: Social media is both a feasible and acceptable way to deliver weight loss interventions in adolescents and acceptability may be improved using a professional athlete as a role model.

Practice Implications: Social media is a feasible/acceptable method of delivering interventions, but may be affected by the person delivering the intervention.

THE FEASIBILITY AND ACCEPTABILITY OF A PILOT WEIGHT LOSS INTERVENTION USING PROFESSIONAL ATHLETES AND REGISTERED DIETITIANS AS MENTORS

Introduction

The prevalence of overweight and obese children in the United States has reached epidemic proportions with 31.8% of children (age 2-19) classified as overweight and 16.9% as obese (118). Traditional in-person adolescent obesity interventions present barriers to participation such as time and school commitments, subject burden of intervention components and lack of motivation to travel to intervention sites (119). Online interventions can improve upon these barriers due to their use of popular technology (i.e. cell phones, social media sites), increased contact with role models (i.e. healthcare providers) and exposure to and individualization of intervention components (58,82,120,121).

The presence of a positive role model in early adolescence may influence later adult behaviors. (5). Adolescents consistently report that they view family members, professional athletes and entertainers as role models (6,8,122, 123). Reporting family members and athletes as role models is strongly correlated with positive behaviors in adolescents, whereas reporting entertainers is more often correlated with adolescents engaging in detrimental behaviors (8). Unfortunately, social media interventions are typically delivered by researchers or healthcare professionals with little evidence to support that adolescents identify with these individuals (6,8,103,122,123).

The use of family members to deliver weight loss interventions often results in minimal and non-sustainable weight loss (42), but the effect of using professional athletes

as models for healthy behaviors that may ultimately result in weight loss is largely unstudied. A barrier to having athletes deliver weight loss interventions is the public's limited interaction with them. Yet, many athletes use social media to connect with fans on a frequent basis. Thus, a social media platform may be an effective way for athletes to deliver health messages.

No known studies have examined the feasibility and acceptability of weight loss interventions delivered via social media by professional athletes. The objective of this study was: 1) to determine the feasibility and acceptability of a social media-delivered pilot weight loss intervention in overweight/obese adolescents and 2) to determine if feasibility and acceptability differed according to whether the intervention was delivered by a professional athlete or healthcare professional. The overall hypothesis was that the intervention will be both feasible and acceptable and that feasibility and acceptance of the intervention will be greater with a professional athlete as a role model compared to a healthcare professional.

Methods

Design

A randomized controlled trial design was used. Subjects (overweight/obese adolescents ages 11-14) were enrolled and randomized into one of two groups using block randomization (124). Group 1 received standard of medical care supplemented with 36 Twitter™ text messages and 24 Twitter™ video messages delivered by a male professional athlete; Group 2 received standard of medical care supplemented with identical messages delivered by a male registered dietitian (RD). Adolescents were blind to study conditions,

but primary researchers were not. Adolescents in both groups received Twitter™ text messages three times per week and Twitter™ video messages two times per week for 12 weeks.

Recruitment and Eligibility

Adolescents were recruited from Texas Children's Hospital (TCH) and Texas Children's Pediatric Associates (TCPA) satellite physician offices in Houston, Texas. Families identified via electronic medical record screening were approached and provided fliers in waiting rooms directing them to the study email address to be further assessed for eligibility. Fliers describing the study were also posted in elevators and clinic waiting rooms. Adolescents were eligible to enroll if they were 1) ages 11-14; 2) overweight or obese ($\geq 85^{th}$ percentile BMI-for-age); 3) had internet access via mobile phone or computer; and 4) able to read, write and speak English. Exclusion criteria included 1) serious illness as determined by physician; 2) co-morbidities (i.e. diabetes) that could interfere with the ability to participate in the study; 3) previous bariatric surgery; or 4) current pregnancy.

Once determined eligible, one and a half hour appointments were scheduled to obtain assent/consent, as approved by Baylor College of Medicine and The University of Texas at Austin Institutional Review Boards, and to complete baseline assessments. Baseline measurements were collected for height, weight, waist circumference (125), and percent body fat via air displacement plethysmography (126). Validated questionnaires were completed by adolescents to investigate motivation (127), self-efficacy (128), stages of change (129,130) and nutrition/exercise knowledge, attitudes and beliefs (131). During this visit, adolescents were assigned an anonymous Twitter™ account created for the study and were instructed how to operate the website and download phone applications. All

participants completed baseline measurements over one weekend, and the 12-week intervention began the following week. Upon completion of the baseline visit, all subjects received two tickets to a Houston Texans training camp practice, autographed Texans memorabilia, and were eligible to receive two tickets to a Texans game if they returned for a follow-up appointment after week 12. Participation rate is described in the results section as it was crucial for determining overall feasibility.

Intervention Components

Private Twitter™ accounts were created for RD's and athletes containing a profile picture of their face and their individual user name. Adolescents received an anonymous account with no identifying pictures or names. Structured Twitter™ messages were developed based on Social Cognitive Theory constructs (9) and were categorized into three groups: 1) questions (to promote interaction and social support); 2) tips (to provide nutrition and exercise information); and 3) challenges (to encourage immediate activity). Messages were validated in a representative group of adolescents prior to beginning the intervention. All messages promoted healthy eating/exercise strategies to increase fruits, vegetables, whole grains, low-fat dairy and daily activity and decrease sugar sweetened beverages. All adolescents received identical structured messages but were also allowed to interact with role models as desired. Athletes were instructed to reply to personal questions from adolescents (i.e. "what is your favorite fruit?"), but were required to have their response to nutrition/exercise questions (i.e. "how many calories are in a Gatorade?") approved by investigators prior to posting to ensure accuracy. Examples of messages are included in **Table 1**.

Table 1. Example Twitter text messages sent to participants

	Tweet A	**Tweet B**	**Tweet C**	
Week	Exercise	Nutrition	Behavior	SCT Construct
1	Try to get 60 mins of exercise/day and wear your pedometers this week! I'm running with (another player) for my 60mins! #TwEAThealthy[a]	This week try replacing 1 white bread product for a whole grain version. Look for 100% whole grain logos: (picture attached) #TwEAThealthy[a]	Experts recommend ½-2 pounds per week. What is your realistic weight loss goal for these 12 weeks?#TwEAThealthy[b]	Goal setting
2	T: Substitute 1 hour of TV or computer use for something active this week! Instead of watching TV, I'm shooting hoops with (player)#TwEAT Healthy[c]	Can you replace all of your sweetened drinks (including juice) with water? Do you think that would be hard? I'm going to do it! #TwEAThealthy[b]	Try to write down everything you eat for 3 days. It's a great way to watch what you eat and can really help with weight loss! #TwEAThealthy[a]	Role Modeling/Self monitoring

[a] Indicates a message that serves as a challenge
[b] Indicates a message that serves as a question
[c] Indicates a message that serves as a tip

Assessment of Feasibility and Acceptability

Feasibility was determined by assessing attrition rates and comparing them to traditional in-person interventions and asking adolescents what percentage of text/video messages were accessed. Acceptability was assessed via exit interviews of the parents, adolescents and athletes. Immediately following the completion of the 12-week intervention, participants and parents were independently interviewed to assess likes/dislikes, ability to access messages, perceived changes in eating/exercise habits, and willingness to participate in the program or similar study again. Athletes were interviewed to assess likes/dislikes and willingness to participate in the program again or recommend it to a teammate. All questions asked to participants and parents are listed in **Table 2**.

Statistical Analysis

The study design consisted of obtaining outcome measurements prior to the beginning of the intervention and immediately upon intervention completion in both Group 1 and Group 2. The data assessed for this paper only consists of that obtained post-intervention. The power determined for this study is based upon the nature of the repeated measures design. GPower was utilized to determine sample size and power analysis. All calculations assumed a correlation among repeated measures of 0.5. In order to detect a significant effect size ($\alpha = .05$) as small as 0.6 standard deviation units in the variables measured in this study with a power of 80%, a sample size of 30 participants was needed for this study. An a priori goal of enrolling 60 subjects, assuming a 50% attrition rate, was established.

Basic descriptive statistics were used to describe the study population. A Fischer's exact X^2 test using SPSS was conducted to determine significant differences in attrition

Table 2. Exit interview questions asked of adolescents (n=28) and parents (n=23)

Adolescent questions:

1. If anything, what did you like about the program?
2. If anything, what didn't you like about the program?
3. On of scale from 0-100%, where 0% is, I didn't see any messages, and 100% is, I saw every message, what percentage of the text messages did you read?
4. On a scale from 0-100%, where 0% is, I didn't see any messages, and 100% is, I saw every message, what percentage of the video messages did you view?
5. If given the chance, would you be willing to participate in this program or one like it again?

Parent questions:

1. If anything, what did you like about the program?
2. If anything, what didn't you like about the program?
3. Did you notice any changes in your child's eating habits? If yes, what changes did you notice?
4. Did you notice any changes in your child's exercise habits? If yes, what changes did you notice?
5. Did you notice any changes in your child's attitudes about eating healthy? If yes, what changes did you notice?
6. Did you notice and changes in you or any other member of your family's eating and exercise behaviors?
7. If given the chance, would you be willing to participate in this program or one like it again?

rates between groups as this test is appropriate for small sample sizes. A t-test was performed to determine differences in mean access of text and video messages between groups.

Results

Feasibility

A total of 77 participants were contacted, with 18% (n=14) recruited in person in the clinics and 82% (n=63) via flyer postings. Seventy-five percent (n=58) of the subjects recruited (n=77) met inclusion/exclusion criteria and 50% of recruited participants (n=39) enrolled in the study. Baseline demographic characteristics of all participants (n=39) are summarized in **Table 3**. Seventy-seven percent (n=30) of those enrolled at baseline completed the program and provided post-week 12 measurement data. Exit interviews were obtained from 28 adolescents and 23 parents.

Although more subjects completed the program in Group 1 (79%, n=16) versus Group 2 (70%, n=14), the difference in attrition rates was not significant, $X^2(2, N=39) =1.108$, $p = 0.29$. Total attrition rate in both groups combined was 23%. All adolescents were asked to record percentage of text/video messages viewed on a ranking scale of 0% to 100% with descriptive wording of, "on a scale of 0-100%, where 0% is, I didn't see any messages, and 100% is, I saw every message, what percentage of the text/video messages did you view?". Sixty-four percent of total participants (n=19) in both groups accessed >75% of text messages with eight subjects viewing all messages. Three adolescents reported viewing none of the text messages or that only their parents accessed them. One adolescent that viewed none of the messages reported he was grounded for the duration of the intervention and internet access had been revoked. There was no significant difference

Table 3. Gender, age, race and body mass index of enrolled participants (n=39)

Variable (N=39)	n	Percent (%)
Gender		
Female	10	25.60%
Male	29	74.40%
Age (years)		
mean (SD)		12.1 (1.0)
range		11-14
Race		
African American	3	7.70%
White	12	30.70%
Hispanic	19	48.70%
Bi/Multi-Racial	5	12.80%
Body Mass Index (kg/m^2)		
Mean (SD)		30.8 (4.7)
Range		25.04 - 47.20

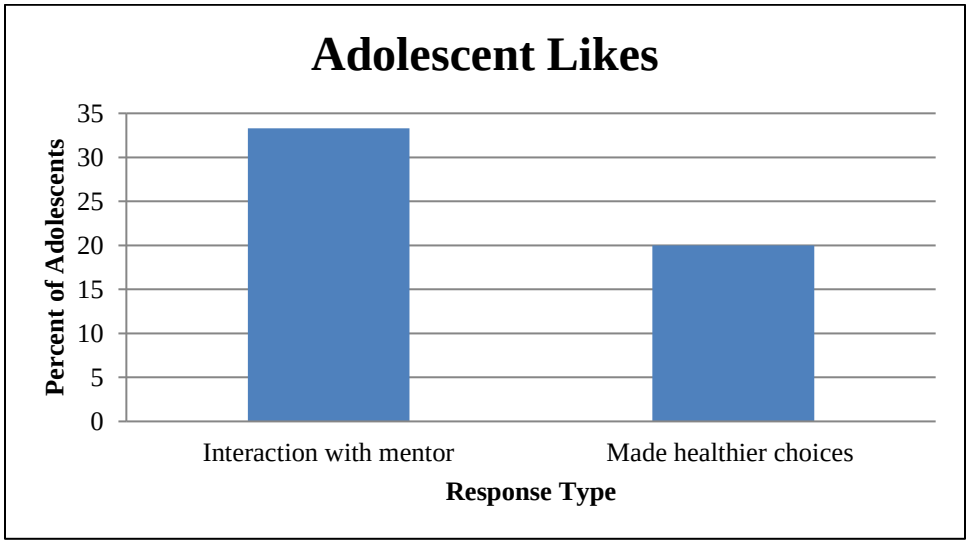
in percent text messages accessed by Group 1 (M=75.00, SD=27.83) and Group 2 (M=67.86, SD=33.61); t(21.34)=0.591, p = 0.56). Only 46% of combined participants (n=14) accessed the majority (>75%) of the video messages. Eleven subjects reported accessing none of the video messages or that only their parents accessed them with frequent reports of technical difficulties preventing them from accessing videos. There was no significant difference in percent video messages accessed by Group 1 (M=52.67, SD=43.17) and Group 2 (M=43.56, SD=47.38); t(22.62)=0.516, p = 0.61).

Acceptability

A total of 23 parents attended the post-intervention visit with their adolescent and were interviewed. When asked what components of the intervention they liked best, parents reported the presence of a non-parental role model (n=9), that the child made healthier choices (n=8), the frequency and content of the messages (n=8) and that it motivated and held their child accountable most frequently (n=8). The adolescents reported liking the interaction with the mentor (n=10) and making healthier choices for the duration of the program (n=6).

Adolescents in Group 1 were significantly more likely to report something positive about their mentor (80%) versus Group 2 (7%) (p < 0.001). Both parents (n=12) and adolescents (n=14) reported "nothing" to dislike most frequently followed by social media/technology issues (n=5, n=4) (**Figures 4 and 5)**. A total of 100% of parents, adolescents and role models reported they would be willing to participate in this program again if given the opportunity.

Figure 4. Self-reported adolescent likes/dislikes of the program



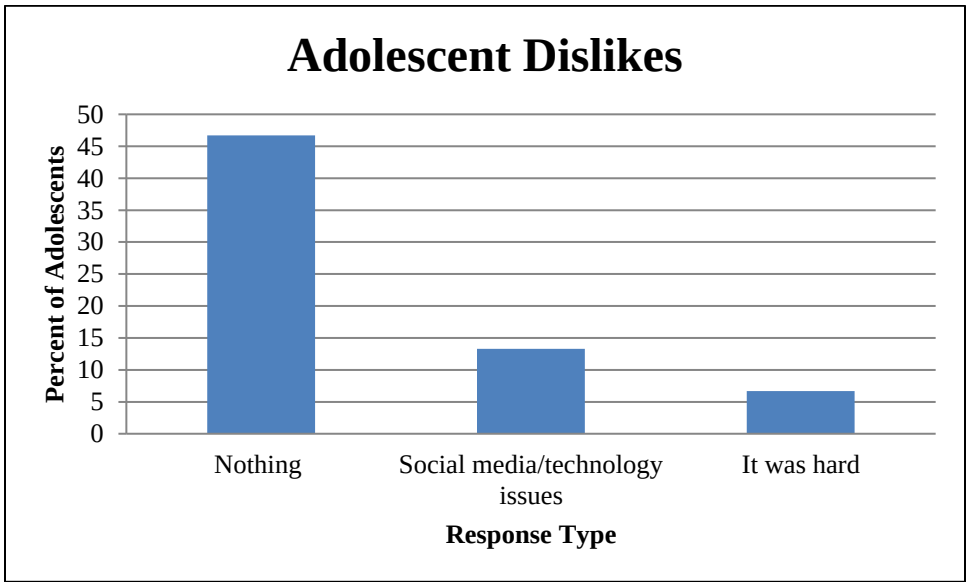
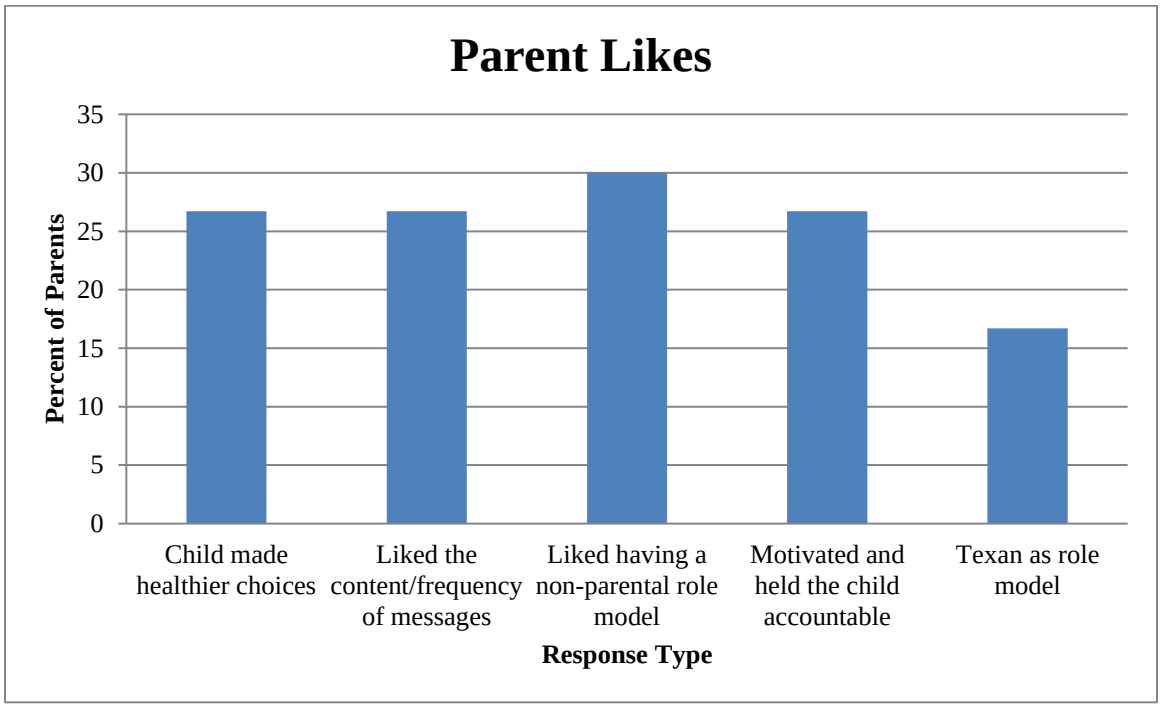
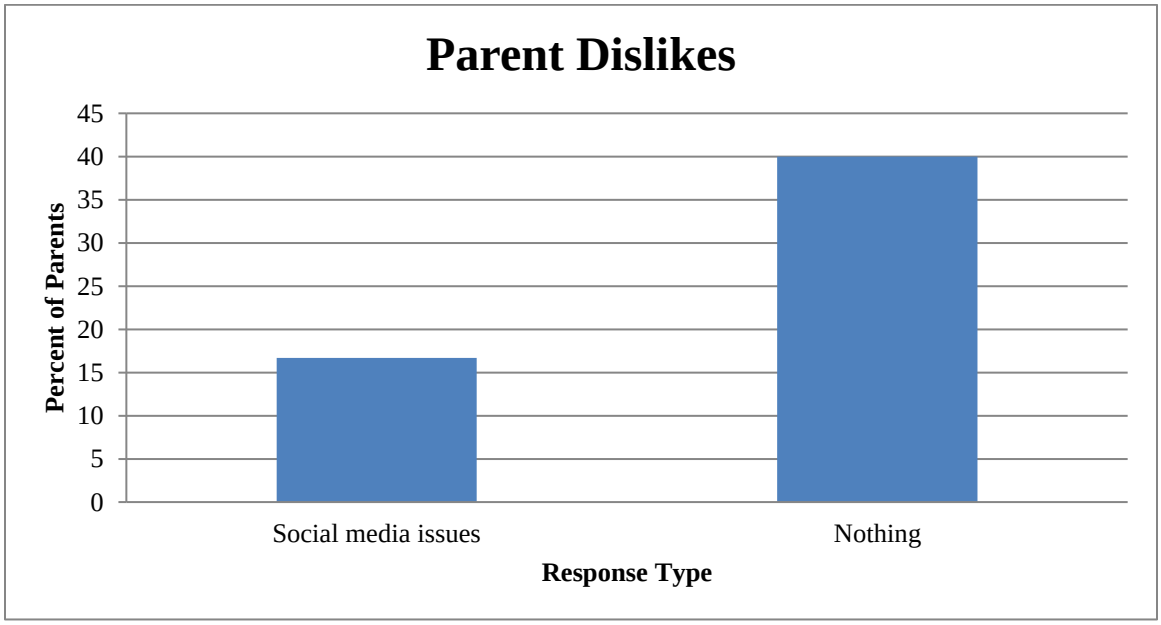


Figure 5. Self-report parent likes/dislikes of the program





During the exit interviews, 89% of parents (n=20) from both groups reported their child had an increase in positive diet/exercise behaviors (i.e., "my child now asks for fruit to be included in their lunch") with 100% of parents (n=23) reporting positive changes in their child's attitudes about healthy eating and exercise (i.e., "my child is less resistant to trying new foods"). Seventy-five percent of parents (n=17) reported a positive change in their or their family's eating/exercise behaviors (i.e., "I feel more motivated to make changes myself").

Athletes (n=3) were interviewed regarding their likes and dislikes about the program. Helping children lose weight and be healthier was their favorite part of the intervention. An additional component noted by the athletes was the program contributed to community service hours required of the Houston Texans team members. All athletes reported willingness to participate in this program again or to recommend it to a teammate.

Discussion and Conclusion

Discussion

Both groups of adolescents reported high acceptability to the intervention with the exception of a dislike of technological issues, which is not reflective of the intervention itself. Adolescents paired with a professional athlete were significantly ($p < 0.001$) more likely to list something positive about their role model when asked what they liked best about the program. This may be due to the fact that adolescents consistently report high identification to professional athletes as role models (8,42,103-105). Acceptability of social media-delivered interventions may be improved using a professional athlete as a role

model versus a healthcare professional. The program was also acceptable to professional athletes as shown by their willingness to participate again and recommend it to a teammate.

This 12-week pilot intervention demonstrated both adequate feasibility and acceptability in groups of participants, parents and athletes. Twelve-week intervention studies that use only social media websites as obesity prevention tools in overweight/obese 11-14 year olds are lacking (58). Typical attrition rates for electronic (text message, CD-ROM, mobile phone, Internet program) based obesity interventions range between 0-42% (58,87,88,132). However, many studies have another issue related to recruitment such as recruiting all participants out of a school or a boy/girl scout troop which may offer social support or peer pressure. These issues could affect the intervention results if not considered in the analysis.

Total attrition and individual group attrition rates in this study were within typical ranges when compared to studies of similar design and length (8-16 weeks) and contained various forms of electronic technology. In-person educational sessions were not included in this study as time commitment and travel time are commonly listed barriers to participation in obesity interventions (119). Due to small sample size, differences in attrition rates between groups were not significant, but the trend indicates there may be a potential for selection of a recognized public figure as a role model to reduce attrition rates in a social media based intervention. Larger scale studies should be conducted to elucidate the role of professional athletes as role models and their effect on attrition rates.

Despite demonstrating feasibility and acceptability, there were significant limitations and barriers in this pilot intervention. A small sample size (n=30) limited the ability to detect significant differences between groups leaving mostly trends to report. Data obtained during exit interviews was via self-report with a non-validated group of questions. There were barriers encountered when utilizing social media as a platform to deliver intervention messages such as parents logging in and viewing the messages and delivering them to the adolescent. This may have introduced some potential confounding from the influence of the parent rather than the child reading the message.

Conclusion

The use of social media is a practical and feasible way to deliver an intervention to overweight/obese adolescents. Using social media platforms to deliver interventions provide a unique and consistent form of communication between role models and enrolled participants that were acceptable to both parties. The person delivering the message may have an effect on retention rates as well as overall acceptability of the intervention. Further research with more large-scale interventions should be conducted to elucidate the role of the mentor delivering online interventions.

Practice and Implications

Utilizing social media platforms allows investigators to provide messages in either text, picture or video format. The results from this study indicated adolescents (age 11-14) overall prefer messages in text form. Videos were difficult for adolescents to access and load on a mobile device with wireless internet. Adolescents paired with a professional athlete may be more likely to access messages in both forms even though differences in access rates between the athlete and RD group were not significant. Future studies should

include objective measurements such as log-in tracking to monitor access to intervention messages. The use of a professional athlete as a role model reduced both attrition rates and improved access to messages.

A larger sample size, plus requiring adolescents to read messages independent of parents should be required for future research. Athletes should be considered as role models for interventions with a social media component for adolescent weight loss programs.

Chapter 4: The Houston Texans TwEAT Healthy Program: Professional athletes' influence on adolescent health behaviors and weight status

Abstract

Background: Many professional sports organizations have created programs to address the epidemic of adolescent obesity. The Houston Texans TwEAT Healthy Program is the first program theoretically designed using professional athletes to improve the health and weight status of overweight and obese adolescents and compare their efficacy to registered dietitians as role models.

Methods: Overweight/obese adolescents (age 11-14) (n=30) randomly assigned to one of two groups in a pilot intervention were sent Twitter text/video messages for 12-weeks by either a professional athlete (Group 1, n=14) or a registered dietitian (RD) (Group 2, n=16). Anthropometrics, body fat percentage and diet/exercise behaviors were collected pre-/post-intervention to assess program success, and effect of different role models.

Results: Participants paired with an RD were significantly more likely to decrease body mass index z-score than those paired with an athlete, though the athlete group was significantly more likely to decrease sugar sweetened beverage consumption. Dietary intake decreased in both groups and exercise habits increased significantly in the RD group only.

Conclusions: Changes in body mass index z-score indicate overall success of the program delivered by both RD's and athletes. Future studies should include larger sample sizes to be able to detect small changes as significant.

THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM: PROFESSIONAL ATHLETES' INFLUENCE ON ADOLESCENT HEALTH BEHAVIORS AND WEIGHT STATUS

Introduction

The rate of obesity in adolescents (ages 12-18) has dramatically increased to 20.5% in recent years (2). Early onset obesity is associated with premature comorbidities, (13) such as advanced bone age, orthopedic complications (14,15), hyperlipidemia (14,16), glucose intolerance (17,18), Type II diabetes (19), hepatic steatosis (20,21), and metabolic syndrome (22). Many overweight/obese adolescents also experience negative self-image (24,25) and decreased quality of life (26,27).

In response to the rise in adolescent obesity, professional sports organizations have created programs to promote healthy weight (6,111). A recent survey conducted by the Henry J. Kaiser Family Foundation reported that adolescents identify with professional athletes and 73% of adolescents listed a professional athlete as someone they admire most (7). The National Football League (NFL) capitalized on child identification with professional athletes by creating the "NFL Play 60/Fuel Up to Play 60" program to encourage healthier eating and exercise habits (6). However, these programs are limited by lack of a theoretical basis and measurements to determine efficacy, implementation through school settings primarily and minimal contact between athletes and participants (6,111).

A recent study by Irwin et al (2010) improved upon some of the limitations of the NFL Play 60/Fuel Up to Play 60 program. In an effort to improve health knowledge and behaviors in children, Irwin collaborated with the Memphis Grizzlies, a National Basketball Association team, to create "Get Fit with the Grizzlies". Implemented in a school setting, this program demonstrated that the influence of a program developed by a

professional sports team is able to produce significant gains in health knowledge as measured by participants' self-reported eating and exercise behaviors. Limitations of this study included lack of a control group and outcome measures of changes in weight or body mass index (BMI) and delivery of the program by trained physical education teacher instead of Grizzlies athletes (111).

In order to improve upon the Irwin study limitations, the theoretically-based Houston Texans TwEAT Healthy program was developed to provide direct contact between professional athletes and overweight/obese adolescents in order to improve weight, nutrition, exercise, and BMI status. The objective was to conduct a pilot randomized controlled trial to determine if athletes (intervention group) were more effective in improving eating/exercise behaviors and promoting weight loss than a control group of traditional healthcare professionals. The hypothesis of this study was that a program delivered by professional athletes would be more effective at improving eating/exercise behaviors and weight status of overweight/obese adolescents than a program delivered by registered dietitians.

Methods

Recruitment

Overweight (>85th BMI-for-age percentile) and obese (>95th BMI-for-age percentile) adolescents were recruited from doctor's offices in Houston, Texas. Researchers pre-screened eligible participants from electronic medical records and informed families of the study. Interested families were directed to email researchers for further assessment of eligibility. Eligibility criteria included 1) age 11-14 years; 2) overweight or obese status; 3) current Internet access; and 4) the ability to read, write and

speak English. Exclusion criteria were: 1) serious illness as determined by physician; 2) co-morbidities that could interfere with the ability to participate in the study; 3) previous bariatric surgery; or 4) current pregnancy. Parents and adolescents were described the study in detail, including risks and benefits and were informed they could stop participating at any time with no consequence. Informed consent and assent were obtained from parents and adolescents, respectively, prior to enrollment.

Program Design

The Houston Texans TwEAT Healthy Program was a randomized controlled pilot trial to improve BMI status, waist circumference and percent body fat in overweight/obese adolescents. The complete study design is described in **Figure 3**. The study was approved by Institutional Review Boards at The University of Texas at Austin and Baylor College of Medicine.

Messaging and Theory

The program consisted of 12-weeks of Twitter messages sent to adolescents enrolled in the program by either registered dietitians or professional athletes. All messages and activities were based upon constructs from Social Cognitive Theory (9), written by registered dietitians, pilot tested in a group of adolescents aged 11-14 years, and delivered via the social media site, Twitter. Social Cognitive Theory focuses on the reciprocal determinism of personal, environmental and behavioral factors. Within this approach, individual and environmental factors are targeted in an attempt to modify behaviors. The personal factor "participant knowledge" was addressed by providing diet/exercise information in each message. Attitudes, beliefs, self-efficacy, motivation, and readiness to change, which are other personal factors, were influenced by environmental factors such

as positive role modeling, social support and messages of encouragement sent by mentors. Presence of these environmental factors may in turn promote a more positive, healthy environment overall for the adolescent, thereby encouraging behavioral modification.

Text versions of messages were sent three times per week and video messages were sent twice per week. All messages sent to intervention and control group adolescents were identical. Messages encouraged increased activity, intake of fruits, vegetables, and whole grains and decreased consumption of sugar sweetened beverages and sweets.

Anthropometrics

Baseline anthropometrics (height, weight and waist circumference) (125) and percent body fat (using air displacement plethysmography) (126) were collected at initial visit. From these data BMI z-scores were calculated.

Nutrition Assessment

Two components of nutrition were assessed for this study: dietary intake and food environment. Nutritional intake was assessed using the validated School Physical Activity and Nutrition (SPAN) questionnaire for grades four through eight (131). Data from 24-hour food frequency questions were utilized to estimate total calorie intake, servings of fruits, vegetables, sugar sweetened beverages, whole grains, and dairy as well as sodium and saturated fat. Standard serving sizes using the diabetic exchange system were established for each food item and were entered into SuperTracker software (133) to determine estimated intake for one day. Questions from the SPAN investigating home food environment were used to create a Healthy Eating Index (HEI) score. HEI questions assessed availability of 100% fruit juice, fresh fruit and vegetables in the home, vitamin/mineral supplementation, frequency of having a breakfast meal and preparing

meals at home, use of food labels to make nutrition decisions and whether or not healthy foods taste good. Examples of HEI questions can be found in **Table 4**. Questions about healthy eating habits (ordinal scale) were included with the most positive response ("Yes, all of the time") receiving the most points, and the least positive response ("Never") receiving the least points. Higher total values for HEI suggest a higher probability of healthy eating or positive home environment habits.

Exercise Assessment

At the baseline visit, adolescents were given a pedometer and log to wear for one week, prior to the start of the program. They were also provided a log to record number of steps per day. Once data had been collected, the average number of steps per day was calculated to compare changes in exercise behaviors pre/post program. SPAN questions were used to create an Exercise Index (EI) to further assess activity level; example questions can be found in **Table 5**. EI questions included frequency of being active >60 mins/day or >20 mins/day, performing strength activities or organized sport and amount of time spent in sedentary activities such as watching TV, using a computer or playing video games. For exercise questions, the more frequently an activity occurred (i.e. seven out of the past seven days), the more points it was awarded. Sedentary activity habits were scored inversely where the less frequently it occurred, the more points it was awarded. Overall positive changes in EI scores suggest an increase in physical activity and/or decrease in sedentary activity.

Statistical Analysis

SPSS 22.0 was used to conduct the data analysis. Chi-squared tests were performed to test equivalence of groups on demographics and independent t-tests were run to test

Table 4. Example of the SPAN[a] questions used to create the Healthy Eating Index

LAST WEEK, were the following available in your home?					
	(*Fill in one answer for each item*)	Yes, All Of The Time	Yes, Most Of The Time	Yes, Some Of The Time	Never
	a. 100% fruit juice (DO NOT COUNT punch, Kool Aid®, sports drinks, or other fruit flavored drinks)				
	b. Fresh fruit (DO NOT COUNT fruit juice)				
	c. Fresh vegetables (DO NOT COUNT canned or frozen vegetables)				

[a]School Physical Activity and Nutrition

Table 5. Example of the SPAN[a] questions used to create the Exercise Index

	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days
1. During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)								
2. On how many of the past 7 days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups or weight lifting?								

[a]School Physical Activity and Nutrition

equivalence on anthropometric values at baseline. A paired t-test was conducted to determine changes in HEI, EI, average number of steps and anthropometric data with significance set at p=0.10. A paired t-test, with significance set at p=0.10 was completed in order to directly compare the control group to the experimental group for each of the seven variables: servings of fruits, vegetables, sugar sweetened beverages, whole grains as well as sodium, saturated fat and total calories. A less conservative p-value was set for the study as it was a pilot program and contained a small sample size. The test of between-subjects effects was used to assess significant change in intake between the two groups. Pair-wise comparisons were used to detect chances in dietary intake that occurred in each individual group for each variable.

Results

Both groups were determined to be equivalent for demographics and anthropometrics at baseline. Baseline demographic data is presented in **Table 6**.

Anthropometrics

There was a significant difference between the two treatment groups in the average amount of BMI z-score change across time (-0.09 $\pm$ 0.029), $t(28)$= -2.99, p=0.006. The change in BMI z-score for the RD group significantly decreased from baseline to week 12 measurements (-0.08 $\pm$0.10 z-score units), $t(13)$= -3.25, p=0.006, and decreased in the athlete group as well, but not significantly (-0.003 $\pm$ 0.05 z-score units), $t(15)$= -0.19, p=0.85. Average changes in waist circumference did not significantly differ between groups (0.63$\pm$1.79cm), $t(28)$=0.36, p=0.78 and did slightly increase in both the RD group (0.68$\pm$6.93 cm), $t(13)$= -0.37, p=0.72 and athlete group (0.04$\pm$1.76 cm), $t(28)$=-0.09, p=0.92. Percent body fat of adolescents did not differ significantly between groups (-

Table 6. Demographic data of enrolled participants

	RD Group (n=14)		Athlete Group (n=16)
Age (mean + SD)	12.0 + 1.14		12.06 + 0.85
Gender (n(%))			
Male	11 (78.6)		11 (68.8)
Female	3 (21.4)		5 (31.3)
Ethnicity (n(%))			
African American	1 (7.1)		1 (6.3)
Biracial	1 (7.1)		1 (6.3)
Caucasian	5 (35.7)		6 (37.5)
Hispanic	7 (50.0)		8 (50.0)

0.59+0.66%), $t(28)= -0.90$, $p=0.38$. It increased slightly, but not significantly, in adolescents in the RD group (0.04±2.18%), $t(13)= -0.06$, $p=0.95$, and significantly in those paired with an athlete (0.63±1.37%), $t(15)= -1.83$, $p=0.09$.

Dietary Behaviors

Detailed changes in dietary data from the SPAN can be found in **Table 7**. Differences in consumption of SSB between groups was significant with adolescents in the athlete group being more likely to decrease SSB than those in the RD group (1.32+070), t(27)=1.82, $p=0.08$.Adolescents paired with an athlete decreased servings of fruits, vegetables, sugared sweetened beverages (SSB), whole grains, total calories, and sodium with only the decrease in SSB being significant ($p=0.10$). Intake of saturated fat increased. Adolescents paired with a registered dietitian decreased intake of fruit, vegetables, whole grains, calories, sodium and saturated fat while increasing intake of SSB. Healthy eating index scores did not differ significantly by group (-2.48+1.93), $t(28)=-1.29$, $p=0.21$, but HEI scores decreased in both groups with a significant decrease in the RD group (-2.86+5.80), $t(13)=1.84$, $p=0.09$, not the athlete group (-0.38+4.76), $t(15)=0.31$, $p=0.76$.

Exercise Behaviors

Differences in average number of daily steps did not differ between groups significantly (825±1451), $t(20)=0.57$, $p=0.58$. Within groups, average number of daily steps increased in adolescents paired with a registered dietitian (645±2259), $t(10)=-0.95$, $p=0.37$ while they decreased in adolescents paired with an athlete (-179±4250), $t(9)=1.35$, $p=0.21$. Exercise index scores did not differ significantly between groups (2.34±2.54), $t(28)=0.92$, $p=0.37$. Scores did significantly improve in the RD group (4.71±5.21), $t(13)=-$

Table 7. Changes in dietary consumption within groups

Treatment Group	Variable	Mean Change	Standard Deviation	Significance (2-tailed)
Athlete	Fruit (servings)	-0.44	1.36	0.22
	Vegetable (servings)	-0.44	2.00	0.4
	SSB[a] (servings)	-0.94	2.14	0.10*
	WG[b] (servings)	-0.06	0.10	0.81
	Calories	-402.31	1091.95	0.16
	Sodium (mg)	-358.25	1382.59	0.32
	Saturated Fat (g)	1.13	5.29	0.41
RD	Fruit (servings)	-0.31	1.11	0.34
	Vegetable (servings)	-0.08	2.93	0.93
	SSB[a] (servings)	0.38	1.66	0.42
	WG[b] (servings)	-0.08	1.04	0.79
	Calories	-652.69	1712.19	0.19
	Sodium (mg)	-840.69	2321.64	0.22
	Saturated Fat (g)	-0.23	7.81	0.92
	[a]Sugar sweetened beverages			
	[b]Whole grains			
	*Indicates a significant value			

3.39, p=0.005, and also improved in the athlete group (2.38±8.17), $t(15)$=-1.16, p=0.26 but not significantly.

Discussion

Findings from this study partially supported our hypothesis that a program delivered by athletes would be more effective at changing diet/exercise behaviors and weight status than RD's. While they were more effective at changing consumption of SSB, a significant calorie contributor to adolescent's diets, they were less effective at ultimately decreasing BMI z-score. RD's appeared to decrease BMI z-score by increasing activity level or decreasing sedentary activities whereas athletes were less effective in this area. Due to the short duration of this pilot study, the decrease in SSB seen in the athlete group may not have had the chance to decrease BMI z-score without a subsequent significant increase in exercise as well.

Adolescents paired with a registered dietitian significantly decreased their BMI z-score over the 12-week program even though both waist circumference and percent body fat increased. The adolescents in the professional athlete group decreased their BMI z-score slightly but not significantly while their waist circumference increased and percent body fat increased significantly. During the ages of 11-14, both male and female adolescents experience an expected increase in percent body fat (49). Data from the Fels Longitudinal study indicated that girls may experience a significantly larger increase in BMI than males around age 12-13. In a mixed weight population of adolescents, BMI increases can generally be attributed to gains in lean mass until late adolescence where changes in BMI are more attributed to total body fat (134). The Fels Longitudinal study did not specifically examine changes in overweight/obese adolescence. Overweight and obese adolescents tend to enter puberty at an earlier age (135) and therefore, the increases in body fat may be

reflective of having a mixed gender population as well as more advanced pubertal status than would be expected in a normal weight population. The decrease in BMI z-score in both groups in place of increases indicated success of the program with registered dietitians and professional athletes with slightly improved results when paired with a registered dietitian.

Overall diet quality decreased in each group according to the healthy eating index but there were some positive effects of the program on diet quality. Both groups decreased intake of most nutrient categories. This could be due to the fact that adolescents were attempting to decrease total intake and therefore, all dietary intake decreased. Even though total caloric decrease in both groups was not statistically significant, it poses some real world significance. A decrease of caloric intake by 402 calories/day in the athlete group and 652 calories/day in the RD group could result in approximately one pound of weight loss per week. The healthy eating index included questions related to food environment in the house which may not have improved even though individual eating habits did. Professional athletes as role models were significantly more likely than dietitians to decrease SSB consumption in adolescents. This is a very important finding as 16% of adolescents are considered heavy SSB consumers (≥500 kcal/day) and heavy sports drink consumption continues to increase specifically in this population (136).

Exercise habits according to the exercise index increased in both groups, however, it was only a significant increase in the RD group. Many questions in the exercise index ask about frequency of exercise and therefore, it appears overall adolescents in both groups were active more frequently after the program than before. However, pedometer data indicated the adolescents were more inactive following the program. The decrease in BMI z-score for both groups may indicate a caloric deficit was created in both groups, which

may have been more attributable to changes in exercise behaviors than dietary behaviors, especially in the RD group.

One major limitation to this study was small sample size. This limited the ability to detect small differences as significant. Another limitation was that adolescents were instructed to remove pedometers for the safety of the device and themselves during contact sports (i.e. Organized football or basketball practice) and therefore activity may have been underreported.

Overall, it appears that healthcare professionals may be more effective at improving, diet, exercise and physical outcomes in an obesity prevention program than professional athletes. One reason may be that the healthcare professional is seen as an expert in the field and therefore, adolescents are more willing to accept suggestions from a person of authority in that area. Adolescents paired with a professional athlete may have a disconnect between where they view their health status versus the athlete's health status believing that becoming like a professional athlete may be an unattainable goal. Future studies should include a larger sample size and consider utilizing one gender and ethnicity to more accurately interpret changes in body composition and weight status.

Chapter 5: The effect of professional athletes as role models on psychosocial mediators of behavioral change in adolescents enrolled in an obesity prevention program

Abstract

Introduction: In 2011-2012, 20.5% of adolescents (age 12-19) were obese. Role models can positively influence adolescent behaviors. Professional athletes are consistently named as role models in this age group but are underutilized in the fight against adolescent obesity. There is limited research examining the effect of professional athletes as role models for adolescents and their influence on obesogenic behaviors and their psychosocial mediators in an obesity prevention program.

Methods: The intervention consisted of 12-weeks of electronic messages sent via Twitter in either text (3x/week) or video form (2x/week). Identical messages developed upon Social Cognitive Theory constructs, which focused on healthy eating habits and exercise, were sent to adolescents either by a professional athlete or a registered dietitian. Given the short duration and low intensity of the program, outcomes of interest were limited to psychosocial precursors of change in diet and physical activity. Adolescents completed questionnaires investigating motivation, self-efficacy and stages of change pre- and post-intervention to assess potential intervention related changes.

Results: Adolescents paired with a registered dietitian were significantly more likely to progress through stages of change for physical activity than those with an athlete. Over time, the adolescents paired with a registered dietitian significantly increased motivation to eat a healthy breakfast, eat healthy foods and overall make healthier choices. The athlete group significantly increased motivation to eat healthy food, consume healthy drinks and overall make healthier choices over time.

Conclusions: While professional athletes may be successful at increasing motivation to eat healthy, they were not able to significantly affect self-efficacy and stages of change, unlike RD's. Limitations to study design may have prevented complete investigation into the role that an individual mentor plays at affecting psychosocial factors and ultimately behavioral change. Larger, more longitudinal studies using professional athletes should further investigate role models and their effect on psychosocial variables during obesity interventions.

THE EFFECT OF PROFESSIONAL ATHLETES AS ROLE MODELS ON PSYCHOSOCIAL MEDIATORS OF BEHAVIORAL CHANGE IN ADOLESCENTS ENROLLED IN AN OBESITY PREVENTION PROGRAM

Introduction

Approximately 14% of adolescents ages 12-19 met the adult definition of obesity ($\geq$30 kg/m^2 body mass index score) in 2011-2012 (2). In the same year, 20.5% of adolescents in the same age range were categorized as obese and 34.5% as overweight or obese by CDC growth chart standards (2, 137). Adolescents exhibit high levels of sedentary activities with 65% not meeting recommended levels of physical activity and 35% watching more than three hours of television on a typical school day (32). Additionally, they consume increased amounts of fat, sugar, salt and inadequate servings of fruits, vegetables and whole grains (138). Dietary patterns developed in adolescence are typically maintained through adulthood (139) and therefore, it may be an ideal time for interventions to establish healthier habits.

Behavior change is mediated through psychosocial variables; such change is necessary but not sufficient to produce behavioral modification (9-11). The Social Cognitive Theory emphasizes the reciprocal determinism of personal, socio-environmental and behavioral factors and how they influence action and behavior (9). Self-efficacy is highlighted as a determinant of behavior described by this theory (140). It is defined as an individual's confidence in ability to perform an action under certain circumstances and when faced with potential obstacles or barriers (141-142). This theory suggests the ability to perform a task or behavior is determined by an individuals' confidence to do so (1,141). This affects motivation to complete a task because individuals are more motivated to attempt and complete a task when they believe they are proficient (143).

In addition to adequate self-efficacy and motivation, an individual must be ready to make a behavior change. The Transtheoretical Model describes five stages of change: precontemplation, contemplation, preparation, action, maintenance (129,144). Without intervention, individuals will remain in early stages of change as there is no intrinsic motivation to progress through these stages (129,144). Creating obesity interventions grounded in the Transtheoretical Model have been shown to be effective at positively changing eating and exercise habits for individuals who can progress to the action/maintenance stage (145). Those who progress to the action/maintenance stage are also two and a half to five times more likely to progress positively on another health behavior as well (145). Therefore, examining readiness to change is important to predict behavioral modification during weight loss interventions.

Role models are another influential factor in shaping lifestyle choices, especially during adolescence, a transitory period where lifestyle choices and patterns of behavior are established and carried into adulthood (5). It is generally accepted that role models can

influence adolescent behaviors, but the relationship between mentorship and health behaviors has not been examined in depth (146). The presence of a role model can influence positive behaviors in adolescents but often the type of role model is the best predictor of behavioral outcomes (8). There are few investigations exploring the influence of role modeling on weight loss, healthy eating and exercise habits (8), and even fewer examining changes in psychosocial variables resulting from exposure to role models. Adolescents consistently identify professional athletes as role models (7), but the ability of professional athletes to influence self-efficacy, motivation and stages of change during a diet and exercise intervention has yet to be examined.

The Houston Texans TwEAT Healthy Program was developed to explore the relationship between professional athletes as role models and their ability to influence diet and exercise behaviors in comparison to traditional health care providers (registered dietitians (RD)). In addition, the program intended to examine how professional athletes influence psychosocial variables that are influential to behavioral change: motivation, self-efficacy and stages of change. The objective of this study was to compare the ability to professional athletes to affect motivation, self-efficacy and stages of change as role models in a weight loss intervention in comparison to RD's. The hypothesis was that due to high adolescent identification to professional athletes, these public figures would be more effective at positively changing self-efficacy and motivation as well as the progression through stages of change for healthy eating and exercise in comparison to RD's.

Methods

Adolescents were eligible to enroll in the study if they met the following criteria: 1) age 11-14 years; 2) overweight or obese status ($\geq 85^{th}$ BMI-for-age percentile); 3) current Internet access; and 4) the ability to read, write and speak English. Investigators reviewed

electronic medical records to identify eligible participants with visits to physicians' offices and families were approached with a flyer containing the study email address alerting adolescents and their parents of eligibility. If interested, families would contact investigators and in-person appointments were scheduled. Upon first visit, parents and adolescents were described the study in detail including risks and rewards and were informed they could discontinue participation of the program at any time without any negative consequences. Parental consent and adolescent assent were obtained in the first visit prior to enrollment. Study design and consent procedures were approved through Baylor College of Medicine and The University of Texas at Austin Institutional Review Boards.

Intervention Design

Following consent, participants were assessed for baseline anthropometrics (height, weight, waist circumference) (125), and percent body fat via air displacement plethysmography (126). Additionally, adolescents completed questionnaires examining motivation to be healthy (127), self-efficacy to not overeat (128), and stages of change (129,130). After initial data was collected, adolescents were randomized by block randomization techniques (124) and were either paired with a professional football athlete or an RD as a role model. A week following enrollment and baseline measurements, the intervention began. The intervention consisted of 12-weeks of electronic messages sent via Twitter in either text (3x/week) or video form (2x/week). Identical messages developed upon Social Cognitive Theory constructs (9) were sent to all adolescents, which focused on healthy eating habits and exercise. Following 12-weeks of messaging and interaction with their mentor, adolescents returned for follow up measurements, which were identical to those done during the baseline visit.

Assessment of Motivation, Self-Efficacy and Stages of Change

Motivation (128), self-efficacy (127) and stages of change (129,130) were all assessed via questionnaire. The motivation questionnaire (Motivators of and Barriers to Health-Smart Behaviors Inventory) (128) asked questions exploring motivations to eat healthy and exercise with a Likert scale rating system on a scale of one ("I strongly disagree") to four ("I strongly agree"). All positive questions (i.e., "I want to lose weight and think being active will help") were assigned the numerical score chosen by the adolescent. Negative questions (i.e., "I feel lazy and watching TV is the only thing I want to do") were scored inversely. Average motivation scores were calculated for subsets of the questionnaire (motivation to eat a healthy breakfast, to eat healthy foods, to consume healthy drinks, and to be physically active) as well as an overall average motivation score. Consequently, higher scores indicate higher levels of motivation to eat healthy and exercise. Self-efficacy questions from the Weight Efficacy Lifestyle Questionnaire (127) measured how confident adolescents were that they could resist eating during specific situations and reported it on a scale from 0 ("Not confident at all that you can resist the desire to eat") to 9 ("Very confident that you can resist the desire to eat"). Scores were averaged per participant and therefore, higher average self-efficacy scores indicated higher self-efficacy to resist the desire to eat across multiple scenarios. To measure stages of change, adolescents chose one statement that reflected each stage of change and that best described how they felt about physical activity and eating healthy. "Pre-contemplation" choices ("I currently do not engage in physical activity and I am not thinking about starting") were given a value of zero, and "maintenance" choices ("I currently do engage in regular physical activity and I have done so for longer than 6 months") were given a value of four. Higher scores reflected more progressed stages of change. Baseline and post

interventions scores were compared to determine changes in psychosocial variables following intervention completion.

Statistical Analysis

SPSS 22.0 was utilized to conduct data analysis. Chi-squared tests were performed in order to test equivalence of baseline demographics across treatment groups (**Table 8**). In order to highlight significant differences in changes of psychosocial variables between treatment group, independent t-tests were conducted. Since this was a pilot study with a small sample size, a liberal significance threshold of $\alpha = 0.10$ was utilized, in order to limit the possibility of Type 2 errors. Within group changes were explored using a paired-samples t-test to compare pre- and post-intervention data. The same significance threshold value was established for within groups analysis.

Results

Baseline Characteristics

Results from Chi-squared analyses indicate all baseline characteristics were equivalent between athlete and RD groups, $p > .05$. Baseline psychosocial variables are described in **Table 9**.

Motivation and Self-Efficacy

Complete results of the motivation analysis can be found in **Table 10**. There was no indication of a treatment effect for changes in motivation or self-efficacy. The RD group and the athlete group did not significantly differ between groups in how those psychosocial variables changed across time. Within the adolescents paired with an RD, there were significant increases in motivation to eat a healthy breakfast (0.34±0.69), $t(13) = 1.85$, $p < .10$, to eat healthy foods (0.39±0.43), $t(13) = 3.36$, $p < .05$, and to overall make healthier

Table 8. Demographic data of enrolled participants

	RD Group (n=14)	Athlete Group (n=16)
Age (mean ± SD)	12.0 ± 1.14	12.06 ± 0.85
Gender (n(%))		
Male	11 (78.6)	11 (68.8)
Female	3 (21.4)	5 (31.3)
Ethnicity (n(%))		
African American	1 (7.1)	1 (6.3)
Biracial	1 (7.1)	1 (6.3)
Caucasian	5 (35.7)	6 (37.5)
Hispanic	7 (50.0)	8 (50.0)
Body Mass Index (mean ± SD)	31.10 ± 6.21	30.33 ± 4.40

Table 9. Baseline psychosocial values by treatment group

	RD		Athlete	
	Mean	Standard Deviation	Mean	Standard Deviation
Motivation				
To eat a healthy breakfast	2.25	0.44	2.49	0.46
To eat healthy food	2.53	0.35	2.51	0.40
To consume healthy drinks	2.68	0.35	2.63	0.35
To be physically active	2.56	0.30	2.51	0.22
Overall motivation to be healthy	2.51	0.26	2.53	0.31
Self-efficacy	6.80	0.61	6.51	1.84
Stages of change				
Physical activity	2.36	1.15	2.81	1.11
Eating healthy	2.36	0.84	2.75	1.00

Table 10. Changes in motivation pre- and post-intervention between and within groups

	Between Groups[a]					Registered Dietitian[b]					Athlete[b]			
	Mean	Standard Error	*t*	*df*		Mean	Standard Error	*t*	*df*		Mean	Standard Error	*t*	*df*
Eating a Healthy Breakfast	0.257	0.22	1.167	28		0.34	0.18	1.85**	13		0.08	0.13	0.63	15
Eating Healthy Foods	-0.04	0.18	-0.23	28		0.39	0.12	3.36*	13		0.43	0.13	3.19*	15
Consuming Healthy Drinks	-0.14	0.19	-0.737	28		0.1	0.14	0.67	13		0.24	0.13	1.87**	15
Being Physically Active	-0.017	0.1	-0.16	28		0.004	0.07	0.07	13		0.02	0.08	0.277	15
Overall Motivation	0.018	0.11	0.16	28		0.19	0.07	2.562*	13		0.17	0.08	2.03**	15
*p <.05														
**p<.10														
[a]Conducted via independent samples t-test														
[b]Conducted via paired samples t-test														

choices (0.19±0.28), $t(13) = 2.56$, $p < .05$. Adolescents paired with a professional athlete were significantly more likely to be motivated to eat healthy foods (0.43±0.54), $t(15) = 3.19$, $p < .05$, consume healthy drinks (0.24±0.51), $t(15) = 1.87$, $p < .10$, and to overall make healthier choices (0.17±0.34), $t(15) = 2.03$, $p < .10$. A graphical representation of changes within groups can be found in **Figure 6**. Differences between RD and athlete groups were not significant in self-efficacy scores to resist eating in certain situations (0.70±0.83 vs. 0.21±1.09), $t(28) = 1.35$, $p = .19$. Self-efficacy did significantly increase in the RD group over time (0.70±0.83), $t(13) = 3.15$, $p < .10$. These changes were not significant in the athlete group (0.21±1.09), $t(15) = 0.78$, $p = .45$.

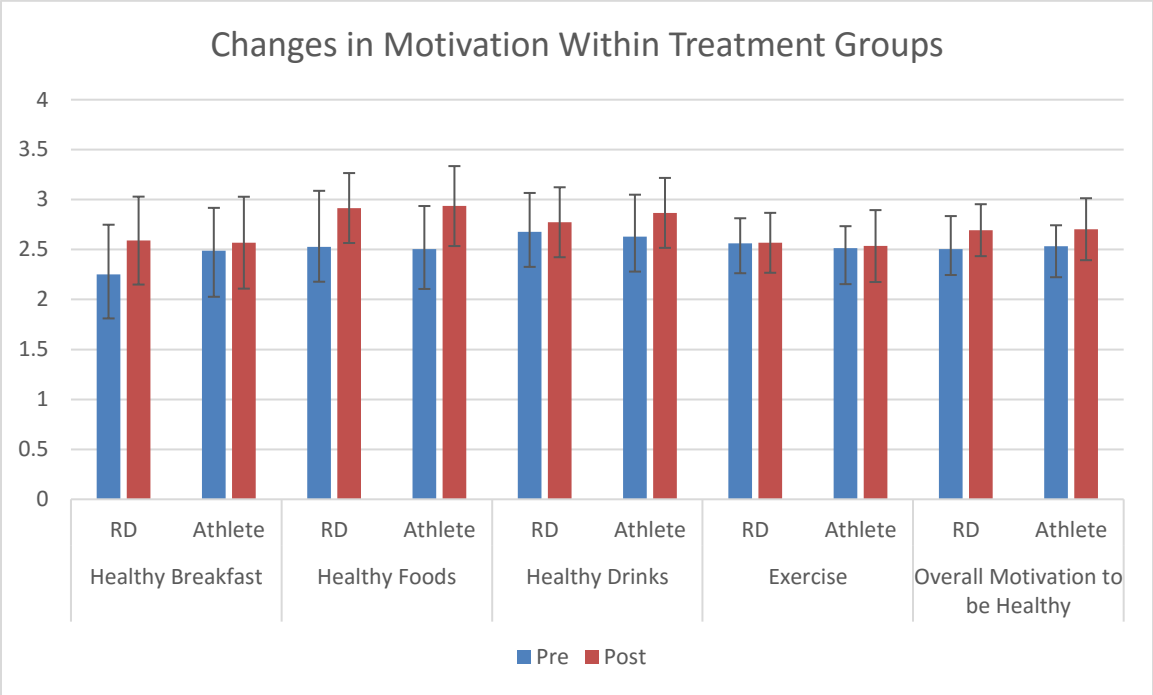
Stages of Change

Progression through the stages of change for physical activity demonstrated that adolescents paired with an RD were significantly more likely to advance through stages of change than those paired with a professional athlete (0.93±1.50 vs. -0.06±1.06), $t(28) = 2.12$, $p < .05$. There were no significant differences between groups for eating healthy (0.43±1.16 vs. 0.13±0.81), $t(28) = 0.84$, $p = 0.41$. Within groups, adolescents paired with an RD were significantly more likely to progress through stages of change for physical activity habits (0.93±1.50), $t(13) = 2.33$, $p < .05$, but significant changes were not seen for eating healthy. For those adolescents in the athlete group, there was not significant progression through stages of change for physical activity (-0.06±1.06), $t(15) = -0.24$, $p = .81$, or eating healthy (0.13±0.81), $t(15) = 0.62$, $p = .54$.

Conclusions

Changes in psychosocial variables such as motivation, self-efficacy and progression through stages of changes are necessary to implement and maintain behavioral

Figure 6. Changes in motivation pre-and post-intervention



change (9-11), and therefore must be examined during weight loss interventions. Subsets and overall motivational scores were significantly influenced by both mentors over the course of the intervention. RD's were able to significantly increase motivation to eat a healthy breakfast, eat healthy foods and overall make healthier choices, while athletes were able to significantly increase motivation to eat healthy foods, consume healthy drinks and make healthier choices. In previous unpublished analysis, it was found that adolescents paired with a professional athlete were significantly more likely to decreased their consumption of sugar sweetened beverages in comparison to those paired with an RD (1.32+070), $t(27)=1.82$, $p=0.08$. Perhaps that action was influenced by the significant increase in motivation to do so. Interestingly, neither mentor was able to increase motivation to be physically active. Children experience significant barriers to physical activity such as lack of time, personal barriers, as well as environmental barriers (147). However, overweight children, especially females, uniquely experience body-related concerns (i.e. being self-conscious of how body looks when exercising) as a significant barrier to exercise (147). Until changes in body shape/size are seen, this barrier may be seen as too difficult to overcome and therefore may decrease overall motivation to be physically active. Although no changes in motivation were seen to be physically active, both mentors appeared to be successful at changing motivation to eat healthy. Changes in motivation to eat healthy may be even more important than that of physical activity as changing diet alone over exercise alone has been demonstrated to result in more successful weight loss (148). Since there were not significant differences between groups in motivational change, both mentors should be considered effective at increasing motivation in overweight/obese adolescents to make positive dietary changes.

Significant changes in self-efficacy were noted in adolescents paired with an RD but not a professional athlete. Found in previous unpublished analysis, adolescents paired with a registered dietitian significantly decreased BMI z-score (-0.08 $\pm$0.10 z-score units), $t(13)= -3.25$, $p=0.006$ after the program, whereas those paired with an athlete did not exhibit a significant decrease in BMI z-score (-0.003 $\pm$ 0.05 z-score units), $t(15)= -0.19$, $p=0.85$. This may emphasize the importance of the combination of increased motivation, self-efficacy and stages of change to result in behavioral and ultimately weight status change. It may also demonstrate how the person delivering health promoting messages may affect psychological mediators and the resulting BMI z-score change. It may be that adolescents view a health professional as an expert and therefore they may not only motivate them to lose weight, but also might increase confidence in ability to do so as well.

It appeared that RD's were significantly more effective at progressing adolescents through stages of change than professional athletes and over time. Adolescents in the RD group on average moved from the pre-contemplation stage to the contemplation stage for physical activity while those paired with an athlete remained in the contemplation stage pre- and post-intervention. The fact that adolescents paired with a registered dietitian began at a lower stage of readiness may have affected the results. As previously mentioned, intervention is typically necessary to progress through more advanced stages of change and perhaps a 12-week intervention may not be enough time to see that progression regardless of mentor. Additionally, having an athlete deliver a message may have some negative consequences on physical activity. Adolescents could perceive the athlete's physical status as an unobtainable goal, which may be frustrating and therefore affect readiness and motivation to change physical activity patterns. Also, adolescents may have been intimated to interact with such a prominent figure, whereas an RD with no associated celebrity status

appeared more approachable. Neither mentor was effective at changing readiness to change for eating habits. The intervention, regardless of mentor, seemed to increase motivation to eat healthier but did not increase readiness to eat healthier. Motivation and self-efficacy are only two components of readiness to change (129) and therefore, only experiencing significant change in those facets may not have been enough to affect readiness to change. Due to the short nature of this pilot investigation, there may not have been enough time for adolescents to progress toward being ready to make changes even though they appeared to have the motivation.

Although this study showed promising results, it did not entirely support the preliminary hypothesis. It appeared that while professional athletes may be successful at increasing motivation to eat healthy within groups, they were not able to significantly affect self-efficacy and stages of change, unlike RD's. Limitations to study design may have prevented complete investigation into the role that an individual mentor plays at affecting psychosocial factors and ultimately behavioral change. The small sample size of this study limited the ability to complete a mediation analysis on psychosocial variables, behavioral change and weight outcomes. Additionally, this pilot study was only completed over 12-week period which may not be long enough to see substantial change.

Future studies should investigate not only the effect of role models on psychosocial variables, but also, how those directly affect behavioral change to determine 1) how different mentors affect psychosocial variables; 2) which changes in psychosocial variables are determinants of diet/exercise behaviors; and 3) how those changes ultimately result in successful weight loss. Studies should include a larger sample size and perhaps greater intervention length and intensity to better predict long term weight loss success in overweight/obese adolescents.

Chapter 6: Overall Conclusion

Conclusions

The purpose of this study was to develop a theoretically based obesity intervention program using professional athletes as role models to promote healthy eating/exercise habits to overweight/obese adolescents and to compare the efficacy of using public figures as role models over healthcare professionals. By following constructs of the Social Cognitive Theory, a program resulted that was based upon behavioral theory, used role models and technology that literature supports are relevant to adolescents, and resulted in behavioral and weight change. This was the first program of its kind to be developed, implemented and evaluated scientifically in detail by an independent academic institution in collaboration with a professional sports organization.

The aims of this research were to 1) assess the feasibility and acceptability of the THP in adolescents, parents and athletes; 2) determine the ability of the THP to modify diet/exercise behaviors as well as body weight/fat status in overweight/obese adolescents; and 3) to examine the effect of different role models on psychosocial variable in an online obesity prevention program.

Seventy-seven overweight/obese adolescents were recruited from doctor's office in Houston, Texas and 39 enrolled in the program. Thirty participants completed the entire 12-week social media intervention and provided complete datasets. Adolescents were measured for anthropometrics, dietary/exercise patterns and psychosocial variables and changes were compared pre- and post-intervention to determine within and between group effects.

Attrition rates were lower in subject paired with a professional athlete (21%) versus those paired with a registered dietitian (70%) (p=0.29) and were more likely to access the majority of intervention messages (64% vs 46%, p = 0.56), but not significantly. Acceptability of mentors was significantly improved when adolescents were paired with an athlete over a registered dietitian (80% vs.7%, $p < 0.001$).

Between groups, participants paired with an RD were significantly more likely to have a decreased body mass index z-score (-0.09 $\pm$ 0.029), $t(28)$= -2.99, p=0.006 than those paired with a professional athlete. Adolescents in the professional athlete group however, were significantly more likely to decrease SSB consumption (1.32+070), $t(27)$=1.82, p=0.08. Within groups, the registered dietitian group was successful at increasing exercise habits throughout the course of the intervention (4.71$\pm$5.21), $t(13)$=-3.39, p=0.005. Although exercise habits improved in the RD group, healthy eating index scores significantly decreased in that group (-2.86+5.80), $t(13)$=1.84, p=0.09.

It appeared that while professional athletes may be successful at increasing motivation to eat healthy over time, they were not able to significantly affect self-efficacy and stages of change, unlike RD's. The RD group significantly increased motivation to eat healthy foods (0.43±0.54), $t(15) = 3.19$, $p <.05$, consume healthy drinks (0.24±0.51), $t(15) = 1.87$, $p < .10$, and to overall make healthier choices (0.17±0.34), $t(15) = 2.03$, $p < .10$. This group also exhibited significant increases in self-efficacy over time (0.70±0.83), $t(13) = 3.15$, $p <.10$, as well as advancement through stages of change for physical activity (0.93±1.50), $t(13) = 2.33$, $p < .05$.The athlete group significantly increased motivation to eat healthy foods (0.43±0.54), $t(15) = 3.19$, $p <.05$, consume healthy drinks (0.24±0.51), $t(15) = 1.87$, $p < .10$, and to overall make healthier choices (0.17±0.34), $t(15) = 2.03$, $p < .10$, but they did not demonstrate significant changes in self-efficacy or stages of change.

Overall, the RD's were more effective at progression through stages of change for physical activity over the athlete group (0.93±1.50 vs. -0.06±1.06), $t(28) = 2.12$, $p < .05$.

There are several future research needs established from the creation and analysis of efficacy of this program. The small sample size limited differences between groups and within groups to be significant, therefore, a larger full-scale study should be formulated building off the structure of the established pilot study to further examine results in a larger sample. Additionally, it should be considered using a single sex population to elucidate body composition changes controlling for pubertal stage to determine whether changes are attributable to normal pubertal stages or as a result of the intervention. The study could be strengthened by the addition of more in depth dietary analysis instead of doing a cross-sectional examination of dietary habits. This study did not include any parental involvement to elucidate the role solely of the mentors, however, parents are still a large influence at this point in adolescents (8). It should be explored if adding a parental component to this program could strengthen results. Most social media derived interventions include some in-person involvement (58) and although it may increase subject burden, it may strengthen the bond between professional athletes, a limited entity to the public, and the child involved in the research. Lastly, interventions using professional athletes as role models should examine barriers in detail prior to execution to determine ways to overcome those to create a successful curriculum.

Overall it appears that using professional athletes as role models may improve acceptability of an obesity intervention, however, RD's are more effective at changing psychosocial mediators and ultimately weight status throughout an obesity intervention. Even though adolescents identify with athletes, they may present barriers for successful

weight loss. Their representation of a physically active lifestyle and physical status may be seen as an unobtainable goal. Additionally, celebrity status may inhibit an adolescent from interacting as they could be seen as intimidating. The use of an RD did not present any negative comments regarding interventions likes/dislikes and were more effective at eliciting changes in weight status and mediators affecting it. Utilizing role models who may be perceived as experts in the field of healthy eating and weight loss appear to be more effective mentors than utilizing public figures that solely represent that lifestyle.

Appendix

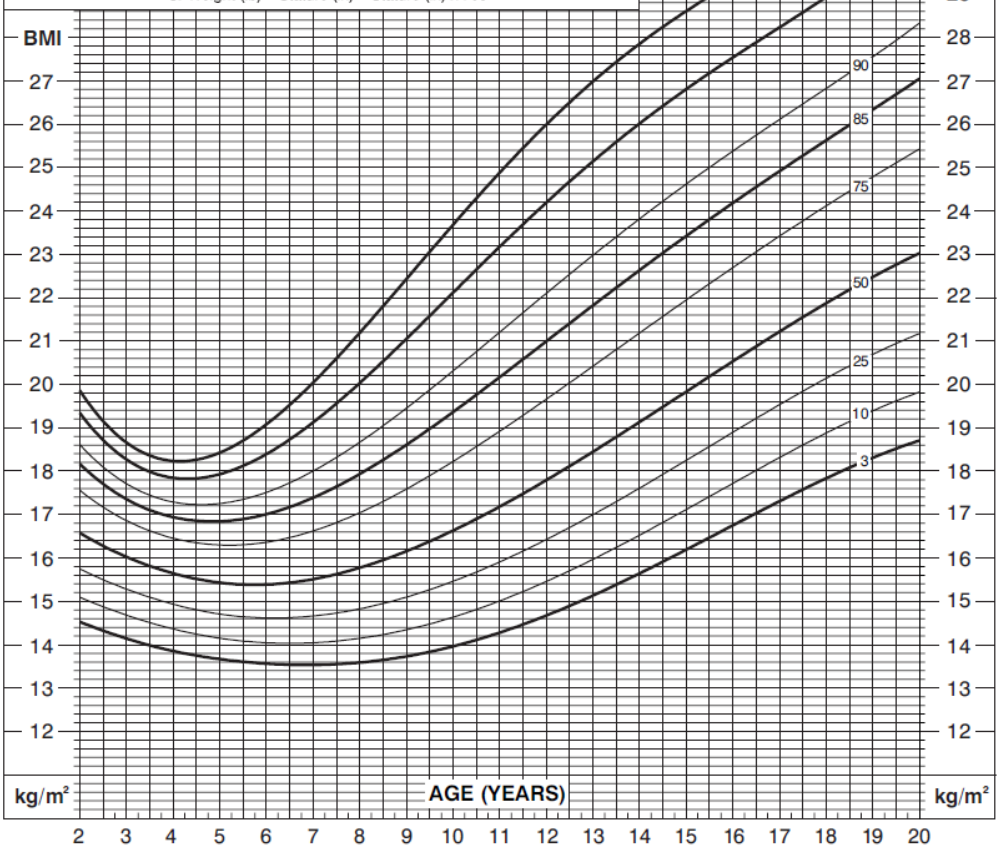
2 to 20 years: Boys
Body mass index-for-age percentiles

NAME _____

RECORD # _____

Date	Age	Weight	Stature	BMI*	Comments

***To Calculate BMI**: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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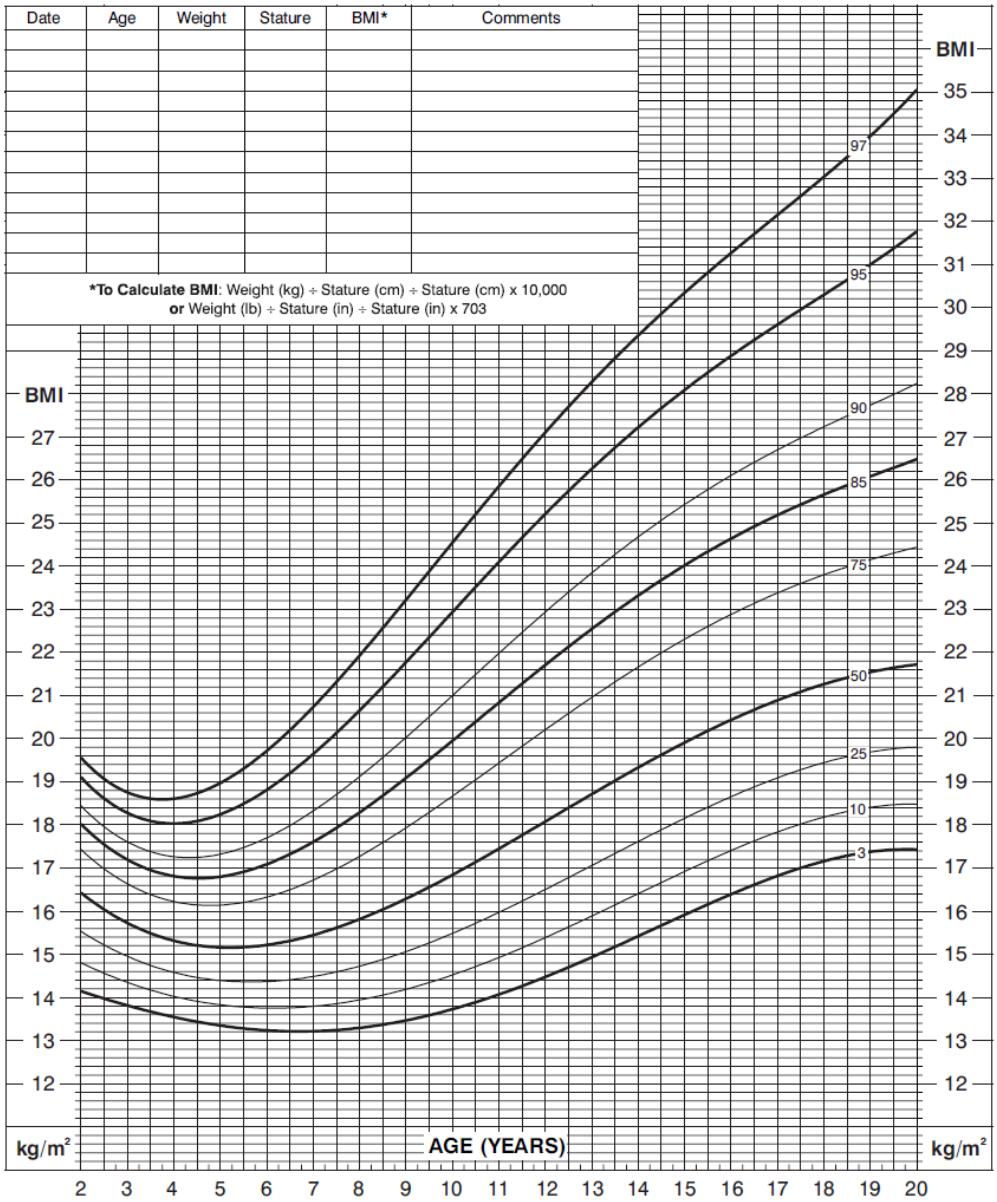
2 to 20 years: Girls
Body mass index-for-age percentiles

NAME _____

RECORD # _____

Date	Age	Weight	Stature	BMI*	Comments

***To Calculate BMI**: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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Anthropometric Measurements

Adolescents will be measured for weight by an electronic scale (Tanita, Arlington, IL) to the nearest 0.01 kg; for height by stadiometer (Holtain Limited, Britain) to the nearest 0.1cm; and for waist circumference (Rudolf07), with participants erect and barefoot. BMI (kg/m2) will be calculated and classified.

Weight: Two digital scales (Tanita, Arlington, IL) will be set up in a private room. Subjects will remove their shoes and stand on the digital scale. The screen displaying the weight of the participant is portable and will only be visible by the research assistant. Weights will be displayed to participants upon request. All weights will be recorded on the subject information sheet in kilograms to the nearest 0.01kg. The scale will be calibrated prior to measurements being performed.

Height: Two stadiometers (Holtain Limited, Britain) will be assembled near the digital scales. Following the weight measurement, the participants will keep their shoes off and be taken to the stadiometers. Subjects will place the back of their heels against the stadiometer. Research assistants will ensure the subject's heels, buttocks, scapulae and head are all in contact with the stadiomter. The adolescents head will be placed in a Frankfurt plane orientation and the headboard will be gently lowered onto their head. The Frankfurt plane is when the eyes and ear canal are placed in a horizontal line that falls parallel to the floor. Subjects will be instructed to take a deep breath, hold it and hold that position. The headboard will be secured and the research assistant will read the height to the nearest 0.1cm and record it on the participant's information sheet. The subject will then be instructed to exhale. The headboard will be loosened and the participant will be asked to step away from the stadiometer. If a subject has a hair style that might interfere with the accuracy of the recording (and can not be removed), the excess length added by the hair style will be measured by a ruler and subtracted from the total height.

Waist Circumference: Waist circumference has been shown to be a valid technique for predicting cardiometabolic risk factors in adolescents (Katzmarzyk04). It can be very useful in a clinical setting as it is a non-invasive way to assess risk (Katzmarzyk04). Cut-off points have been established at $\geq$ 80.5 cm for males and $\geq$81cm for females as being associated with increased

risk of cardiovascular disease (Taylor11). These cut-off points were established at Texas Children's Hospital and will be used to quantify disease risk.

In dealing with only obese subjects, locating the iliac crest can be extremely difficult and uncomfortable for the subject. Therefore, waist circumference will be measured at the umbilicus. The subject will be instructed to gather their shirt above their waist and cross their arms across their body. Research assistants will describe all processes prior to performing them. The umbilicus will be located and the measuring tape will be extended around the waist. A second research assistant will assist to ensure the measuring tape stays in a horizontal position parallel to the floor. The tape will fit snug but will not compress the skin. The zero end of the measurement tape will always be placed below the section of tape containing the measurement value and the waist circumference will be recorded to the nearest 0.1cm.

Air Displacement Plethysmography (Bod Pod)

Percent body fat and lean mass will be calculated from participant mass and volume, as determined by the BOD POD® body composition tracking system (Life Measurement System, Concord, CA). These are based on theoretical constructs of Dempster and Aitkens (1995) and methods of Ginde et al. (2005). The empty chamber will be calibrated using a 50.313 liter cylinder. The subject will then be seated inside the sealed chamber and variations in pressure and volume will estimate density. Body composition will be determined using the Lohman equation (Fields04). Then, thoracic gas volume will be estimated using an equation appropriate for adolescents (Fields94).

Pedometers

Subjects will wear pedometers/ accelerometers (New-Lifestyles Model NL-1000) for 7 days at week at week 1, 12 and 24. This pedometer/accelerometer has a 7-day memory function and can determine the number of minutes in moderate to vigorous activity. Total number of completed pedometer sheets will be tallied and used as a method to estimate physical activity. In addition, subjects will be asked to bring in their pedometer to each visit for corroboration of the data sheets with the pedometer memory function. The lack of physical activity is seen as a contributor to the obesity epidemic seen in pediatrics. Assessing, promoting and prescribing changes in physical activity can be viewed as key element in preventing pediatric obesity. Pedometers represent a simple tool to assess current activity patterns and prescribing graduated changes in activity. There is not universal agreement on the relationship on the number of steps needed by adolescents to promote an increase in fitness and data suggests that 15,000 steps in boys and 12,000 steps in girls is a normal and expected amount for

normal weight youth (62). However, for the overweight adolescent the use of an appropriate pedometer is an essential element in tracking activity. A piezoelectric pedometer (accelerometer) provides an accurate assessment of the number of steps achieved for overweight youth and the minutes in moderate to vigorous physical activity.

School Physical Activity and Nutrition (SPAN) Questionnaire

A 91-item questionnaire developed by Hoelscher et al (2003) (1) and validated by comparison to 24-hour recalls ($0.32 < r < 0.68$) will be used to assess changes in diet and physical activity patterns, as well as nutrition knowledge, attitudes and beliefs (1). Reproducibility evaluated using a test-retest design indicated agreement regarding food intake was 70%-98% with K statistics between 0.54 and 0.93. Physical activity questions as well as weight loss and food selection behaviors had good agreement (66%-89%) where as nutrition knowledge questions had agreements of 50%-87%, K statistics of 0.27-0.52 and correlations of 0.33-0.63 (1). This questionnaire includes a 24-hr recall, food and exercise frequency questionnaire, as well as questions regarding nutrition knowledge, attitudes, and beliefs, parental involvement, risk taking behaviors, and social support.

The Motivators of and Barriers to Health-Smart Behaviors Inventory

The original Motivators of and Barriers to Health-Smart Behaviors Inventory has been modified for use in youth (The Youth Form of the Motivators of and Barriers to Health-Smart Behaviors Inventory). It has been validated in a group of 9-15 year olds who represented both genders and different ethnicities. This questionnaire demonstrates reliability (Cronbach's alpha range .78-.93) as well as convergent, discriminant and concurrent validity.

The Weight Efficacy Lifestyle (WEL) Questionnaire

The WEL questionnaire is acceptable method of assessing self-efficacy in obese individuals that demonstrates good psychometric properties and is sensitive to changes due to treatment. The WEL questionnaire demonstrated good convergent validity with the Eating Self-Efficacy Scale. The 20-item questionnaire includes constructs of negative emotions, availability, social pressure, physical discomfort and positive activities. The questionnaire asks questions about how confident one is in performing different activities in the five constructs previously mentioned. This questionnaire is used in practice at Texas Children's Hospital in a population similar in age, ethnicity and gender to the population used in this study.

Stages of Change Assessment

The Stages of Change as derived from the Transtheorhetical Model indicating that there are five different stages that one must go through to make a sustainable change in behavior. This will be assessed by asking the participants one question to identify each stage. The statements are as follows for each stage

1) Precontemplation: “I currently do not engage in physical activity and I am not thinking about starting”
2) Contemplation: “I currently do not engage in physical activity but I am thinking about starting”
3) Preparation: “I currently do engage in some physical activity but not on a regular basis”
4) Action: “I currently do engage in regular physical activity but I have only begun to do so within the last 6 months”
5) Maintenance: “I currently do engage in regular physical activity and I have done so for longer than 6 months”

These questions will also be adapted to reflect dietary habits replacing “physical activity” with “eating healthy”. This type of adaptation has been shown effective as many of the current questionnaires were adapted this way from the original Stages of Change Questionnaire developed to assess stages of change in smokers enrolled in a smoking cessation program (Prochaska83,Courneya95, Nigg98).

Potential Benefits for the Texans

1) This is the ONLY initiative EVER to apply a validated program that has empirical evidence to back it up, a theoretical backbone, and evaluation component created by a research institution

2) It will show the Texans are committed to the health of their community and will provide data to prove their success

3) It will be an initiative that the Texans can present to the NFL Play 60/Fuel Up to Play 60 as THEIR initiative

4) Houston is one of the fattest cities in America and so to be in this city and to be an organization that stands for health and exercise

5) Positive media and press surrounding the intervention; national press

6) Coaches will like this intervention: players put in good community service hours but it does not require a lot of time away from the team

7) This could be an initiative presented to not only the league but to other professional sports teams as well

8) It could actually make an IMPACT on the community and really augment the fight against childhood obesity

9) It could provide sponsorship opportunity (i.e. The Houston Texans TwEAT Healthy Program presented by Methodist)

10) Once you get past start up and evaluation costs, this program will essentially be free in the years to come (low cost, high reward)

The Houston Texans TwEAT Healthy Program

Preventing Adolescent Obesity Using Professional Athletes as Role Models

Background

- Houston is one of the fattest cities in America
  - 1/3 of Houston's children are overweight or obese
- The Texans have shown their commitment to improving the health of this city
  - The Houston Texans YMCA
  - Gatorade camps in schools
  - Toro's Training Table
- The Texans players can influence large populations due to their popularity and the fact that they are seen as a representation of a physically fit lifestyle
  - The city is in love with this team right now so how can we create the largest impact following this momentum?

The Houston Texans TwEAT Healthy Program

- 12-week program pairing overweight adolescents with a healthy role model
  - The role model will encourage a healthy lifestyle through a kick off event as well as Twitter and video messages
- Adolescents will be measured before and after the program to assess the effectiveness of the initiative

What will be asked of the players?

- Attend at least 1 hour of the kick-off event
- Autograph memorabilia
- Send out Twitter messages (3x/wk) for 12 weeks
- Record video messages (approximately $\leq$ 1 hour)

Why would this be beneficial to the Texans?

- Propose this as a Texans initiated program to be added to the Fuel Up to Play 60 initiative
- This is the ONLY initiative EVER to apply a scientifically validated program with empirical evidence to back it up with an evaluation component
  - The Texans would be the only sports team in America with a program like this
- It will increase the Texans image of being committed to the health of their community and will produce data to actually back that up

Why would this be beneficial to the Texans?

- Positive media and press
  - Academic publications
- Coaches will like this intervention: players put in community service but it won't interfere with their football schedule
- It is sustainable and aside from start up costs, completely free (low cost, high reward)
- It could provide sponsorship opportunities (ie. The Houston Texans TwEAT Healthy Program sponsored by Methodist)

What kind of resources will be needed?

- Kick-off event
  - Use of the Methodist Training Center for 1 hour
  - Use of the team cafeteria (1 hour) and locker room (30 mins)
  - Lunch for 40 participants, 2 parents each, staff and players (135 people)
- In kind support
  - Tickets (24 total) to a preseason/regular season game
  - 24 autographed pictures
  - Logo creation
- Pedometers
  - 100 pedometers

Focus Group Twitter Messages

Try to get 60 mins of exercise/day and wear your pedometers this week! I'm running with (another player) for my 60mins! #TwEAThealthy

A can of soda has ~140 calories! Drinking only 3 less sodas a week can equal 1 lb of weight loss per week! #TwEAThealthy

Experts recommend ½-2 lbs per week. What is your realistic weight loss goal for these 12 weeks?#TwEAThealthy

Substitute 1 hr of TV or computer use for something active this week! Instead of watching TV, I'm shooting hoops with (player)#TwEAT Healthy

Have you seen the new My Plate at choosemyplate.gov? ½ of your plate should be fruits and veggies. Here's mine (link)! #TwEAThealthy

Try to write down everything you eat for 3 days. It's a great way to watch what you eat and can really help with weight loss! #TwEAThealthy

Sports drinks are only needed after 60 minutes of hard exercise and have 125 calories per bottle. They should not be a water substitute! Remember your 60 minutes a day! #TwEAThealthy

Sports drinks aren't a water substitute and have 125 calories! That can add up! Drink water instead and get your 60 mins! #TwEATHealthy

This week try replacing 1 white bread product for a whole grain version. Look for 100% whole grain logos: (show picture) #TwEAThealthy

Reminding yourself you CAN do this is a great way to achieve your goals. How do you celebrate when you do well? #TwEAThealthy

The more muscle you build, the more calories you will burn everyday! How do YOU build muscle? Get your 60 mins! #TwEAThealthy

Do you think you could substitute grilled or baked items for fried ones? Who can give me an example of what they would try? #TwEAThealthy

Go to the grocery store with your parents this weekend and pick out fruits and vegetables that you would like to eat. Just having them around will help you eat more of them! #TwEAThealthy

Just having fruits/veggies around the house will help u eat more of them.Go pick out ones u like at the grocery store this week#TweatHealthy

Exercise is a great way to reduce stress! If things are bothering you, take a walk! Remember 60 minutes everyday!#TwEAThealthy

Can you substitute ONE full fat dairy item (cheese, yogurt, milk,etc) for a reduced fat item? I'm switching to skim milk! #TwEAThealthy

My teammates and I love to eat smoothies for breakfast! Here is the recipe we use. Try this one out! (include recipe link) #TwEAThealthy

Doing chores can help you get your 60 minutes a day and it makes your parents happy! #TwEAThealthy

Can you replace all of your sweetened drinks (including juice) with water? Do you think that would be hard? I'm going to do it!#TwEAThealthy

When you get cravings for something sweet, don't ignore them but don't eat too much. Just have a bite or two! #TwEAThealthy

All this exercise makes me hungry! Try drinking 2 glasses of water after working out to rehydrate and make you feel fuller. #TwEAThealthy

Remember portion sizes and use your measuring cups and MyPyramid.com to remind yourself how much you should be eating! #TwEAThealthy

Instead of sitting and watching TV, see how many jumping jacks you can do during commercial breaks! How many did you get? #TwEAThealthy

Who has been making half of their grains whole? I've been trying really hard so I can be healthier! What about you? #TwEAThealthy

For the last 4 weeks, try to only eat out at restaurants once a week. You can make healthier options at home! #TwEAThealthy

Fats from plants (olive oil) are better than animal fats (butter) but are still packed with calories, so use in moderation!#TwEAThealthy

Fruits and vegetables make great snacks. They are low in calories, fat-free and have tons of vitamins and minerals! #TwEAThealthy

Summer break is right around the corner! Take this chance to do something active and tell me about what you plan to do! #TwEAThealthy

Jumping rope is a great way to get exercise and it burns a lot of calories! Try jumping for10-15 minutes throughout the day! #TwEAThealthy

Having a wide variety of colors from fruits +vegetables on ur plate can help u stay healthy. What was ur most colorful meal? #TwEAThealthy
What do you think the most important thing that YOU can do to be healthy? For me it's exercising 60 mins/day! #TwEAThealthy

This is your last week so make sure to wear your pedometer and make this last week count! Who's getting their 60 mins?#TwEAThealthy

Remember when this program is over you can access healthy recipes here (link). Which one is your favorite? #TwEAThealthy

I challenge u to keep up these healthy habits. U worked so hard and learned a lot! Keep it up! How did you like the program? #TwEAThealthy

Twitter Messages

Week	Exercise	Nutrition	Behavior	SCT Construct
1	C: Try to get 60 minutes of exercise a day and remember to wear your pedometers this week. I'm going running with (another player) for my activity today! #TwEAThealthy	T: A can of soda has ~140 calories! Drinking only 3 less sodas a week can equal 1 lb of weight loss per week! #TwEAThealthy	Q: What do you think is a realistic weight loss goal? Experts recommend ½-2 lbs per week. I'm writing my goal down and posting it on my mirror.#TwEAThealthy	Goal setting: Set specific objectives for a desired behavior. Setting a long-term weight loss goal to drive positive behaviors.
2	T: Decrease the amount of time you spend in front of a screen by one hour and spend that time being active this week! Instead of watching TV, I'm going to play basketball with (another player). #TwEAThealthy	Q: Have you seen the new My Plate at choosemyplate.gov? ½ of your plate should be fruits and veggies. Post a picture of your plate following those guidelines. Here's mine! #TwEAThealthy	C: Try to write down everything you eat for 3 days. It's a great way to monitor what you eat and can really help with weight loss! #TwEAThealthy	Self monitoring
3	T: Sports drinks are only needed after 60 minutes of hard exercise and have 125 calories per bottle. They should not be a	C: This week try replacing one white bread for a whole grain version. Look for 100% whole grain logos on products like this one:	Q: Positive self talk (reminding yourself you CAN do this) is a great way to achieve your goals. How do you celebrate when you do well? #TwEAThealthy	Self-efficacy/rewarding behavior

	water substitute! Remember your 60 minutes a day! #TwEAThealthy	(show picture) #TwEAThealthy		
4	T: Lifting weights can not only burn calories right away, but the more muscle you build, the more calories you will burn everyday! Don't forget your 60 minutes! #TwEAThealthy	Q: Do you think you could substitute grilled or baked items for fried ones? Who can give me an example of what they would try? #TwEAThealthy	C: Go to the grocery store with your parents this weekend and pick out fruits and vegetables that you would like to eat. Just having them around will help you eat more of them! #TwEAThealthy	Environment
5	T: Exercise is a great way to reduce stress! If school or other things are bothering you, take a time out and go for a walk! Remember 60 minutes is our goal everyday. #TwEAThealthy	Q: Can you substitute ONE full fat dairy item (cheese, yogurt, milk,etc) for a reduced fat item? I'm switching to skim milk! #TwEAThealthy	C: My teammates and I love to eat smoothies for breakfast! Here is the recipe we use. Try this one out! (include recipe link) #TwEAThealthy	Role modeling, emotional coping response
6	T: Doing chores can help you get your 60 minutes a day and it makes	Q: Can you replace all of your sweetened drinks (including juice) with water? Do you think that	C: When you get cravings for something sweet, don't ignore them but don't eat too much. Have just a bite or	Self-control

	your parents happy! #TwEAThealthy	would be hard? I'm going to do it! #TwEAThealthy	two and you'll feel better without adding too many extra calories! #TwEAThealthy	
7	T: All this extra exercise makes me hungry! Try drinking 2 glasses of water after working out to rehydrate and make you feel fuller. #TwEAThealthy	C: Remember portion sizes and use your measuring cups to remind yourself how much you should be eating! #TwEAThealthy	Q: What is your favorite food group? I can't get enough veggies! #TwEAThealthy	Behavioral capability
8	T: Instead of sitting down and watching TV, try to see how many jumping jacks you can do during commercial breaks! How many did you get?	Q: Who has been making half of their grains whole? I've been trying really hard so I can be healthier! What about you? #TwEAThealthy	C: For the remaining 4 weeks, try to only eat out at restaurants once a week. Many items are high in fat, calories and salt and you can make healthier options at home! #TwEAThealthy	Environment
9	T: Fats from plants (ie, olive oil) are better than animal fats (ie. Butter) but are still packed with calories, so use in moderation!	T: Fruits and vegetables make great snacks. They are low in calories, fat-free and have tons of vitamins and minerals! #TwEAThealthy	Q: Who can give me an example of their favorite healthy snack? Mine is fresh fruit with low-fat yogurt. #TwEAThealthy	Behavioral capability
10	Q: It's almost spring! Since	T: French fries are the most	C: Spring break is right around the	?

	the weather is warming up what kind of outdoor activities do you do to get your 60 minutes a day? #TwEAThealthy	commonly consumed veggie in children but they aren't very healthy! What could we eat instead? #TwEAThealthy	corner! Take this chance to do something active and tell me about it! #TwEAThealthy	
11	T: Jumping rope is a great way to get some exercise and it burns a lot of calories! Try and see if you can jump rope for 10-15 minutes throughout the day! #TwEAThealthy	C: Having a wide variety of colors from fruits and vegetables on your plate can help you stay healthy. Send me pictures or describe your most colorful meal this week! #TwEAThealthy	Q: What do you think the most important thing that YOU can do to be healthy? For me it's exercising 60 mins/day! #TwEAThealthy	Role modeling
12	T: This is your last week so make sure to wear your pedometer and make this last week count! #TwEAThealthy	Q: Remember when this program is over you can access healthy recipes on our website (link). Which one is your favorite? #TwEAThealthy	C: I challenge you to keep up these healthy habits. You worked so hard and learned a lot! Keep it up! How did you like the program? #TwEAThealthy	Reinforcement, Expectancies

Texas Children's Hospital

Located in the Texas Medical Center

Adolescent, Sports Medicine, and Young Woman's Clinics

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Constance M. Wiemann, Ph.D.

Dear (CLINICIAN NAME),

I would like to let you know about a research study that may be of interest to your patients and ask you to consider referring your patients for possible participation.

The purpose of this study is to determine the efficacy of positive role modeling and celebrity status on the prevention of adolescent obesity using professional athletes as agents of change. The impact of a program created by The University of Texas at Austin and Baylor College of Medicine (The Houston Texans TwEAT Healthy Program) will be determined by examining changes in physical as well as psychosocial variables. Eighty adolescents will be enrolled in this pilot study.

Inclusion criteria will be:

1) 11-14 years of age
2) Overweight status (85th-95th percentile BMI-for-age)
3) Absence of pregnancy
4) Internet access via mobile phone or computer
5) Ability to read/write/speak English

Exclusion criteria will be:

1) Any serious illness as determined by a physician
2) Co-morbidities that could interfere with the ability to participate in the study
3) Bariatric surgery

We look forward to speaking with you about the study and recruiting patients in your practice who may be interested in participating in the study.

Thank you for your time and consideration.

Sincerely,

Roberta Anding MS RD LD

(832)822-4005






TwEAT Healthy Study-Nutrition and Exercise Weight Loss Program

Is your child 11-14 years old, overweight or obese, want to change their eating and exercise habits, and have access to the Internet? If you answered yes to all of those questions, your child may be eligible to participate in a nutrition/exercise research study!

The study determines the effect of positive role modeling on the prevention of weight gain in adolescents.

Benefits include:

- **FREE body composition analysis**
- **Access to nutrition and exercise information specific to adolescent health**
- **Two tickets to a 2012-2013 Houston Texans training camp practice**
- **The chance to meet the AFC South Champions Houston Texans**
- **The chance to win tickets to a 2012-2013 Houston Texans game or autographed items**

This study will include at least 3 visits to Texas Children's Hospital

If you are interested in learning more,
e-mail tweathealthy@gmail.com

CONSENT FORM

Institutional Review Board for Baylor College of Medicine and Affiliated Hospitals

Adolescent Participation

H-29461- THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM: PREVENTING ADOLESCENT OBESITY USING TWITTER

Background

In this document, the word "you" refers to you and your child who is less than 18 years of age. You are being asked to be a part of a research project. If you agree to participate in this study, you will need to sign this consent form. This consent form describes the research project.

We know very little about how the use of Twitter among adolescents and positive role models can help adolescents prevent weight gain and adopt a healthier lifestyle. Texas Children's Hospital (TCH) and The University of Texas at Austin have developed a program using the social networking site, Twitter, to help adolescents who are trying to adopt a healthier lifestyle. We will be sending you Twitter and Video nutrition/exercise messages 3 times per week through via Twitter. We want to see if these messages will help adolescents increase healthy habits. Following the intervention we will ask you questions to see what you liked and did not like about the project. We hope your answers can help us improve this program.

This research study is sponsored by Baylor College of Medicine.

Purpose

The purpose of this study is to evaluate whether the use of Twitter and Video nutrition and exercise messages can help adolescents like you create a healthier lifestyle to prevent adolescent obesity.

Procedures

The research will be conducted at the following location(s): Baylor College of Medicine, Reliant Center , TCH: Texas Children's Hospital, Clinic.

If you agree to participate in this research project, you will be one of 80 participants. You will be assigned to one of two groups at random, like flipping a coin. This means that everyone in the study has the same chance of being in either group 1 or group 2. Both groups are being asked to make up to 4 visits to Reliant Stadium over a 6-month period. Your visits to Reliant Stadium will last about 2 1/2 hours. Both groups will receive nutrition and exercise messages via Twitter. At your first visit, if you agree to participate in the study, you will sign this consent form and then complete some surveys and measurements of your body.

At this first visit, you will be asked to answer questions like your age, gender, past health history, what you know about healthy eating habits and exercise. You will also be measured for height, weight, percent body fat, and how wide your waist is. Your body fat will be measured using a machine called a BOD POD. A BOD POD is a machine that looks like a large white capsule (egg-like shape) that you sit inside of with the door closed for approximately 2 minutes. You will need to wear special clothing like a bathing suit or a fitted spandex shirt and shorts when you get measured in the BOD POD. You will also be asked to look at drawings that show different stages of puberty for males or females. You will be instructed to circle the drawing that best resembles your body.

Then, you will be given a log-in account to Twitter™ that was specifically made for you. Only use this account for this study and you should not share your log-in information with anyone outside of your family. We will give you a set of Twitter™ log-in instructions on paper that show you how to

access your Twitter™ account and view and respond to Twitter™ and Video messages from your Twitter™ homepage. You will receive Twitter™ messages 3x/week and Video messages 2x/week via you mobile phone or personal computer.

You will also be given a device called a pedometer that you will clip on your waistband to measure how many steps you walk per day. We will ask you to wear the pedometer at weeks 1, 12, and 24 for a total of 7 days (one week) each time. A member of our team will call you at the beginning of each week to remind you to wear your pedometer and record how many steps you walked each week on the Pedometer Log-Sheet we give to you.

You will be asked to return to Reliant Stadium at least two more times over the next 6 months. At two of the visits (12 weeks and 24 weeks) you will complete questionnaires similar to the ones you completed at your first visit as well as BOD POD assessments. All the information we collect from you will be coded using a unique number that has been assigned to only you. This means that your name will not be on any of the papers that contain information about you.

Lastly, we will obtain a copy of your growth chart from your primary physician in order to track weight loss or gain.

Your research doctor may never be able to provide you with your research related health information.

Potential Risks and Discomforts
Any personal information you provide to us will remain private to the public by removing your name on any of the papers we ask you to complete (other than this consent form). Your answers will not be linked with your name. We will keep your answers locked in a file cabinet or in a password protected computer/laptop. Only study personnel will have access to your data. You may be uncomfortable answering some of our questions and can refuse to answer any questions. All of those questions will be answered by you on paper and will not be shared with anyone not involved with the project.

The BOD POD machine may cause you to feel claustrophobic (fear of not having an exit inside of small spaces) when you sit inside of it. If you become uncomfortable, there is an emergency exit and you can request to stop measurement at any point. You may also feel self-conscious or embarrassed wearing a bathing suit or spandex fitted clothing used for BOD POD measurements. We will minimize discomfort by providing you with a private room in which to change your clothes and be measured.

When you receive your packet of assessments, it will also include a paper with the drawings of different stages of puberty. You may feel a bit self-counscious or embarrased. To minimize this, you will complete your assessments in a private area.

Study staff will update you in a timely way on any new information that may affect your decision to stay in the study.

Potential Benefits
The benefits of participating in this study may be: You will receive free body fat testing and information about your health status. You will also be given nutrition and exercise information to help you create a healthy lifestyle. However, you may receive no benefit from participating.

Alternatives
You may choose to not participate in this study.

Subject Costs and Payments
You will not be asked to pay any costs related to this research.

When you visit Reliant Stadium, you will be provided with free access to parking. At the end of your first visit, you will receive 2 free tickets to a Houston Texans training camp practice. Then, at the end of your second visit (week 12), your name will be entered into a raffle style drawing and will be eligible to win 2 tickets to a Houston Texans 2012-2013 football game. Finally, at end of your your last visit (week 24), you will receive an autographed picture of a Texans player.

Subject's Rights
Your signature on this consent form means that you have received the information about this study and that you agree to volunteer for this research study.

You will be given a copy of this signed form to keep. You are not giving up any of your rights by signing this form. Even after you have signed this form, you may change your mind at any time. Please contact the study staff if you decide to stop taking part in this study.

If you choose not to take part in the research or if you decide to stop taking part later, your benefits and services will stay the same as before this study was discussed with you. You will not lose these benefits, services, or rights.

Your Health Information

We may be collecting health information that could be linked to you (protected health information). This protected health information might have your name, address, social security number or something else that identifies you attached to it. Federal law wants us to get your permission to use your protected health information for this study. Your signature on this form means that you give us permission to use your protected health information for this research study.

If you decide to take part in the study, your protected health information will not be given out except as allowed by law or as described in this form. Everyone working with your protected health information will work to keep this information private. The results of the data from the study may be published. However, you will not be identified by name.

People who give medical care and ensure quality from the institutions where the research is being

done, the sponsor(s) listed in the sections above, representatives of the sponsor, and regulatory agencies such as the U.S. Department of Health and Human Services will be allowed to look at sections of your medical and research records related to this study. Because of the need for the investigator and study staff to release information to these parties, complete privacy cannot be guaranteed.

The people listed above will be able to access your information for as long as they need to, even after the study is completed.

If you decide to stop taking part in the study or if you are removed from the study, you may decide that you no longer allow protected health information that identifies you to be used in this research study. Contact the study staff to tell them of this decision, and they will give you an address so that you can inform the investigator in writing. The investigator will honor your decision unless not being able to use your identifiable health information would affect the safety or quality of the research study.

The investigator, ROBERTA H ANDING, and/or someone he/she appoints in his/her place will try to answer all of your questions. If you have questions or concerns at any time, or if you need to report an injury related to the research, you may speak with a member of the study staff: ROBERTA H ANDING at 832-822-4005 during the day and after hours.

Members of the Institutional Review Board for Baylor College of Medicine and Affiliated Hospitals (IRB) can also answer your questions and concerns about your rights as a research subject. The IRB office number is (713) 798-6970. Call the IRB office if you would like to speak to a person independent of the investigator and research staff for complaints about the research, if you cannot reach the research staff, or if you wish to talk to someone other than the research staff.

If your child is the one invited to take part in this study you are signing to give your permission. Each child may agree to take part in a study at his or her own level of understanding. When you sign this you also note that your child understands and agrees to take part in this study according to his or her understanding.

Please print your child's name here _____

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Adolescent Participation

H-29461- THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM: PREVENTING ADOLESCENT OBESITY USING TWITTER

Signing this consent form indicates that you have read this consent form (or have had it read to you), that your questions have been answered to your satisfaction, and that you voluntarily agree to participate in this research study. You will receive a copy of this signed consent form.

Subject	Date
Legally Authorized Representative Parent or Guardian	Date
Investigator or Designee Obtaining Consent	Date
Witness (if applicable)	Date
Translator (if applicable)	Date

H-19461: THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM: PREVENTING ADOLESCENT OBESITY USING PROFESSIONAL ATHLETES AS ROLE MODELS

INVESTIGATOR DATA COLLECTION FORM

Males Subject Identification Number _____

Measurement	**Baseline**	**Week 12**	**Week 24**
Height:	_____ cm	_____cm	_____cm
Weight:	_____ kg	_____ kg	_____ kg
Calculated BMI:	_____ kg/m^2	_____ kg/m^2	_____kg/m^2
BMI-for-age %ile:	_____%ile	_____ %ile	_____%ile
Waist circumference:	_____ cm	_____ cm	_____ cm
% Body fat	_____ %	_____ %	_____ %

Tanner Stage Assessments

Boys

Genital Development

Baseline:	1	2	3	4	5
Week 12:	1	2	3	4	5
Week 24:	1	2	3	4	5

Pubic Hair Growth

Baseline:	1	2	3	4	5
Week 12:	1	2	3	4	5
Week 24:	1	2	3	4	5

H-19461: THE HOUSTON TEXANS TWEAT HEALTHY PROGRAM: PREVENTING ADOLESCENT OBESITY USING PROFESSIONAL ATHLETES AS ROLE MODELS

INVESTIGATOR DATA COLLECTION FORM

Females Subject Identification Number _____

Measurement	**Baseline**	**Week 12**	**Week 24**
Height:	_____ cm	_____cm	_____cm
Weight:	_____ kg	_____ kg	_____ kg
Calculated BMI:	_____ kg/m^2	_____ kg/m^2	_____kg/m^2
BMI-for-age %ile:	_____%ile	_____ %ile	_____%ile
Waist circumference:	_____ cm	_____ cm	_____ cm
% Body fat	_____ %	_____ %	_____ %

Tanner Stage Assessments

Girls

Breast Development

Baseline:	1	2	3	4	5
Week 12:	1	2	3	4	5
Week 24:	1	2	3	4	5

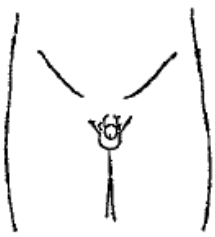
Pubic Hair Growth

Baseline:	1	2	3	4	5
Week 12:	1	2	3	4	5
Week 24:	1	2	3	4	5

Self-Assessment of Tanner Stages

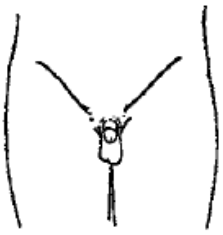
THE DRAWINGS ON THIS PAGE SHOW DIFFERENT AMOUNTS OF MALE PUBIC HAIR. A BOY PASSES THROUGH EACH OF THE FIVE STAGES SHOWN BY THESE DRAWINGS. PLEASE LOOK AT EACH DRAWING AND READ THE SENTENCES UNDER THE DRAWING. THEN CHOOSE THE DRAWING CLOSEST TO YOUR STAGE OF YOUR HAIR DEVELOPMENT. MARK A 1 ON THE LINE ABOVE THAT DRAWING. THEN CHOOSE THE DRAWING THAT IS NEXT CLOSEST TO YOUR STAGE OF HAIR DEVELOPMENT AND MARK IT A 2. IN CHOOSING THE RIGHT PICTURE, LOOK ONLY AT THE PUBIC HAIR, AND NOT AT THE SIZE OF THE TESTES, SCROTUM, AND PENIS.

1. DRAWING A _____



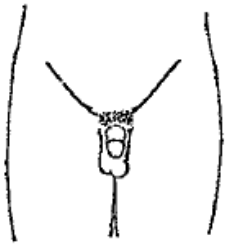
THERE IS NO PUBIC HAIR AT ALL.

2. DRAWING B _____



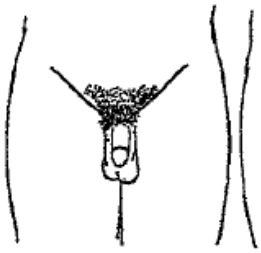
THERE IS A LITTLE SOFT, LONG, LIGHTLY COLORED HAIR. MOST OF THE HAIR IS AT THE BASE OF THE PENIS. THIS HAIR MAY BE STRAIGHT OR A LITTLE CURLY.

3. DRAWING C _____



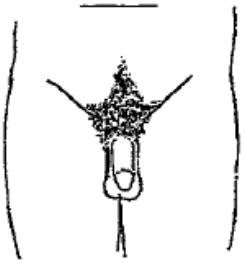
THE HAIR IS DARKER IN THIS STAGE. IT IS COARSER AND MORE CURLED. IT HAS SPREAD OUT AND THINLY COVERS A SOMEWHAT LARGER AREA.

4. DRAWING D _____



THE HAIR IS NOW AS DARK, CURLY, AND COARSE AS THAT OF AN ADULT MALE. HOWEVER, THE AREA THAT THE HAIR COVERS IS NOT AS LARGE AS THAT OF AN ADULT MALE. THE HAIR HAS NOT SPREAD OUT TO THE THIGHS.

5. DRAWING E _____



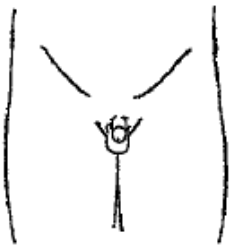
THE HAIR HAS SPREAD OUT TO THE THIGHS. THE HAIR IS NOW LIKE THAT OF AN ADULT MALE. IT COVERS THE SAME AREA AS THAT OF AN ADULT MALE.

Fig. 3

Self-Assessment of Tanner Stages

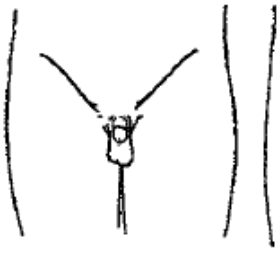
THE DRAWINGS OF THIS PAGE SHOW DIFFERENT STAGES OF DEVELOPMENT OF THE TESTES, SCROTUM, AND PENIS. A BOY PASSES THROUGH EACH OF THE FIVE STAGES SHOWN BY THESE DRAWINGS. PLEASE LOOK AT EACH OF THE DRAWINGS AND READ THE SENTENCES UNDER THE DRAWING. THEN CHOOSE THE DRAWING CLOSEST TO YOUR STAGE OF DEVELOPMENT. MARK A "1" ON THE LINE ABOVE THAT DRAWING. THEN CHOOSE THE DRAWING THAT IS NEXT CLOSEST TO YOUR STAGE OF DEVELOPMENT AND MARK IT "2". IN CHOOSING THE RIGHT PICTURE, LOOK ONLY AT THE STAGE OF DEVELOPMENT, NOT AT PUBIC HAIR.

1. DRAWING A _____



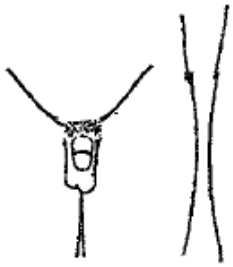
THE TESTES, SCROTUM, AND PENIS ARE ABOUT THE SAME SIZE AND SHAPE AS THEY WERE WHEN YOU WERE A CHILD.

2. DRAWING B _____



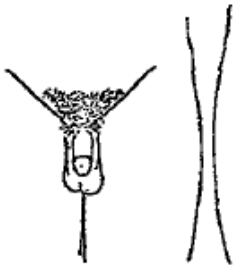
THE TESTES AND SCROTUM HAVE GOTTEN A LITTLE LARGER. THE SKIN OF THE SCROTUM HAS CHANGED. THE SCROTUM, THE SACK HOLDING THE TESTES, HAS LOWERED A BIT. THE PENIS HAS GOTTEN ONLY A LITTLE LARGER.

3. DRAWING C _____



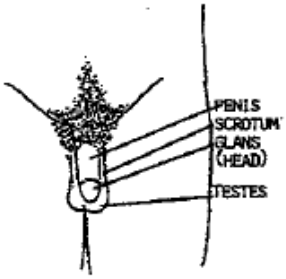
THE PENIS HAS GROWN MAINLY IN LENGTH. THE TESTES AND SCROTUM HAVE GROWN AND DROPPED LOWER THAN IN STAGE 2.

4. DRAWING D _____



THE PENIS HAS GROWN EVEN LARGER. IT IS WIDER. THE GLANS (THE HEAD OF THE PENIS) IS BIGGER. THE SCROTUM IS DARKER THAN BEFORE. IT IS BIGGER BECAUSE THE TESTES HAVE GOTTEN BIGGER.

5. DRAWING E _____



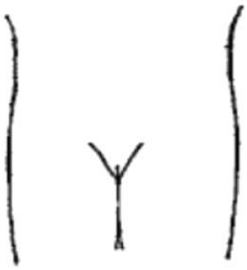
THE PENIS, SCROTUM, AND TESTES ARE THE SIZE AND SHAPE OF THAT OF AN ADULT MALE.

Fig. 4

Self-Assessment of Tanner Stages

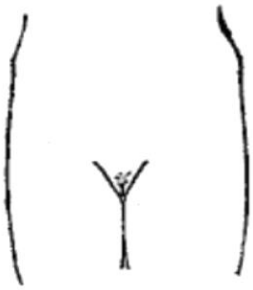
THE DRAWINGS ON THIS PAGE SHOW DIFFERENT AMOUNTS OF FEMALE PUBIC HAIR. A GIRL PASSES THROUGH EACH OF THE FIVE STAGES SHOWN BY THESE DRAWINGS. PLEASE LOOK AT EACH DRAWING AND READ THE SENTENCES UNDER THE DRAWINGS. THEN CHOOSE THE DRAWING CLOSEST TO YOUR STAGE OF HAIR DEVELOPMENT AND MARK IT 1. THEN CHOOSE THE DRAWING THAT IS NEXT CLOSEST AND MARK IT 2.

1. DRAWING A _____



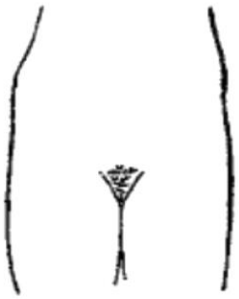
THERE IS NO PUBIC HAIR.

2. DRAWING B _____



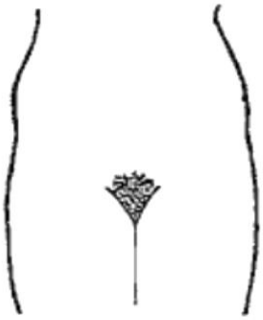
THERE IS A LITTLE LONG, LIGHTLY COLORED HAIR. THIS HAIR MAY BE STRAIGHT OR A LITTLE CURLY.

3. DRAWING C _____



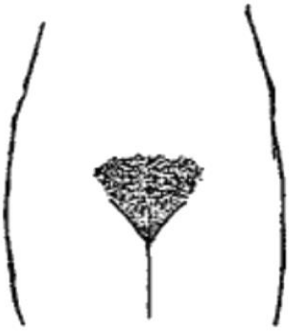
THE HAIR IS DARKER IN THIS STAGE. IT IS COARSER AND MORE CURLED. IT HAS SPREAD OUT AND THINLY COLVERS A LARGER AREA.

4. DRAWING D _____



THE HAIR IS NOW AS DARK, CURLY, AND COARSE AS THAT OF AN ADULT FEMALE. HOWEVER, THE AREA THAT THE HAIR COVERS IS NOT AS LARGE AS THAT OF AN ADULT FEMALE. THE HAIR HAS NOT SPREAD OUT TO THE THIGHS.

5. DRAWING E _____

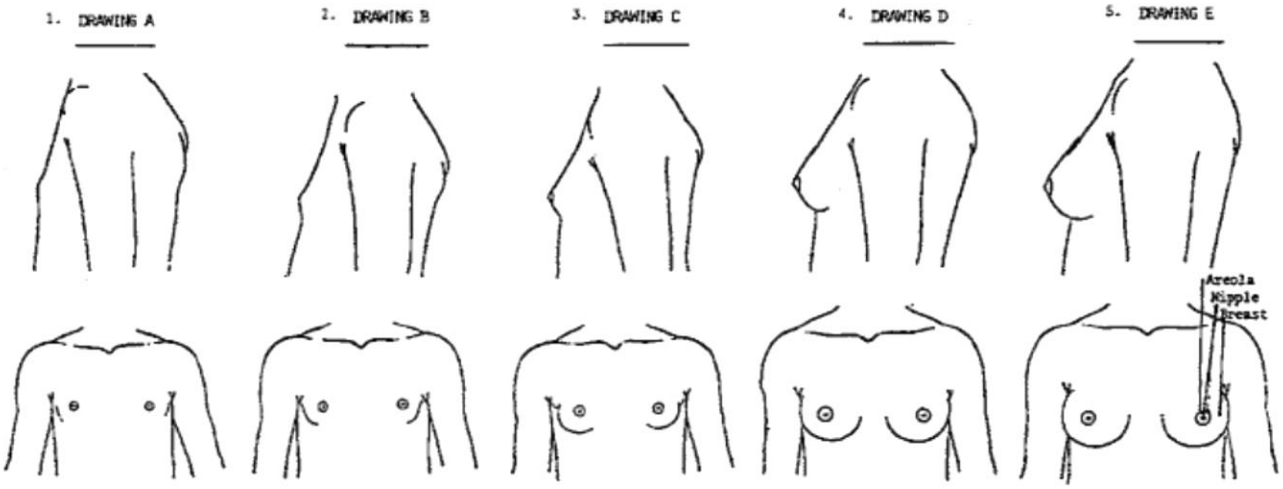


THE HAIR NOW IS LIKE THAT OF AN ADULT FEMALE. IT ALSO COVERS THE SAME AREA AS THAT OF THE ADULT FEMALE. THE HAIR USUALLY FORMS A TRIANGULAR (▽) PATTERN AS IT SPREADS OUT TO THE THIGHS.

Fig. 2

Self-Assessment of Tanner Stages

THE DRAWINGS ON THIS PAGE SHOW DIFFERENT STAGES OF DEVELOPMENT OF THE BREASTS. A FEMALE PASSES THROUGH EACH OF THE FIVE STAGES SHOWN BY THESE SETS OF DRAWINGS. PLEASE LOOK AT EACH SET OF DRAWINGS AND READ THE SENTENCES UNDER THE DRAWING. THEN CHOOSE THE SET OF DRAWINGS CLOSEST TO YOUR STAGE OF BREAST DEVELOPMENT AND MARK IT 1. THEN CHOOSE THE DRAWING THAT IS THE NEXT CLOSEST AND MARK IT 2.



THE NIPPLE IS RAISED A LITTLE IN THIS STAGE. THE REST OF THE BREAST IS STILL FLAT.

THIS IS THE BREAST BUD STAGE. IN THIS STAGE THE NIPPLE IS RAISED MORE THAN IN STAGE 1. THE BREAST IS A SMALL MOUND. THE AREOLA IS LARGER THAN IN STAGE 1.

THE AREOLA AND THE BREAST ARE BOTH LARGER THAN IN STAGE 2. THE AREOLA DOES NOT STICK OUT AWAY FROM THE BREAST.

THE AREOLA AND THE NIPPLE MAKE UP A MOUND THAT STICKS UP ABOVE THE SHAPE OF THE BREAST. (NOTE: THIS STAGE MAY NOT HAPPEN AT ALL FOR SOME GIRLS, SOME GIRLS DEVELOP FROM STAGE 3 TO STAGE 5, WITH NO STAGE 4.)

THIS IS THE MATURE ADULT STAGE. THE BREASTS ARE FULLY DEVELOPED. ONLY THE NIPPLE STICKS OUT IN THIS STAGE. THE AREOLA HAS MOVED BACK TO THE GENERAL SHAPE OF THE BREAST.

Fig. 1

Testing Guidelines

Testing Environment

- Ensure that room temperature is **stable** and between 70 to 90ºF.
  - Do not place near heating/cooling vent or fan.
  - Heating/cooling systems should remain either on or off. Automatic, or alternating settings will lead to unstable room temperature.
- Ensure room pressure is stable.
  - Avoid opening and closing doors during testing.
- Avoid placing the BOD POD in direct sunlight.

Before Testing

The following should be completed daily before conducting subject testing:

- Warm up BOD POD for at least 30 minutes while in the Main Menu;
- Perform one Test System. Proceed if:
  - Mean volume is within 100 ml of the actual volume;
  - Standard Deviation < 75 ml.

  NOTE: If two consecutive Test Systems fail, please call LMI Customer Service.
- Calibrate the scale using the 20.00kg Standard Weights provided by LMI. Proceed if:
  - Mass is within 0.02 kg of 20.00 kg.

Subject Preparation

For accurate results, it is important the subject:

- Wear a form-fitting Speedo®, Lycra®, or other spandex-type swimsuit.
- Wear a swim cap during testing.
- Remove all jewelry.
- Void bladder.
- Avoid exercising two hours prior to testing.
- Avoid eating two hours prior to testing.
- Be dry and in a relaxed state during testing.

During Testing

- Ensure the subject wears swim cap during testing.
- Ensure subject remains quiet, still, and relaxed during testing.
- Make sure the scale is clear before and after weighing.
- Do not touch the BOD POD while data is being collected.

303-002A

LIFE MEASUREMENT, INC.
1850 Bates Avenue Concord, CA 94520 www.bodpod.com fax: 925-676-6005 ph: 925-676-6002 1-800-4 BOD POD

School Physical Activity and Nutrition (SPAN) Project

Student Assent

YOUR NAME: _____

SCHOOL: _____

GRADE: _____

YOUR TEACHER'S NAME: _____

- In this study you are being asked to answer questions about your food choices and physical activity (exercise). No one at school or at home will see your answers.
- An adult will weigh you, measure your height, and write the results on the last page of the survey.
- Taking part in this project is up to you. Your choice about taking part will not affect your grades in school or your ability to take part in any school activities.
- If you do not want to answer a question, you can skip it.
- You may stop taking part in this project at any time.
- After you complete the survey and are measured for height and weight, this page with your name on it (Student Assent) will be removed. Your name will never be used after that.
- By signing below, you agree to take part in this project.

_____ Signature of Student

_____ Date

00001

The next questions are about what you ate or drank YESTERDAY.

Yesterday, how many times did you... *(Fill in one answer for each question)*	None	1 Time	2 Times	3 Times	4 Times	5 Or More Times
10. ...eat hamburger meat, hot dogs, sausage (chorizo), steak, bacon, or ribs?	0	1	2	3	4	5+
11. ...eat fried chicken, chicken nuggets, chicken fried steak, fried pork chops, fried fish, or fish sticks?	0	1	2	3	4	5+
12. ...eat peanuts or peanut butter, or other nuts such as pecans, walnuts, or almonds?	0	1	2	3	4	5+
13. ...eat any kind of cheese, cheese spread, or cheese sauce? (INCLUDE cheese on pizza or in dishes such as tacos, enchiladas, lasagna, sandwiches, cheeseburgers, or macaroni and cheese.)	0	1	2	3	4	5+
14. ...drink any kind of milk? (INCLUDE chocolate or other flavored milk, milk on cereal, and drinks made with milk.)	0	1	2	3	4	5+
15. ...eat yogurt or cottage cheese or drink a yogurt drink? (DO NOT COUNT frozen yogurt.)	0	1	2	3	4	5+
16. ...eat brown rice, faro, macaroni, spaghetti, or pasta noodles?	0	1	2	3	4	5+
17. ...eat white bread, buns, bagels, tortillas, or rolls?	0	1	2	3	4	5+
18. ...eat whole wheat or dark bread, buns, bagels, tortillas, or rolls; or corn tortillas?	0	1	2	3	4	5+
19. ...eat hot or cold cereal?	0	1	2	3	4	5+
20. ...eat French fries or chips? (INCLUDE potato chips, tortilla chips, Cheetos®, corn chips, or other snack chips.)	0	1	2	3	4	5+
21. ...eat any starchy vegetables like potatoes, corn, or peas? (DO NOT COUNT French fries or chips.)	0	1	2	3	4	5+
22. ...eat any orange vegetables like carrots, squash, or sweet potatoes?	0	1	2	3	4	5+
23. ...eat a salad made with lettuce, or any green vegetables like spinach, green beans, broccoli, or other greens?	0	1	2	3	4	5+
24. ...eat any other vegetables like peppers, tomatoes, zucchini, asparagus, cabbage, cauliflower, cucumbers, mushrooms, eggplant, celery or artichokes?	0	1	2	3	4	5+
25. ...eat beans such as pinto beans, baked beans, kidney beans, refried beans, or pork and beans? (DO NOT COUNT green beans.)	0	1	2	3	4	5+
26. ...eat fruit? Fruits are all fresh, frozen, canned, or dried fruits. (DO NOT COUNT juice.)	0	1	2	3	4	5+
27. ...drink fruit juice? Fruit juice is a 100% juice drink like orange juice, apple juice, or grape juice. (DO NOT COUNT punch, Kool-Aid®, sports drinks, and other fruit-flavored drinks.)	0	1	2	3	4	5+
28. ...drink any punch, Kool-Aid®, sports drinks, or other fruit-flavored drinks? (DO NOT COUNT 100% fruit juice.)	0	1	2	3	4	5+
29. ...drink any regular (NOT diet) sodas or soft drinks?	0	1	2	3	4	5+
30. ...drink any diet sodas or soft drinks?	0	1	2	3	4	5+
31. ...drink a bottle or glass of water? (INCLUDE sparkling or any other water drink that has 0 calories.)	0	1	2	3	4	5+
32. ...drink a cup, bottle, or can of coffee, tea, iced tea, or a coffee drink like Frappucino®?	0	1	2	3	4	5+
33. ...eat a frozen dessert? (A frozen dessert is a cold, sweet food like ice cream, frozen yogurt, an ice cream bar, or a Popsicle®.)	0	1	2	3	4	5+
34. ...eat sweet rolls, doughnuts, cookies, brownies, pies, or cakes?	0	1	2	3	4	5+
35. ...eat any candy? (COUNT chewy, gummy, hard, or chocolate candy. DO NOT COUNT brownies, chocolate cookies, or gum.)	0	1	2	3	4	5+
36. ...eat food from any type of restaurant? (Restaurants include fast food, sit-down restaurants, pizza places, and coffee shops.)	0	1	2	3	4	5+
37. ...eat or drink a snack? (A snack is any food or beverage that you eat or drink before, after, or between meals.)	0	1	2	3	4	5+
38. ...eat a meal?	0	1	2	3	4	5+

Please continue on next page

39. LAST WEEK, were the following available in your home?

(Fill in one answer for each item)	Yes, All Of The Time	Yes, Most Of The Time	Yes, Some Of The Time	Never
a. 100% fruit juice (DO NOT COUNT punch, Kool-Aid®, sports drinks, or other fruit-flavored drinks.)	☐	☐	☐	☐
b. Fresh fruit (DO NOT COUNT fruit juice.)	☐	☐	☐	☐
c. Fresh vegetables (DO NOT COUNT canned or frozen vegetables.)	☐	☐	☐	☐

40. Do you usually take a vitamin or mineral pill?
- ☐ Yes
- ☐ No

41. What type of milk do you usually drink? *(Fill in only one)*
- ☐ Regular (whole) milk
- ☐ 2% milk
- ☐ 1% (low-fat) or fat-free (skim/non-fat) milk
- ☐ Soy milk, almond milk, rice milk, or other milk
- ☐ I don't drink milk
- ☐ I don't know

42. Do you usually eat or drink something for breakfast?
- ☐ Yes, all of the time
- ☐ Yes, most of the time
- ☐ Yes, some of the time
- ☐ Never

43. Where do you usually get your lunch on school days?
- ☐ From the main lunch line in the school cafeteria
- ☐ From a snack bar, a kiosk, or a la carte line in the school cafeteria
- ☐ From a vending machine at school
- ☐ From somewhere off-campus
- ☐ From home
- ☐ I don't usually eat lunch

44. Do you usually eat an evening meal?
- ☐ Yes, I usually eat an evening meal that is homemade
- ☐ Yes, I usually eat an evening meal at home that is not homemade (frozen pizza, microwave meal, etc.)
- ☐ Yes, I usually eat an evening meal from a fast food restaurant
- ☐ Yes, I usually eat an evening meal from a sit-down restaurant or pizza place
- ☐ Yes, I usually eat an evening meal from a place other than home or a restaurant
- ☐ No, I don't usually eat an evening meal

Please continue on next page

45. Do you help prepare meals/cook at home? (DO NOT INCLUDE frozen dinners.)

- ☐ Yes, all of the time
- ☐ Yes, some of the time
- ☐ Yes, most of the time
- ☐ Never

46. How often does your family buy or get fruits/vegetables from:

(Fill in one answer for each location)	All Of The Time	Most Of The Time	Some Of The Time	Never
a. A large chain grocery store or supermarket (such as Randall's)?	☐	☐	☐	☐
b. A natural or organic supermarket (such as Whole Foods Market)?	☐	☐	☐	☐
c. A small local store or corner store?	☐	☐	☐	☐
d. A convenience store (such as 7-Eleven or mini market)?	☐	☐	☐	☐
e. A warehouse club store (such as Sam's Club or Costco)?	☐	☐	☐	☐
f. A discount superstore (such as Wal-Mart)?	☐	☐	☐	☐
g. An ethnic market?	☐	☐	☐	☐
h. A farmer's market/co-op?	☐	☐	☐	☐
i. A food bank/pantry?	☐	☐	☐	☐
j. Your own garden?	☐	☐	☐	☐

47. How many total cups of fruits should you eat each day?

- ☐ At least 2
- ☐ At least 3
- ☐ At least 4
- ☐ At least 5
- ☐ I don't know

48. How many total cups of vegetables should you eat each day?

- ☐ At least 2
- ☐ At least 3
- ☐ At least 4
- ☐ At least 5
- ☐ I don't know

49. Which contains the most calories?

- ☐ One gram of protein
- ☐ One gram of fat
- ☐ One gram of carbohydrate
- ☐ I don't know

50. Do you use food labels (nutrition facts) to make your food choices?

- ☐ Yes, all of the time
- ☐ Yes, some of the time
- ☐ Yes, most of the time
- ☐ Never

51. If I am overweight I am more likely to have more health problems like cancer or heart disease.

- ☐ True
- ☐ False
- ☐ I don't know

52. The foods that I usually eat and drink are healthy so there is no reason for me to make changes.

- ☐ Yes, all of the time
- ☐ Yes, some of the time
- ☐ Yes, most of the time
- ☐ Never

53. Healthy foods taste good.

- ☐ Yes, all of the time
- ☐ Yes, some of the time
- ☐ Yes, most of the time
- ☐ Never

Please continue on next page

54. I think the food served in the main lunch line at school is healthy.

- ☐ Yes, all of the time
- ☐ Yes, some of the time
- ☐ Yes, most of the time
- ☐ Never

55. During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)

- ☐ 0 days
- ☐ 2 days
- ☐ 4 days
- ☐ 6 days
- ☐ 1 day
- ☐ 3 days
- ☐ 5 days
- ☐ 7 days

56. On how many of the past 7 days did you exercise or take part in physical activity that made your heart beat fast and made you breathe hard for at least 20 minutes? (For example: basketball, soccer, running or jogging, fast dancing, swimming laps, tennis, fast bicycling, or similar aerobic activities)

- ☐ 0 days
- ☐ 2 days
- ☐ 4 days
- ☐ 6 days
- ☐ 1 day
- ☐ 3 days
- ☐ 5 days
- ☐ 7 days

57. On how many of the past 7 days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weight lifting?

- ☐ 0 days
- ☐ 2 days
- ☐ 4 days
- ☐ 6 days
- ☐ 1 day
- ☐ 3 days
- ☐ 5 days
- ☐ 7 days

58. During the past 12 months, on how many sports teams run by your school did you play (DO NOT INCLUDE PE classes)? Sports teams include soccer, basketball, baseball, swimming, gymnastics, wrestling, track, football, tennis, and volleyball teams.

- ☐ 0 teams
- ☐ 1 team
- ☐ 2 teams
- ☐ 3 teams or more

59. During the past 12 months, on how many sports teams run by organizations outside of your school (like the recreation department, club sports, summer leagues, YMCA , or church teams) did you play? Sports teams include soccer, basketball, baseball, swimming, gymnastics, wrestling, track, football, tennis, and volleyball teams.

- ☐ 0 teams
- ☐ 1 team
- ☐ 2 teams
- ☐ 3 teams or more

60. Do you currently participate in any other organized physical activities or take lessons, such as martial arts, dance, gymnastics, or tennis?

- ☐ Yes
- ☐ No

61. Experts recommend that children should be physically active for at least how many minutes per day?

- ☐ 10 minutes
- ☐ 30 minutes
- ☐ 90 minutes
- ☐ 20 minutes
- ☐ 60 minutes
- ☐ I don't know

Please continue on next page

62. How many hours per day do you usually watch TV, DVDs, or movies away from school?

- ☐ I don't watch TV, DVDs, or movies
- ☐ Less than 1 hour
- ☐ 1 hour
- ☐ 2 hours
- ☐ 3 hours
- ☐ 4 hours
- ☐ 5 hours
- ☐ 6 hours or more

63. How many hours per day do you usually spend on a computer away from school? (Time on the computer includes time spent surfing the Internet, instant messaging, and playing online video or computer games.)

- ☐ I don't use a computer
- ☐ Less than 1 hour
- ☐ 1 hour
- ☐ 2 hours
- ☐ 3 hours
- ☐ 4 hours
- ☐ 5 hours
- ☐ 6 hours or more

64. How many hours per day do you usually spend playing video games like Nintendo® Wii or DS, Sega®, PlayStation®, Xbox®, GameBoy®, or arcade games away from school?

- ☐ I don't play video games
- ☐ Less than 1 hour
- ☐ 1 hour
- ☐ 2 hours
- ☐ 3 hours
- ☐ 4 hours
- ☐ 5 hours
- ☐ 6 hours or more

65. Do you have a TV in your bedroom?

- ☐ Yes
- ☐ No

66. How many of your friends do your parents know?

- ☐ All of them
- ☐ Most of them
- ☐ Some of them
- ☐ None of them

67. How often do your parents know what you are doing during your free time like after school, at nights, or on weekends?

- ☐ Almost never
- ☐ Sometimes
- ☐ Often
- ☐ Almost always

68. How upset would your parents feel if they found out you were eating a lot of junk food?

- ☐ Not at all upset
- ☐ A little upset
- ☐ Pretty upset
- ☐ Very upset

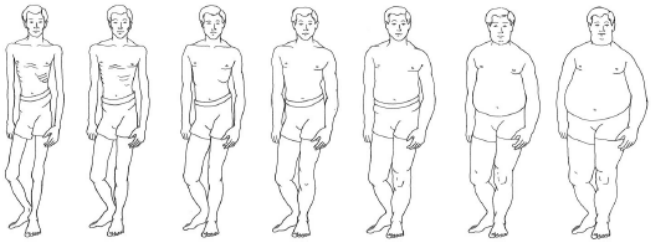
69. How upset would your parents feel if they found out you were not exercising?

- ☐ Not at all upset
- ☐ A little upset
- ☐ Pretty upset
- ☐ Very upset

Please continue on next page

(Fill in one bubble for each question)

Male



70. Which of these bodies do you think a boy your age should look like? ① ② ③ ④ ⑤ ⑥ ⑦

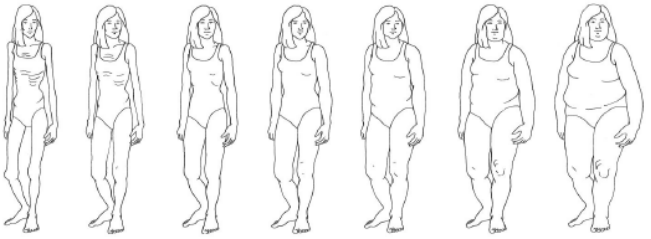
71. Which of these bodies looks most like you? ① ② ③ ④ ⑤ ⑥ ⑦
☐ I am not a boy

72. Which of these bodies looks most like your closest male friend? ① ② ③ ④ ⑤ ⑥ ⑦

73. Which of these bodies looks most like your father? ① ② ③ ④ ⑤ ⑥ ⑦
☐ I do not know what my father looks like

(Fill in one bubble for each question)

Female



74. Which of these bodies do you think a girl your age should look like? ① ② ③ ④ ⑤ ⑥ ⑦

75. Which of these bodies looks most like you? ① ② ③ ④ ⑤ ⑥ ⑦
☐ I am not a girl

76. Which of these bodies looks most like your closest female friend? ① ② ③ ④ ⑤ ⑥ ⑦

77. Which of these bodies looks most like your mother? ① ② ③ ④ ⑤ ⑥ ⑦
☐ I do not know what my mother looks like

Please continue on next page

78. In the past 12 months, have you tried to lose weight?
- ☐ Yes
- ☐ No

79. What are you trying to do about your weight?
- ☐ Lose weight
- ☐ Gain weight
- ☐ Stay the same weight
- ☐ Nothing

80. Compared to other students in your grade who are as tall as you, do you think you weigh:
- ☐ Too much
- ☐ The right amount
- ☐ Too Little (or not enough)

81. For the following statements, it would help us if you answered all items as best you can even if you are not absolutely certain. Please give your answers on the basis of how things have been for you over the last six months.

(Fill in one answer for each statement)	Not True	Somewhat True	Certainly True
a. I get a lot of headaches, stomach-aches or sickness.	☐	☐	☐
b. I worry a lot.	☐	☐	☐
c. I am often unhappy, depressed or tearful.	☐	☐	☐
d. I am nervous in new situations. I easily lose confidence.	☐	☐	☐
e. I have many fears, I am easily scared.	☐	☐	☐

82. Please indicate your agreement or disagreement with the statements below.

(Fill in one answer for each statement)	I Agree A Lot	I Agree A Little	I Neither Agree Nor Disagree	I Disagree A Little	I Disagree A Lot
a. I am satisfied with life.	☐	☐	☐	☐	☐
b. I am happy.	☐	☐	☐	☐	☐
c. I am optimistic or hopeful about the future.	☐	☐	☐	☐	☐
d. I feel enthusiastic or excited.	☐	☐	☐	☐	☐
e. When I have a problem, I can come up with lots of ways to solve it.	☐	☐	☐	☐	☐

83. During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?
- ☐ Almost Always or Always
- ☐ Sometimes
- ☐ Almost Never or Never

84. Over the last 6 months, how often have you been bullied at school? (A student is being bullied when another student, or a group of students, say or do nasty and unpleasant things to him or her. It is also bullying when a student is teased repeatedly in a way he or she doesn't like. But it is NOT BULLYING when two students of about the same strength quarrel or fight.)
- ☐ I haven't been bullied at school over the last 6 months
- ☐ It has only happened once or twice
- ☐ 2 or 3 times a month
- ☐ About once a week
- ☐ Several times a week

Please continue on next page

85. During the past 30 days, on how many days did you smoke cigarettes?

- ☐ I have never tried smoking, not even a puff
- ☐ I have tried smoking cigarettes, but have not smoked in the past 30 days
- ☐ 1 or 2 days
- ☐ 3 to 5 days
- ☐ 6 to 9 days
- ☐ 10 to 19 days
- ☐ 20 to 29 days
- ☐ All 30 days

86. I have parents or guardians who…

(Fill in one answer for each statement)	Never	Almost Never	Some-times	Almost Always	Always
a. …want me to exercise or be physically active.	☐	☐	☐	☐	☐
b. …exercise with me.	☐	☐	☐	☐	☐
c. …spend time teaching me to play a sport or do a physical activity.	☐	☐	☐	☐	☐
d. …eat lots of fruits and vegetables with me.	☐	☐	☐	☐	☐
e. …drink water instead of a soft drink (soda) with me.	☐	☐	☐	☐	☐
f. …want me to eat breakfast every morning.	☐	☐	☐	☐	☐

87. I have friends who…

(Fill in one answer for each statement)	Never	Almost Never	Some-times	Almost Always	Always
a. …want me to exercise or be physically active.	☐	☐	☐	☐	☐
b. …exercise with me.	☐	☐	☐	☐	☐
c. …spend time teaching me to play a sport or do a physical activity.	☐	☐	☐	☐	☐
d. …eat lots of fruits and vegetables with me.	☐	☐	☐	☐	☐
e. …drink water instead of a soft drink (soda) with me.	☐	☐	☐	☐	☐
f. …want me to eat breakfast every morning.	☐	☐	☐	☐	☐

88. I tell my family and friends to eat fruits and vegetables.

- ☐ Yes, all of the time
- ☐ Yes, most of the time
- ☐ Yes, some of the time
- ☐ Never

Please continue on next page

89. Do you have any of the following conditions?

(Fill in one answer for each)	Yes	No	I Don't Know
a. Asthma	⬭	⬭	⬭
b. Physical limitation or disability that makes it harder for you to do things other people your age do	⬭	⬭	⬭
c. Dietary limitations/restrictions (e.g., diabetes, food allergies)	⬭	⬭	⬭

90. During the past 6 months, did you have a toothache (pain in your tooth) more than once, when biting or chewing?

⬭ Yes ⬭ No ⬭ Don't know, or don't remember

91. Indicate the highest level of education completed for your parents/guardians.

(Fill in only one answer for each adult)

a. Mother or other adult female in the home

⬭ Less than high school ⬭ College degree
⬭ High school or GED ⬭ Graduate or professional degree (Master's, PhD, MD, etc.)
⬭ Some college ⬭ No mother or adult female in the home

b. Father or other adult male in the home

⬭ Less than high school ⬭ College degree
⬭ High school or GED ⬭ Graduate or professional degree (Master's, PhD, MD, etc.)
⬭ Some college ⬭ No father or adult male in the home

STOP HERE

Thank you for taking the time to complete this survey!

Height

⬭ Refd Meas ⬭ Refd Shoe ⬭ Cast ⬭ Time ⬭ Hair Access ⬭ Heavy Obj ⬭ Other

Weight

⬭ Refd Meas ⬭ Refd Shoe ⬭ Cast ⬭ Time ⬭ Hair Access ⬭ Heavy Obj ⬭ Other

⬭ Comments: _____

PLEASE DO NOT WRITE IN THIS AREA

Student's Height . cm Student's Weight . kg

⬭ Q. C. ⬭ Remeasure . cm . kg

00001

J & D Data Services 09/09,ev5

Kick-off event protocol

1) For the kick-off event, 40 adolescents as well as two parents per adolescent will be invited to attend.

2) Participants will park in the Teal Lot (in front of the Methodist Training Center) and be directed to the entrance of the training facility

3) Upon entering staff will be sitting at registration tables to check-in each participant and distribute a wrist-band (one pattern coded to identify participants, one coded to identify parents). Wrist bands will be in different colors according to player assignments of the participants. This will allow them to be easily grouped.

4) Behind the check-in tables, there will be tables set up where parents can pick up a handout with all of the child's log-in information.

5) Thirty to 45 minutes will be spent in the Methodist Training Center. Here there will be different activity stations set up and the kids and players will go through each activity station with players. After activity stations have been run through, there will be a short (15-20 minute) educational session going over nutrition and exercise basics (such as portion size, how to use pedometers, 60 minutes a day). After the educational portion, players and participants (along with family members) will walk over to Reliant Stadium.

6) They will proceed to the team meeting room (downstairs) where they will get a short Twitter and video message demonstration.

7) Following this demonstration the children will go to the team cafeteria (directly across from the team meeting room) where they will have lunch with the players. They will be grouped by wrist band and will get a chance to sit down and eat with their players.

8) Following lunch (approximately 30-45 minutes), the children will get a chance to take pictures with the players and get autographs. They will then be given a short tour of the field, locker room and the weight room. After this, they will be escorted back to the Teal Lot where they have parked.

H-19461: THE TWEAT HEALTHY PROGRAM: PREVENTING ADOLESCENT OBESITY USING PROFESSIONAL ATHLETES AS ROLE MODELS

This questionnaire was created to understand why people are motivated to eat healthy and also why they think it is hard to eat healthy. For each question, please circle a number from 1 (strongly disagree) to 4 (strongly agree) to let us know how much you agree or disagree with the statement.

Breakfast

1. I feel good about myself when I eat a healthy breakfast

   1 (Strongly disagree) 2 3 4 (Strongly agree) † I do not understand this question

2. I understand why it is important to eat a healthy breakfast

   1 (Strongly disagree) 2 3 4 (Strongly agree) † I do not understand this question

3. Healthy breakfast foods are foods that I am used to eating

   1 (Strongly disagree) 2 3 4 (Strongly agree) † I do not understand this question

4. It is a habit for me to have a healthy breakfast everyday

   1 (Strongly disagree) 2 3 4 (Strongly agree) † I do not understand this question

5. I have not found any healthy breakfast foods that I like

   1 (Strongly disagree) 2 3 4 (Strongly agree) † I do not understand this question

6. People from my culture or family do not usually eat healthy breakfasts

   1 (Strongly disagree) 2 3 4 (Strongly agree) † I do not understand this question

7. My culture's or family's traditional breakfast foods are not very healthy

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

8. To me, a "healthy breakfast" means only eating a little bit or eating something that won't stop my hunger

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

9. I like eating a large lunch instead

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

10. I do not think about eating in the morning

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

11. I am not hungry enough o eat until later in the day

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

<u>Healthy Foods</u>

1. I understand why healthy foods are good for my body

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

2. Someone has taught me why fruits and vegetables are healthy

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

3. There are many fruits that I like

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

4. Eating healthy is a habit for me

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

5. I eat healthy foods everyday so that I can be healthy

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

6. I am used to eating healthy foods and snacks every day

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

7. Eating healthy foods is part of my regular routine

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

8. No one ever taught me how to eat healthy

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

9. In my culture or family, it is not common to eat many fruits

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

10. I do not like the smell of vegetables

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

11. I like to eat unhealthy foods when I feel stressed

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

Healthy Drinks

1. It is easier to get a drink of water instead of wasting time getting a soda

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

2. I understand why regular soda and other sugary drinks can be bad for me

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

3. Water is the easiest drink to get, wherever I go

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

4. When I exercise or play sports, I drink only healthy drinks

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

5. I feel better when I drink healthy drinks instead of unhealthy drinks

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

6. Drinking water or healthy drinks is a habit for me

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

7. I like the taste of regular soda but not diet soda

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

8. Seeing commercials for sodas makes me want to drink them

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

9. I have cravings for soda

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

10. I just do not like the taste of water

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

11. Drinking water is not very satisfying

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

12. The healthy drinks that I like are hard to find

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

Physical Activity

1. I think being active is something fun and enjoyable to do

1	2	3	4	☐ I do not understand this question
(Strongly disagree)			(Strongly agree)	

2. There are many fun things I like to do that involve being active

1	2	3	4	☐ I do not understand this question
(Strongly disagree)			(Strongly agree)	

3. I can get exercise from a variety of activities

1	2	3	4	☐ I do not understand this question
(Strongly disagree)			(Strongly agree)	

4. Exercising is part of my routine

1	2	3	4	☐ I do not understand this question
(Strongly disagree)			(Strongly agree)	

5. I can make the time to exercise

1	2	3	4	☐ I do not understand this question
(Strongly disagree)			(Strongly agree)	

6. I feel better when I exercise

1	2	3	4	☐ I do not understand this question
(Strongly disagree)			(Strongly agree)	

7. I want to lose weight, and I think being active will help

1	2	3	4	☐ I do not understand this question
(Strongly disagree)			(Strongly agree)	

8. I want to watch my weight, and I think being active will help

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

9. I would rather watch TV or play video games than do something active

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

10. I would rather watch TV than be active because it is easier

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

11. I feel lazy and watching TV is the only thing I want to do

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

12. Watching TV or playing video games is more fun than doing something active

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

13. Watching TV is part of my regular routine and being active is not

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

14. I have a hard time making myself turn off the TV to do something active

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

15. TV, movies, or video games let me take my mind off of other things better than exercising does

1 2 3 4 † I do not understand this question
(Strongly disagree) (Strongly agree)

16. I am always making excuses for myself to not exercise

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

17. Laziness is the only reason I am not more active

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

18. I have a health condition that stops me from being more active

1 2 3 4 ☐ I do not understand this question
(Strongly disagree) (Strongly agree)

Could you resist eating if/when…?

The questions below describe some typical eating situations. Everyone has situations, which make it very hard for them to keep their weight down. The following are a number of situations relating to eating patterns and attitudes. The situations below will help you to identify the eating situations, which you find the hardest to manage.

Read each situation listed below and decide how confident (or certain) you are that you will be able to resist eating in each of the difficult situations. In other words, pretend that you are in the eating situation right now. On a scale from 0 (not confident) to 9 (very confident), choose ONE number that reflects how confident you feel now about being able to successfully resist the desire to eat. Write this number down next to each item.

_____

Not confident at all that you can resist the desire to eat — Very confident that you can resist the desire to eat

0 1 2 3 4 5 6 7 8 9

EXAMPLES

I AM CONFIDENT THAT:	CONFIDENCE NUMBER
1. I can control my eating on weekends.	_____8_____
2. I can say "no" to snacks.	_____6_____

_____

I AM CONFIDENT THAT:	CONFIDENCE NUMBER
1. I can resist eating when I am anxious (nervous).	_____
2. I can control my eating on the weekends.	_____
3. I can resist eating even when I have to say "no" to others.	_____
4. I can resist eating when I feel physically run down.	_____
5. I can resist eating when I am watching TV.	_____
6. I can resist eating when I am depressed (or down).	_____
7. I can resist eating when there are many different kinds of food available.	_____
8. I can resist eating even when I feel it is impolite to refuse a second helping.	_____
9. I can resist eating even when I have a headache.	_____
10. I can resist eating when I am reading.	_____
11. I can resist eating when I am angry (or irritable).	_____
12. I can resist eating even when I am at a party.	_____
13. I can resist eating even when others are pressuring me to eat.	_____
14. I can resist eating when I am in pain.	_____
15. I can resist eating just before going to bed.	_____
16. I can resist eating when I have experienced failure.	_____
17. I can resist eating even when high calorie foods are available.	_____
18. I can resist eating even when I think others will be upset if I don't eat.	_____
19. I can resist eating when I feel uncomfortable.	_____
20. I can resist eating when I am happy.	_____

Please put a check mark next to the statement that best describes how you feel about physical activity.

_____ I currently do not engage in physical activity and I am not thinking about starting

_____ I currently do not engage in physical activity but I am thinking about starting

_____ I currently do engage in some physical activity but not on a regular basis

_____ I currently do engage in regular physical activity but I have only begun to do so within the last 6 months

_____ I currently do engage in regular physical activity and I have done so for longer than 6 months

Please put a check mark next to the statement that best describes how you feel about eating healthy.

_____ I currently do not eat healthy and I am not thinking about starting

_____ I currently do not eat healthy but I am thinking about starting

_____ I sometimes eat healthy, but not on a regular basis

_____ I currently eat healthy but I have only begun to do so within the last 6 months

_____ I currently eat healthy and I have done so for longer than 6 months

Pedometer Log

	Steps Taken Using a Pedometer	Type of Physical Activity	Activity Time in Minutes
Sunday			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			

Twitter Instructions

TO ACTIVATE

1. Using a computer or mobile phone (with internet capability), go to http://twitter.com
2. Log into twitter using the following:

   Username: _____

   Password: _____

   PLEASE do not change your username, password or privacy settings for the duration of this study as it could interfere with your ability to interact with the players. Additionally please do not use this account for any personal reasons.
3. Your account will already be set up to follow your assigned player

TO USE

- To download a Twitter app on a mobile device, go to m.twitter.com to download a mobile application. If you are using Twitter from a computer, go to http://twitter.com
- To receive Tweets from your player, simply log into your account. Your home screen should display a live feed of players Tweets
- All player Tweets will be identified with the hashtag "#TwEAT" players name"
    - Anything with a "#" sign in front of it will create a trending topic. This will allow users to follow anything that is said by this person or what others have said related to their Tweet
    - Any time you reply to a player, please follow your Tweet with #TwEAT" players name". That way, other kids on your team can see the discussions you are having

- To say something new to a player, include their Twitter name

  _____ somewhere in the message. This message will then be directly sent to the player.
- To reply to what a player has said, simply put your mouse over the message sent by the player and hit the reply button and type in your message. Remember, messages can only be 140 characters.
- To view pictures or video links, click on the highlighted link and it will direct you to the correct page
- If you have any questions or concerns please contact the researchers at tweathealthy@gmail.com.

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Vita

Katie McInnis grew up in Houston, Texas. Following high school she attended Emory University where she majored in psychology and was a two sport athlete in women's basketball and track and field. After graduation, she got a job in marketing for an NFL team. Here she found her true passion was working with athletes, not in the business world. She went back to school at The University of Texas at Austin to complete her nutrition undergraduate and graduate work as well as her dietetic internship. While in graduate school, she was hired full time by The University of Texas at Austin's Athletics Department as an Assistant Sports Dietitian, which she will continue upon graduation.

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